



COMPENDIUM OF ABSTRACTS National Oral Health Research Priorities 2020 - 2022



**COMPENDIUM
OF ABSTRACTS
NATIONAL ORAL
HEALTH RESEARCH
PRIORITIES
2020 - 2022**

Research Projects and Publications
of Oral Health Personnel
in Malaysia

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Compendium of Abstracts: National Oral Health Research Priorities 2020–2022

This compendium, curated under the National Oral Health Research Initiative (NOHRI) Executive Committee, serves as a key platform for sharing research findings in alignment with national oral health research priorities. It features a collection of abstracts derived from research presentations and publications, with the aim of fostering knowledge exchange within the dental community and promoting evidence-based practices.

As a summary, seven main oral health research priorities have been identified under this initiative:

1. Oral health conditions (inclusive of several subdomains)
2. Public oral health intervention and empowerment
3. Access to oral healthcare
4. Traditional and Complementary Medicine (TCM) in oral healthcare
5. Oral Tissue Engineering (OTE) and Regenerative Dentistry
6. ICT support systems for oral healthcare (Information and Communication Technology)
7. Digital Technologies in Dentistry

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Foreword

I am delighted to contribute to the inaugural Compendium of Abstracts National Oral Health Research Priorities, showcasing the depth of oral health research in Malaysia from 2020 to 2022. This compendium, with 380 abstracts, highlights the dedication, innovation, and collaborative efforts of our researchers.

Guided by the Oral Health Research Priorities, these studies focus on critical domains such as service delivery, workforce development, innovation, health promotion, and oral disease prevention. This aligns with our commitment to promoting evidence-based policies to improve oral health outcomes for Malaysians. The compendium also resonates with the Global Strategy and Action Plan on Oral Health 2023–2030, fostering transparency reporting through the engagement of diverse dental stakeholders.

The abstracts underscore Malaysia's active role in oral health research, reflecting both challenges and opportunities. They emphasize the importance of interdisciplinary approaches and partnerships, highlighting innovations in health promotion, digital health, and oral disease mitigation.

This compendium is more than a collection of research; it is a testament to progress, a platform for knowledge exchange, and a foundation for future initiatives. I am confident it will inspire further research and collaboration among academics, clinicians, policymakers, and stakeholders, driving sustainable and equitable oral healthcare in Malaysia and beyond.

I extend my gratitude to the National Oral Health Research Initiatives (NOHRI) Executive Committee, researchers, and contributors whose efforts have made this publication possible. May this compendium serve as a vital resource for advancing oral health through evidence-based decision-making and innovation.



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EDITORS' NOTE

This Compendium of Abstracts National Oral Health Research Priorities 2020 - 2022 marks the first compilation of research abstracts published or presented by oral health professionals in Malaysia from 2020 to 2022. The abstracts collected here represent the work of oral health professionals who have shared their findings at local and international scientific meetings, through university dissertations, published scientific papers and various research projects conducted in Malaysia.

The National Oral Health Research Initiative (NOHRI) Executive Committee has agreed that abstracts for this compilation should be submitted by the Principal Investigators. Each abstract will be credited with the corresponding publication or presentation details. The Principal Investigator is responsible for selecting the most appropriate domain for each abstract, although the editors may make adjustments to the domain if needed.

The research abstracts are organised according to the domains established by the National Oral Health Research Priorities in Malaysia. Only research projects that were published or presented between 2020 and 2022 and submitted by the Principal Investigator are included in this publication.

The Editor

Compendium of Abstracts National Oral Health Research Priorities 2020-2022

Oral Health Programme

Ministry of Health Malaysia

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- Appreciation is extended to all individuals and organisations whose technical contributions and commitment have supported the completion of this document.

DOMAIN 1

Oral Health Condition



1. UNILATERAL ZYGOMATIC COMPLEX FRACTURE - A COMPARISON BETWEEN NONSURGICAL TREATMENT AND SURGICAL TREATMENT

NMRR-14-276-19157(IIR)

Ling XF, Yew CC, Mohd Nazri S, Tew MM

Introduction: Medical advances have enabled zygomatic complex (ZMC) fractures to be treated by various approaches. This study aims to analyze the demographics and treatment outcomes of unilateral ZMC fractures, treated nonsurgically or surgically. **Methods:** This 5-year nonrandomized prospective study had included 65 patients of unilateral ZMC fractures from October 2014 until December 2019. The patients were given the information and full authority to choose the treatment modulation according to their preference. The patients were divided into nonsurgical and surgically treated group and treated accordingly. The nonsurgical group was treated conservatively, given pain killers and antibiotics for two weeks, advice for soft diet and jaw exercise was taught at week post trauma, following local hospital protocol. The surgical group was operated by the first author. Treatment outcomes in terms of step deformities, malar depression, diplopia, infraorbital hypoesthesia, and mouth opening were evaluated up to six months post-trauma/operative. **Results:** Road traffic accident (96.9%) was the main cause, with predominant male involvement (80%) and median age of 28 years. Significant improvements ($P < 0.05$) were observed for step deformities and malar depression among the surgically treated group at postoperative day 1 and week 1. Throughout the six months review, infraorbital hypoesthesia and diplopia showed no significant differences between both groups, ($P > 0.05$). Besides, all patients showed significant mouth opening improvement ($P < 0.05$) over six months period. **Conclusion:** We found that infraorbital hypoesthesia and limited of mouth opening should not be the absolute indications for surgical treatment of ZMC fractures. Nonsurgical treatment that included early jaw exercise and symptomatic treatment had potential value for satisfactory functional gain.

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2. BEHAVIORAL OUTCOME OF ORAL MIDAZOLAM PREMEDICATION IN PEDIATRIC DENTAL GENERAL ANESTHESIA: A SYSTEMATIC REVIEW

USM/JEPeM/20050249

Abdul Rauf BH, Farah Najihah M, Iza Nabihah A, Nik Rozainah NAG, Norsamsu AS

This systematic review discusses the post behavior outcomes of oral midazolam premedication in pediatric dental general anesthesia (DGA). Premedication drug aids the psychological impact during the induction of general anesthesia, thus influence the postoperative behavior particularly in pediatric patients. **Methods:** This review was registered under the International Prospective Register of Systematic Reviews (PROSPERO) database. Articles published in the five search engines between January 1980 and December 2020 were analyzed according to Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) guidelines. Bias risks and evidence levels were determined on the selected articles. **Results:** Out of 6944 screened articles, only seven were eligible for final synthesis, which involved a total of 392 children in intervention arms and 89 children in the placebo arms. Oral midazolam had shown positive and negative behavior outcomes post DGA using various assessment tools, when compared to other premedications. Less side effect was reported in midazolam group. **Conclusion:** Oral midazolam premedication demonstrated limited evidence for satisfactory behavior outcomes in children undergoing DGA. Among the tested midazolam dosage, 0.5 mg/kg body weight dose provides the most positive outcome postoperatively. Nonetheless there is still limited evidence for satisfactory behavior outcomes based on the collective review.

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3. AGE AND FACTORS OF SMOKING INITIATION AMONG MILITARY COMMUNITY IN KELANTAN

Ruslan R, Mohd. Adnan M, Abd. Rahman N, Zainal Abidin Z

Introduction: Cigarette smoking is one of the risk factors for chronic diseases which may affect the health readiness of army personnel. **Objective:** To determine age and factors of smoking initiation among army personnel in Kelantan. **Methodology:** A cross-sectional study was carried out on Dec 2020 among 134 voluntarily involved infantry army personnel who smoked in Kelantan. A validated Bahasa Malaysia questionnaire was used to assess army personnel's history of smoking used. Descriptive statistics were calculated using SPSS version 26. **Results:** All (100%) respondents were male, and the majority (83.6%) were Malays with the mean age of 26.6 (SD 7.10) years. Most of them received the highest level of education at secondary school (89.6%), while others (10.4%) went to the higher institution. Most of them were having marital status of single (59.7%) and lived in the camp (69.4%). The mean age to start smoking among respondents was 15.8 (SD 3.20). Factors associated with the initiation of smoking includes curiosity (59.2%), influence by friends (53.8%), stress (17.7%) and influence by family members (3.1%). Twelve respondents (9.0%) had a history of using drug and four (3.0%) with a history of addiction to alcohol. **Conclusions:** Army personnel-initiated smoking before enlisted in the force. Curious about smoking, influence by friends and family members and stress were found to be the factors of smoking initiation among army personnel in Kelantan.

Keywords: Cigarette smoking, military, age, initiating factors

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4. THE EFFECTS OF SITE-DIRECTED MUTAGENESIS ON SELECTED HPV GENES: IN SILICO STUDY

Sailan AT, Daud@Ibrahim NF, Aris N

Objectives: The objective of this research is to study the effects of mutagenesis on E2 protein, E6 and E7 oncoproteins of high and low risk human papillomavirus (HPV) types towards their protein structures and biological functions. **Materials and Methods:** This retrospective bioinformatics studies focus on the protein sequences and structure templates of both high and low risk HPV genes and were retrieved from NCBI database, BLAST and Protein Data Bank. The constructed protein structure models (SWISSMODEL) were visualised by RasMol and DEEP VIEWER application to calculate the Root Mean Square Deviation (RMSD) value for protein structural difference. The mutation effects on protein and oncoproteins were comprehensively reviewed with recent scientific literature. **Results:** E2, E6 and E7 play roles in regulating viral gene replication, cell survival and modulate cell differentiation. The mutated low risk HPV11 E2 (R37K and I73L) impaired transcriptional activity of the protein with no changes in RMSD value while HPV16 reduced gene expression rate (R37A and I73A) which were 0.00 to 0.01Å, respectively. The range RMSD value of HPV16 E6 compared protein structures was in between 0.00 to 0.04Å on different sites of mutation but they exhibited a strong dominant negative effect on p53 degradation activity. Zinc-binding domain of E7 oncoprotein is important for its nuclear localization. Mutated amino acid residues (C58A and C91A) in zinc binding domain clearly disrupted its function in high and low risk (HPV11 and HPV16) with the RMSD value 0.04 to 0.55Å in range. **Conclusion:** The mutation effects on selected HPV genes were relatively independent of protein structural changes.

Keywords: Human papillomavirus (HPV), in silico, mutations, site-directed mutagenesis

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5. CLUSTERING OF HEALTH AND ORAL HEALTH-COMPROMISING BEHAVIOURS AMONG ARMY PERSONNEL IN CENTRAL PENINSULAR MALAYSIA

DF CO2016/0097 (P)

BPK-KOORD.500/5/42-09

Ahmad Asyraf A, Marhazlinda J, Yusof ZYM

Introduction: Health and oral health-compromising behaviours (HOHCB) may impact health readiness, and therefore combat readiness, resulting in decreased fitness performance and affecting military personnel's well-being, physical and mental health. **Objectives:** The study aimed to 1) determine the prevalence of HOHCB and 2) to identify the clustering pattern of HOHCBs among army personnel in Central Peninsular Malaysia. **Materials and Methods:** A cross-sectional study using a multistage sampling technique and a validated 42-item online questionnaire was conducted to assess ten health (medical screening, physical activity, sedentary lifestyle, smoking status, alcohol consumption, substance abuse, aggressive behaviours, sleep, and road safety habits) and five oral health behaviour domains (toothbrushing, fluoridated toothpaste use, flossing, dental visit, bruxism). The data on each HOHCB was dichotomised into binary codes, with 0 = healthy and 1 = health-compromising behaviour. Descriptive statistics and Hierarchical Agglomerative Cluster Analysis (HACA) statistical analysis were used for data analysis. **Results:** Overall, 2435 army personnel responded (response rate = 100.0%). The mean age was 30.3 years (SD=5.9). Majority were males (92.5%), other ranks (96.8%), and healthy with no history of medical conditions (83.9%). The most prevalent HOHCBs were under and over-consumption of four dietary intakes; cereal and cereal products (82.0%), milk and dairy products (77.6%), fish, poultry, meat, egg and legume (75.8%), and low vegetable intake (74.1%), and exposure to the smoke of tobacco products (78.5%). The HACA identified two broad clusters, i.e., 'high-risk behaviours,' which consisted of 30 HOHCBs, and 'most common-risk behaviours' consisted of 12 HOHCBs. **Conclusion:** The most prevalent HOHCB among army personnel in the Central Peninsular Malaysia involved four dietary sub-domains and exposure to the smoke of tobacco products. HACA identified two broad HOHCB clustering patterns among them, namely 'high-risk' and 'most common-risk' behaviours.

Keywords: clustering behaviour, health-compromising behaviours, oral health-compromising behaviours, adults, military, army

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6. PERCEPTION OF ORAL HEALTH AND ITS IMPACT ON SPORTS PERFORMANCE AMONG MALAYSIAN PARA-ATHLETES

NMRR ID-22-00760-D53

Ko LWL, Francis J, Ahmad Fisal A

Introduction: Oral health is an integral part of general health and is paramount for optimal athletic performance and maintaining good quality of life. **Aim:** To study the perception of oral health status and its impact on sports performance and psychosocial aspects among Malaysian para-athletes using a questionnaire adapted from the Oral Health Screening Toolkit for Athletes developed by University College London, UK. **Methods:** This is an institutional cross-sectional, descriptive study utilising purposive sampling of elite para-athletes registered under the National Sport Council (NSC), Malaysia. Demographic data and self-reported questionnaire were recorded and collected. Descriptive analyses were performed. **Results:** A total of 58 para-athletes from eleven sports participated in the study. The median age of the participants was 27 years (range 17-49), 82.8% were males and 70.7% had physical disabilities. Two out of ten para-athletes (20.7%) assessed their general health as not good. Similarly, 18 (31%) of para-athletes in the study reported their oral health ranging as fair to poor. More than half of them reported an impact on their quality of life (53.4%) and on sports performance (51%). There was a positive correlation between self-perceived oral health status with psychosocial impacts ($r = .52$, $n = 58$, $p < .001$); and sports performance impacts ($r = .45$, $n = 58$, $p < .001$). **Conclusion:** This is the first study of self-reported oral health in the para-athlete population of Malaysia. Even though most of the para-athletes felt that their oral health status is good, their perceived oral health-related impacts on well-being and sports performance were very substantial. Thus, oral health should be prioritised when carrying out general health interventions in order to optimise athletic performance and quality of life among Malaysian para-athletes.

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Oral Presentation at the 15th Dental Postgraduate Conference, Faculty of Dentistry, Universiti Malaya on 21 September 2022

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7. ORAL HEALTH STATUS AND TREATMENT NEEDS OF MALAYSIAN ELITE PARA-ATHLETES

NMRR ID-22-00553-2LW

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Introduction: An athlete needs to be in their best health condition to perform at the highest level, including oral health. The oral health status of elite athletes has been reported worldwide, but there is limited research on the oral health status of athletes with disabilities (para-athletes). **Aim:** To evaluate the oral health status and treatment needs among elite para-athletes in Malaysia. **Materials and Methods:** This pilot cross-sectional study applied purposive sampling which involved 58 Malaysian elite para-athletes from eleven types of para-sports trainings at the National Sports Institute of Malaysia and Malaysia Paralympic Sports Excellence Centre. Demographic data, self-reported questionnaires, and clinical oral examinations were collected from February until June 2022. The evaluation of oral health status was conducted to determine the presence of caries using International Caries and Detection System (ICDAS), periodontal condition, oral infection, erosive tooth wear using Basic Erosive Wear Examination (BEWE), and the presence of tooth trauma. **Results:** The majority of the participants were male (82.8 %) and had physical disabilities (70.7%). The median age was 27 years (range 17 to 49). Active caries (ICDAS code ≥ 3) was found in 56.9% of para-athletes while 94.8% of para-athletes had periodontal diseases (BPE code ≥ 1). Pulpitis, ulcer, fistula, or abscess was present in 29.3% of para-athletes, 3.4% had pericoronitis and 1.7% had tooth trauma from sports injury. Twenty-six per cent of para-athletes had erosive tooth wear, but no treatment was indicated. The majority of para-athletes required periodontal treatment (94.8%), restorative treatment (56.9%), and tooth extraction (29.3%). **Conclusion:** Malaysian elite para-athletes in this study had a high prevalence of oral diseases and unmet treatment needs. Therefore, oral health education activities, regular dental check-ups and dental services should be made available for these para-athletes to improve their oral health status.

Poster presentation at the 15th Postgraduate Conference, Faculty of Dentistry, Universiti Malaya on 21 September 2022. Corresponding e-mail: asmaksubahir@gmail.com

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8. DETECTION OF SARS-COV-2 VIRAL LOAD IN SALIVA COLLECTED FROM ASYMPTOMATIC PATIENTS: A SCOPING REVIEW

Nam NA, Azhar Hilmy SH, A. Rahman Z

Introduction: From December 2019, rapid transmission of severe acute respiratory syndrome coronavirus (SARS-Cov-2 virus) that causes COVID-19 infection has resulted in worldwide pandemic. Clear understanding of viral transmission is critical in controlling the spread of disease effectively. While efforts have been focussed on tracing symptomatic patients, asymptomatic patients who are not presented with common sign and symptoms might also contributed to the spread of the disease. Current evidence suggests the diagnostic potentials of saliva in detecting SARS-Cov-2 viral load among patients. However, not much is known regarding the reliability of saliva sampling for the detection of SARS-CoV-2 among asymptomatic individuals. **Objectives:** This review presents the findings of SARS-Cov-2 virus in saliva samples collected from asymptomatic COVID-19 patients and their possible contribution in the spread of COVID-19. **Methods:** A systematic search was performed in five public databases (Pubmed, Scopus, Web of Science, Science Direct, Google Scholar). This literature search was carried out without any restrictions on date of publication to determine the detection of SARS-Cov-2 virus in saliva from asymptomatic patients. **Results:** As of October 12, 2020, a total of 9 studies have investigated the presence of SARS-CoV-2 virus component in saliva collected from asymptomatic patients. A few of these studies also simultaneously compare detection of virus in cohort of symptomatic patients, showing reliable detection of SARS-CoV-2 in the saliva of patients with COVID-19. Saliva offers non-invasive, easier sampling methods compared to existing current standard of nasopharyngeal and throat swabs. **Conclusions:** Findings of this review suggest potential application of saliva sampling for detection of viral load in samples collected from COVID-19 patients, including those that under asymptomatic status.

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9. DENTAL ANXIETY AMONG WISMA LINCOLN UNIVERSITY COLLEGE COMMUNITY

LUCEthics/FDent/009/2018

Misliah Ahmad, Tan WW

Introduction: Dental anxiety is common among people of all ages, which results in delay and avoidance of dental visit and eventually deterioration of oral health. **Objectives:** The aim of this study is to assess the dental anxiety level among the community in Wisma Lincoln University College. **Materials and Methods:** A cross-sectional study was carried out from April to December 2018. A total of 186 participants were included in this study. The Modified Dental Anxiety Scale (MDAS) was used to assess participants' dental anxiety level. **Results:** The prevalence of participants with severe anxiety level was 16.7% (n=31), with Indian female being the highest number (n=6, 20%). Participants felt most anxious if they were to receive a local anesthetic injection, with a mean score of 2.04 for male and 3.76 for female. With regards to the aspects of dental treatment that make participants anxious, 74.7% (n=139) of the participants would feel anxious about extraction, followed by pain arising from treatment (63.4%, n=118) and fear of injury caused by dental instrument (60.8%, n=113). **Conclusions:** In conclusion, 16.7% of the community in Wisma Lincoln University College were highly anxious, with Indian female being most anxious (20%).

Keywords: dental anxiety, dental visit, Modified Dental Anxiety Scale

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10. INHIBITORY EFFECT OF ORAL THIN FILMS (OTFS) CONTAINING XYLITOL AGAINST STREPTOCOCCUS MUTANS

Teng EYE, Xixian H, Ismail MF

Dental Caries is a chronic disease affecting half of the global population, causing pain and discomfort due to progressive damage to the teeth. Whilst xylitol has been studied for its effect on dental caries prevention, current practices present few limitations for its successful oral delivery, including short residence time in the mouth and poor patient compliance. Recently, oral thin films (OTFs) emerged as an alternative to delivering xylitol in the oral cavity. This research aims to develop novel OTFs containing xylitol with extended-release properties (as determined by the disintegration time) and to investigate its effect on a cariogenic bacterial strain, *Streptococcus mutans*. The minimum inhibitory concentration (MIC) of xylitol was determined. Employing the microdilution broth method, the antibacterial activity of the oral thin films containing xylitol for oral *S. mutans* was performed with simulated salivary fluid, incubated at 1, 4, and 10 h. The MIC of xylitol was found at 10%. Meanwhile, there was no significant difference in the inhibition of *S. mutans* ($p > 0.05$) between the control, OTFs (10 h), and xylitol-OTF (1 h), with the latter, demonstrated only 16.58% inhibition. Interestingly, when compared to xylitol-OTF (1 h), xylitol-OTF showed significant inhibition ($p < 0.05$) to *S. mutans* after four h (+53.24 %) and almost a complete inhibition after ten h (-92.58 %). These results suggest that the OTFs demonstrated a gradual release of xylitol and inhibited oral biofilm formation by decreasing the growth of *S. mutans* in a time-dependent manner. Most importantly, the study indicated the successful development of a novel xylitol-OTF with potential as an oral health biotherapeutic agent.

Keywords: Xylitol, oral thin film, *Streptococcus mutans*, dental caries

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11. COMPARISON BETWEEN PREOPERATIVE AND POST-OPERATIVE ADMINISTRATION OF PARACETAMOL, IBUPROFEN AND MEFENAMIC ACID FOR POST-EXTRACTION PAIN CONTROL

Kumar GP, Shu-Lyn C, Win GE, Sie LW, Lakman NFK, Haque N

Pain is a common aftereffect following a dental treatment, especially extractions. Hence, the main aim of the study was to compare the effect of pre-operative and post-operative analgesic usage on post-operative pain management following dental treatment. Moreover, the efficacies of three types of painkillers (Paracetamol, Ibuprofen and Mefenamic Acid) in pain relief were also evaluated. Volunteers (n = 120) who were undergoing extraction participated in this study and were randomly divided into two groups. One group consisting of 60 participants were given pre- and post-operative analgesics while another group (n = 60) received post-operative analgesics only. A visual scale was used to record pain from zero to 56 hours post-operatively at 8-hour intervals. The results showed that patients who were taking analgesics pre-operatively experienced significantly ($p = 0.0045$) less pain compared to those who had taken post-operative analgesics only. However, a lower cumulative number of moderate and severe experiences of post-extraction pain was recorded for the pre- and post-operative analgesic treatment groups as compared to the postoperative only analgesic treatment group; no significant differences were observed. Moreover, no significant differences were observed among the analgesics used in this study as well. On the basis of these results, we conclude that preoperative analgesic usage has a positive impact on postextraction acute pain management.

Keywords: Pre-operative pain, Post-operative pain, dental extraction, paracetamol, ibuprofen, mefenamic acid

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12. EVALUATING THE PERFORMANCE OF DENTAL STUDENTS WITH DIFFERENT LEVELS OF CLINICAL EXPERIENCE IN LEARNING ICDAS

Pishipati KV, Telang L, Nerali JT, Telang A, Jaganathan S

Aim: This study aimed to evaluate the dental students' performance in ICDAS (International Caries Detection and Assessment System) coding with different levels of clinical experience. **Materials and methods:** Dental students (n = 122) in their clinical years, year 3 (n = 37), year 4 (n = 44), and year 5 (n = 41) received training (two-hour introductory lecture on ICDAS, followed by a 90 min e-learning video, and practice sessions using extracted teeth and photographs) from a calibrated expert. After training, the students examined a prevalidated set of extracted teeth and assigned scores in two sessions. The intra- and inter-examiner agreement between students was analyzed using weighted kappa statistics and a focus group discussion was conducted for qualitative feedback. **Results:** The range of kappa values for intra-examiner agreement among the year 3, 4, and 5 students for ICDAS caries code (0.611-0.879, 0.633-0.848, and 0.645-1.000) and restoration code (0.615-0.942, 0.612-0.923, 0.653-1.000), respectively. The range of kappa values for inter-examiner agreement for year 3, 4, and 5 students with a trained expert for ICDAS caries code (0.526-0.713, 0.467-0.810, and 0.525-0.842) and restoration code (0.531-0.816, 0.682-0.842, and 0.645-0.928), respectively. **Conclusion:** The ICDAS system is a promising tool for caries detection and its implementation in the curriculum was perceived by dental students as an effective method. In general, there was moderate to substantial agreement for ICDAS caries and restoration code between students of different academic year groups and with a trained ICDAS expert. **Clinical significance:** ICDAS is a simple, logical, and evidence-based system for the detection and classification of caries. Introducing ICDAS to dental students enables them to detect caries in a reliable and reproducible manner irrespective of their past clinical experience and also significantly improves their caries detection skills.

Keywords: Caries detection, Dental students, ICDAS Training

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13. EVALUATION OF OROFACIAL PAIN AND PSYCHOLOGICAL COMORBIDITIES IN HEALTH SCIENCES UNIVERSITY STUDENTS

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Introduction: Orofacial pain (OP) is a common public health problem among the general population however, its distribution among the young population like students has not been evaluated so far. The objectives of this study were to investigate the self-reported prevalence, and characteristics of OP, and to evaluate its association with psychological comorbidities such as anxiety and depression. **Materials and Methods:** A questionnaire-based study was conducted on students studying health sciences programs at SEGi University, Malaysia. A well-designed, structured questionnaire was utilized to assess the prevalence and characteristics of OP. Hospital Anxiety and Depression (HAD) scale was used to evaluate the psychological status of the students. The collected data was subject to statistical analysis by using the SPSS version 22 software. **Results:** Overall 494 university students had participated in the study of which, 78% (n = 375) of students had suffered from OP and it was significantly higher among the female students ($p < 0.03$). Headache was the most common type of OP (66.2%) followed by pain in temple region (47.2%), in and around eyes (29.1%), facial region (23.3%), and tooth/gingival pain (20.9%). The association between the prevalence of OP and anxiety was statistically significant ($p < 0.019$). About 35.4% of the health sciences students had first OP episode started three months ago, 4.2% had daily pain, 14.3% suffered from continuous pain, and only 14% of the students had consulted professionals and 36.1% of them took medication. **Conclusion:** A significantly higher prevalence of self-reported OP was evident among the health sciences university students and students with different types of OP had higher anxiety and depression scores. Early recognition of OP symptoms and associated comorbidities must be considered for the prevention and successful management of these conditions to circumvent its negative academic impact on the students.

Keywords: Dental, headache, medical, orofacial pain, tooth pain

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14. CARIES DIAGNOSIS IN MIXED DENTITION AMONG 6 TO 12 YEARS OLD CHILDREN OF KEDAH USING ICDAS-II METHOD

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Introduction: School children have been the focus of preventive programmes aimed at preventing carious lesion development and retarding its progression in the earlier stages. The purpose of the research was to assess the caries status of mixed dentition in children aged between 6-12 years in Kedah using the ICDAS-II method. Also, this study focused to determine the gender & race distribution of paediatric patients. **Materials and Methods:** A cross sectional study was conducted on 110 patients involving child patients among 6 to 12 years old who visited AIMST university pediatric dental clinic, Kedah. Caries status and its correlation with gender and race distribution of mixed dentition in children were assessed using the ICDAS-II method. **Results:** Pie Chart analysis depicted the age, gender and racial distribution for children visiting the AIMST dental clinic, Kedah. Caries coding using ICDAS II coding for deciduous and permanent teeth of children between 6-12 years children were analyzed using suitable statistical analysis. Based on the ICDAS II scoring criteria and results obtained in Kedah, Malaysia, school dental service served as a main thrust in gaining the oral health awareness among the primary school students by practicing tooth brushing drills and regular dental check-up in schools. Emphasis on the fluoride tooth paste and oral hygiene was re-emphasized. **Conclusion:** In this study, ICDAS-II identified high prevalence of dental caries in the age group of 6 to 12 years old in Kedah that indicated the necessity of implementation of more oral health awareness campaigns and caries prevention programmes.

Keywords: Caries diagnosis, ICDAS II, Public health

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15. RELIABILITY OF CARIES ASSESSMENT SPECTRUM AND TREATMENT (CAST) TOOL IN THE INDIAN SUB-CONTINENT

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Background: Accurate diagnosis, reporting of caries and its consequences, is absolute mandate for planning an efficient, effective community health-care program. Literature reports indicate shortcomings of existing caries assessment tools. Caries assessment spectrum and treatment (CAST) is novice caries quantification tool, which quantifies the entire spectrum of carious lesions. This tool records give an insight into the status of restorations along with various progressive developmental stages of dental caries. This instrument has been validated for face, content, and construct by an expert group, and currently, its usage is on the rise. **Aim:** The aim of this study was to report the reliability of this assessment tool with regard to the primary and permanent dentition of school children and adults belonging to a south Indian district. **Materials and methods:** A cross-sectional study was carried out by two trained and calibrated examiners by examining 192 school children in the age-group between 4 and 6 years and 262 adults between 19 and 69 years. The study sample was reexamined by the same examiners after a gap of 4 weeks. The κ coefficient values and percent of agreement were calculated for the data recorded from the study subjects. **Results:** The analyzed data showed moderate intra-examiner and inter-examiner reproducibility for either of the dentition as revealed by κ coefficient values (0.80-0.89). Inter- or intra-examiner agreement was found to be substantial to almost perfect (percent agreement above 90%) with respect to both the age-groups. **Conclusion:** The CAST tool seems quite promising to be the future for quantifying caries spectrum for a community or an individual.

Keywords: Caries assessment spectrum and treatment, caries epidemiology, dental caries, reliability studies

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16. EVALUATION OF ORAL HYGIENE STATUS AMONG 12–14 YEAR OLD SCHOOL CHILDREN

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Background: Oral diseases such as dental caries, gingivitis, and periodontitis are common among population. The present study was conducted to assess dental caries status and oral hygiene practice among school children. **Materials and methods:** This school-based study was conducted on 520 children of age group of 12-14 years of both genders. Location, education, and employment status of parents, use of toothbrush, frequency of brushing, dental floss, total number of meals in a day, number of snacks between meals and sugar consumption, and decayed, missing, filled teeth were recorded. **Results:** There were 266 males and 254 females. Age group 12 years had 80 males and 90 females, 13 years had 70 males and 60 females, and 14 years had 116 males and 104 females. Ninety-six males and 110 females were from urban and 170 males and 144 females were from rural. The mean plaque score in 12-year male children was 0.61 ± 0.32 , in 13-year children was 0.68 ± 0.45 , and in 14 years was 0.74 ± 0.48 . In males, the mean plaque score was 0.70 ± 0.38 and in females was 0.66 ± 0.42 . In children from urban area, the mean plaque score was 0.62 ± 0.34 and from rural area was 0.74 ± 0.40 . Four hundred and eighteen children were using toothpaste and they had plaque score of 0.76 and 102 children were using floss and they had plaque score of 0.89. Three hundred and twenty children were brushing once, 90 twice, and 110 irregular and their mean plaque score was 0.70, 0.61, and 0.76, respectively. The difference was significant ($P < 0.05$). **Conclusion:** Authors found that oral health status of children consuming high sugar, more snacks per day, and brushing occasionally was poor.

Keywords: Brushing, dental caries, oral hygiene status

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17. EVALUATION OF MICROBIAL CONTAMINATION OF TOOTHBRUSHES AND THEIR DECONTAMINATION USING VARIOUS DISINFECTANTS: AN *IN VITRO* STUDY

Joy T, Venugopal S, Sadanandan S, Mathew M

This study aimed to evaluate the microbial contamination of toothbrushes and their decontamination using various disinfectants. **Subjects and Methods:** An *in vitro* study was carried out on 80 subjects with a gingival index (Loe and Silness, 1963) score of two or three received toothbrush and paste with complete oral hygiene instructions. After 1 month, toothbrushes were collected and checked for microbial contamination by aerobic culture. Toothbrushes were divided into four groups (n = 20) and treated with one of the following agents: Group A – 0.2% chlorhexidine gluconate, Group B – Listerine, Group C – Dettol, and Group D – tap water for 1 h. After an hour, the brushes were further cultured to evaluate the efficacy of each agent. Statistical procedures were performed using Statistical Package for the Social Sciences (SPSS) 16 software. Inferential statistics were performed using Chi-square analysis. $P < 0.05$ was set as statistically significant. **Results:** All the sampled toothbrushes had significant ($P < 0.001$) bacterial growth after 1 month of use. Most of the brushes were contaminated with *Escherichia coli* (17.1%). All the tested disinfectants significantly ($P < 0.001$) reduced bacterial growth and Dettol showed maximum effectiveness (95.3%). **Conclusions:** Toothbrushes significantly get contaminated after use, which is reduced after disinfecting the brushes. Although not 100% effective, all the disinfectants significantly reduced the bacteria, and Dettol was found to be comparatively better than other agents.

Keywords: Contamination, disinfectant, microorganisms, oral hygiene, toothbrush

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18. ASSOCIATION BETWEEN TOOTH LOSS AND HYPERTENSION: A CROSS-SECTIONAL STUDY

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Context: Cardiovascular diseases (CVD) are one of the leading causes of premature deaths among noncommunicable disease. Hypertension increases the risk of cardiovascular events. In addition to well-known risk factors for hypertension like obesity, lack of physical activity, studies have shown independent association between tooth loss and increased blood pressure and stroke. However, the relevant literature is not conclusive. **AIMS:** Aim of our study was to investigate the association between tooth loss and increased blood pressure among adult patients. **Methods And Material:** A cross-sectional study among 270 adults aged 20-59 years was conducted. The dependent variables were systolic blood pressure (SBP) and diastolic blood pressure (DBP). The main exploratory variable was the number of self-reported natural teeth for each dental arch. They were recorded as 10 or more natural teeth, less than 10 natural teeth, and no natural teeth. Data were analyzed using descriptive statistics, independent t-test, ANOVA, and multiple linear regression analysis. **Results:** Mean SBP was 125.3 mmHg and DBP was 78.9 mmHg. Moreover, 29.3% of participants had hypertension, 8.9% were edentulous, 22.8% had lost more than 10 teeth, and 68.3% had lost less than 10 teeth. Increased SBP was seen with increased tooth loss among participants. After adjusting for all covariates, no significant association between tooth loss and SBP and DBP was seen. **Conclusions:** The mean SBP was higher among the participants who were edentulous than partially edentulous. However, there was no significant association between tooth loss and SBP and DBP after adjusting for confounding factors.

Keywords: Association, blood pressure, cross-sectional, tooth loss

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19. ASSOCIATION BETWEEN DERMATOGLYPHICS AND EARLY CHILDHOOD CARIES AMONG PRESCHOOL CHILDREN: A PILOT STUDY

Uma E, Binti Mazalan NH, Binti Ramlan NA, Binti Adnan NA, Kyaw Soe HH

Context: Primary teeth and dermal ridges form around the same time in utero. Hereditary and intrauterine factors affecting the formation of primary teeth may affect dermal ridge formation also. **AIMS:** This pilot study was conducted to see the association between dermatoglyphics and dental caries among preschool children. **Settings And Design:** Cross sectional, case-control design. **Materials And Methods:** One hundred, healthy preschool children aged 3-6 years attending private kindergarten participated. They were divided equally into caries active and caries free group based on the oral examination. The fingerprint patterns were collected for all the fingers of both hands of children and categorized as loop, whorl or arch for each finger of the right and left hand. **Statistical Analysis Used:** Statistical analysis was performed using the Chi-square test and Independent t-test to compare the dermatoglyphics patterns between the caries-free group and the caries active group for each variable. **Results:** (1) Dental caries susceptibility of an individual decreases with an increase in the incidence of loop pattern, followed by whorl pattern and arch pattern; (2) Left hand loop was found statistically significant ($P = 0.03$); (3) Presence of loop pattern in left hand thumb predicts significantly lower risk of caries, whereas the presence of arch pattern in left hand thumb predicts significantly high risk of early childhood caries ($P = 0.01$). **Conclusions:** The caries free status of a preschool child increased with the presence of loop on the left thumb.

Keywords: Dermatoglyphics, early childhood caries, preschool children'

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20. TRENDS OF DENTAL CARIES STATUS OF 12-YEAR-OLD SCHOOL CHILDREN IN SARIKEI DIVISION, SARAWAK 2015-2019

NMRR ID-21-02438-USE

Bibiana Yong HY, Hwang YL, Hassmah M, Emmanuel Joseph FT, Wong ST

Introduction: Dental caries is a preventable, multifactorial, biofilm-mediated, diet-modulated and dynamic disease. This non-communicable disease results in a net-mineral loss of dental hard tissue which affects most of the population across their lifespan. According to the Global Burden of Disease Study 2019, untreated dental caries in permanent teeth is the most prevalent health condition. The 12-year-old is the most common indicator age group used by the World Health Organization (WHO) to assess oral health status. The National Oral Health Survey of Schoolchildren 2017 (NOHSS 2017) reported caries prevalence and caries experience (mean DMFT) of 12-year-olds in Sarawak state were 49.7% and 1.35 respectively. However, oral health status of each administrative division and district in Sarawak was not reported. This data is important for evidence-informed planning of school oral health services for the biggest state in Malaysia, Sarawak. The land size of Sarawak is comparable with the Peninsular Malaysia. Based on the NOHSS 2017 findings, it can be inferred that the oral health status of school children in Sarikei Division was poor compared to districts in more developed states. The objectives of this study were to determine the trend of caries prevalence, caries severity and treatment needs of 12-year-old school children in Sarikei Division, Sarawak from 2015 to 2019. **Methods:** This was a cross-sectional study involving 12-year-old school children enrolled in 110 primary schools under the purview of Ministry of Education Malaysia (MOE) from 2015 to 2019 who were covered under the MOH comprehensive incremental oral health care. Data was extracted from the Health Information Management System (HIMS) - Oral Health Sub-System. The diagnosis and reporting of dental caries status were in accordance with the WHO criteria using the decayed-missingfilled teeth (DMFT) index. **Results:** This study involved 9736 12-year-old school children. There was a slight downward trend of dental caries prevalence of 12-year-old school children over a five-year period, from 38.3% (2015) to 35.8% (2019), despite a sharp increase in 2016 (51.3%). However, dental caries experience demonstrated an increasing trend from 0.89 in 2015 to 0.98 in 2018 before a marked decline to 0.86 in 2019. Dental caries treatment needs based on mean decayed teeth (mean D) showed static trend from 0.20 (2015) to 0.19 (2019). **Discussion / Conclusion:** Despite nearly all school children in Sarikei Division were rendered comprehensive incremental oral healthcare annually since enrolment to primary education at 6-year old, almost half of them did not remain caries free. The analysis of dental caries prevalence and dental caries severity is crucial in re-strategizing the preventive and curative approach of comprehensive incremental oral health care among school children in Sarikei division. The oral health status among 12-year-old is important as a baseline for future projection of prevalence of dental caries among the adult population. In conclusion, future 'upstream' action and multisectoral collaboration are needed to reduce the dental caries burden and improving the oral health status to a higher level to get the best buys for oral health.

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21. TRENDS OF DENTAL CARIES STATUS OF 12-YEAR-OLD SCHOOL CHILDREN IN SIBU DIVISION, SARAWAK 2015-2019

NMRR ID-21-02438-USE

Wong ST, Asmawati S, Susan M, Teh JH, Norkhafizah S

Introduction: Dental caries is one of the most prevalent oral diseases affecting most individuals worldwide during their life course despite being largely preventable. It shares many common risk factors, social and commercial determinants with non-communicable diseases. The National Health and Morbidity Survey 2017: National Oral Health Survey of School Children 2017 (NHMS 2017: NOHSS 2017) demonstrated that dental caries status of school children in Sarawak was generally poor compared to other states. There was no data at division and district levels, which is important for evidence-based planning of school oral health service in big states such as Sarawak with diverse ethnicities, cultural backgrounds, and lifestyles. Thus, the objectives of this study were to determine dental caries status and treatment needs of 12-year-old school children under the Ministry of Health Malaysia (MOH) comprehensive incremental oral health care program in Sibu Division, Sarawak from 2015 to 2019. **Methods:** This was a cross-sectional study involved five different cohorts of 12-year-old school children enrolled in the Ministry of Education (MOE) primary schools in Sibu Division from 2015 to 2019. Data was extracted from the MOH Health Information Management System (HIMS) - Oral Health Sub-System. The diagnosis and reporting of dental caries status followed the World Health Organization (WHO) criteria using the Decayed, Missing, and Filled Teeth (DMFT) index. **Results:** There was an upward trend of caries free (with zero decay or treated decay) status among five different cohorts of 12-year-old school children over five-year period, from 64.2% (2015) to 71.0% (2019). Furthermore, dental caries experience (mean DMFT) showed a reducing trend from 0.79 in 2015 to 0.58 in 2019. Dental caries treatment needs based on the mean decayed teeth (mean D) exhibited decreasing trend from 0.22 (2015) to 0.14 (2019). **Discussion:** Despite provision of dental treatment annually since Primary 1 in Sibu Division, there was still more than a quarter of them did not remain caries free by 2019. More pragmatic multi-sectoral approaches should be taken to address social and commercial determinants of dental caries to elevate oral health status of school children in Sibu Division to be on par with the Peninsular counterparts. It is hoped that this can chart the way forwards for sustainable oral health and lifetime smile, while ensuring strengthening of universal oral health coverage. Efforts should be taken to champion that all sectors are related to oral health for the best buy interventions. In conclusion, dental caries status of 12-year-olds in Sibu Division showed gradual improvement from 2015 to 2019. However, more need to be done to ensure sustainable orally-fit status following treatment completion.

Keyword: Caries free, dental caries, DMFT, Sarawak, Sibu

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22. DATABASES SELECTION IN A SYSTEMATIC REVIEW OF THE ASSOCIATION BETWEEN ANTHROPOMETRIC MEASUREMENTS AND DENTAL CARIES AMONG CHILDREN IN ASIA

NMRR-18-3551-45099

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Introduction: A comprehensive search for primary studies using a sufficient number and relevant databases is critical to minimise bias and increase the validity of a systematic review. **Objective:** We examined the frequency and choices of databases commonly used to provide an efficient search of primary studies for a systematic review of anthropometric measurements and dental caries among children in Asia. **Method:** Twelve previous systematic reviews on a similar topic were retrieved from six databases. The frequency and choice of databases used by reviewers were determined from the methods sections. We also identified the lists of other databases usually searched in other reviews. Eligibility criteria for final databases selection were the database's scope, the topic of interest, design of the study, type of article, and the accessibility of the databases. **Results:** Of the 77 databases identified, previous reviews on this topic used 21 databases, ranging from 2 to 12 databases in each review. Medline, Cochrane Library, Web of Science, and PubMed were employed most frequently. Twenty-six databases were eligible and selected for the present review. Twelve were regional databases to provide comprehensive coverage of primary studies. **Conclusion:** A systematic approach in selecting appropriate databases for searching primary studies is paramount to reduce errors, ensure coverage, and increase the validity of systematic reviews' conclusions.

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23. PREVALENCE OF PERIODONTITIS IN ERECTILE DYSFUNCTION PATIENTS

NMRR-19-3936-52463

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Introduction: Erectile dysfunction (ED) and periodontitis have common risk factors, such as diabetes mellitus and tobacco smoking. Multiple reports are available in regard to the association between erectile dysfunction and chronic periodontitis. **Objectives:** The study aimed to determine the association of erectile dysfunction and chronic periodontitis in selected Malaysian population. **Materials and Methods:** Seventy-four patients (mean age= 52.4 ± 10.9 years) diagnosed with erectile dysfunction, from scores via the International Index of Sexual Function-5 (IIEF-5) questionnaire, were included in the study. Erectile dysfunction severity was classified as mild, mild to moderate, moderate, and severe. Periodontal condition was recorded using basic periodontal examination (BPE) method, of which scores of 0, 1, 2, 3 were associated with having no periodontitis while a score of 4 was considered to have periodontitis. **Results:** There are 40 (54.1%) subjects found to have periodontitis and the association of erectile dysfunction and periodontitis showed a moderate positive degree of correlation, $p=0.487$ ($p<0.001$). The percentage of subjects having periodontitis indicated an increasing trend with the severity of ED; from 19.0% (mild ED), 54.2% (mild to moderate ED), 75.0% (moderate ED), to 84.6% (severe ED). Greater degree of correlation was noted in between dental scaling experience and erectile dysfunction, $p=0.635$ ($p<0.001$). Binomial logistic regression had shown no other co-morbidities and factors were affecting this relation. **Conclusions:** There seemed to be an association between erectile dysfunction and periodontitis existing in these selected Malaysian population.

Keywords: Basic periodontal examination (BPE), chronic periodontitis, dental scaling, erectile dysfunction, International Index of Erectile Function (IIEF-5)

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24. PERCEPTION OF PERIODONTAL HEALTH AMONG PATIENTS WITH BPE SCORE 4 IN TAWAU, SABAH AND THE ASSOCIATED FACTORS: A CROSS-SECTIONAL STUDY

NMRR-21-02157-JGS

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Individuals' perception of periodontal health is influenced by signs and symptoms of periodontal diseases, socio-demographic and oral health practices. This study determines the association between self-perceived periodontal health, sociodemographic characteristics, and oral health practices. This cross-sectional study uses a validated questionnaire comprising three sections; sociodemographic characteristics, oral health practices, and self-perceived periodontal health. The calculated sample size was 149 adult subjects with a Basic Periodontal Examination (BPE) score of 4. The study was conducted in Tawau District, Sabah. Multiple logistic/linear regression was used to determine the association between the variables. The significant level was set at $P < 0.05$. The total number of respondents was 149 and the mean (SD) age was 47.7 (14.92) years. Bugis (30.9%) respondents outnumbered the other ethnicity. Most of the respondents (89.3%) visited the dentist when in pain/toothache. Having been told by a dentist to have periodontal diseases ($\beta = 1.167$, Exp (B) = 3.214, $P = 0.026$) was found to be significantly associated with the perception of having periodontal diseases. The oral health practice of using mouthwash regularly ($\beta = 1.027$, Exp (B) = 2.791, $P = 0.020$), perceived to have bleeding gum ($\beta = 2.293$, Exp (B) = 9.906, $P < 0.001$) and perceived to have wobbly teeth ($\beta = 0.990$, Exp (B) = 2.690, $P = 0.037$) were significantly associated with the perception of having gingival swelling. The use of dental floss regularly was significantly associated with the perception of needing specialist care for periodontal diseases ($\beta = 1.662$, Exp (B) = 5.268, $P = 0.017$). Dental visits and oral health practices were significantly associated with self-perceived periodontal health.

Keywords: Perception of periodontal health, Basic Periodontal Examination (BPE) score of 4, oral health practices

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25. THE ASSOCIATION BETWEEN SMOKING AND PERIODONTAL HEALTH STATUS AMONG ARMY PERSONNEL IN NORTH-EAST MALAYSIA

Ruzawani R, Munirah MA, Normastura AR

Introduction: Smoking is a common risk factor for periodontal disease and other chronic diseases. **Objective:** This study was conducted to determine the prevalence of smoking among army personnel and its association with periodontal health status. **Methods:** A cross-sectional study was carried out among randomly selected 233 army personnel in 8th Brigade Infantry, Kelantan. A face validated self-administered Bahasa Malaysia questionnaire was used for data collection. Periodontal examination was done using Community Periodontal Index (CPI) and coded as '0' for healthy; '1' for bleeding observation; '2' for detection of calculus; '3' for probing of 4-5mm pocketing and '4' for probing of 6mm or more pocketing. **Results:** All respondents (n=233) were male, the majority (92.7%) Malays, not married (60.5%) with the mean (SD) age of 25.8 (5.06) years. The prevalence of smoking among army personnel was 76.0% (95% CI: 70.4, 81.5). Almost all (97.4%) have some degree of periodontal disease. The non-smoker, ex-smoker and smoker groups were highest for having calculus with a percentage of 40.5%, 57.1%, and 57.1%, respectively. **Result:** No significant association was found between smoking status (ever-smoker and non-smoker) and periodontal pocketing (CPI 0-2 and CPI 3-4) (p=0.960). However, the ever-smokers (93.2%) significantly higher percentage for the need of invasive treatment (CPI >2) compared to the non-smokers (76.2%) (p=0.002). **Conclusion:** The prevalence of smoking among army personnel in North-East Malaysia was high, with most of them have some degree of periodontal disease. Smoking cessation intervention should be strategized in the military community to reduce the burden of care for chronic diseases.

Keywords: Periodontal disease, Cigarette smoking, Military personnel, Periodontal index

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26. ASSOCIATION BETWEEN PERIODONTITIS CLASSIFICATION, GLYCAEMIC STATUS AND BODY MASS INDEX AMONG PERIODONTITIS PATIENTS

UKM PPI/111/8/JEP-2018-479

Kong CY, Teo HS, Balramal A, Al-Khatiry E., Jamil NA, Mohd-Said S

Introduction: There is growing interest in the association between obesity, diabetes mellitus and periodontitis, with more focus on integrating disease management for the improved overall wellness of the patients. **Aim:** Our study aimed to determine the association between periodontitis, glycaemic status and obesity among newly diagnosed periodontitis patients undergoing treatment in two public dental schools. **Methods:** Eighty-eight patients (mean age 42.5 years old) were classified using the 2017 Classification of Periodontitis clinical parameters and assessed for (1) glycaemic status using the glycated haemoglobin HbA1c measurement (No diabetes <5.6%, Prediabetes 5.6-6.2%, Diabetes ≥6.3 %), and anthropometry assessment for (2) general obesity using Body Mass Index (BMI) (Underweight <18.5 kg/m², Normal weight 18.5-22.9 kg/m², Overweight (23-27.49 kg/m², Obese ≥27.5 kg/m²), and (3) abdominal obesity via Waist Circumference, WC (cm.). **Results:** Our study found that most patients have 'currently unstable periodontitis' (96.6%) with an equally high percentage in prediabetes and diabetes groups (33% and 31% respectively). Most periodontitis patients were pre-obese and obese (38.6% and 31.8% respectively), 26% had normal weight, and very few were underweight (3.4%). Most overweight and obese patients also had prediabetes (27%) and diabetes (29.5%). **Conclusion:** Our study highlights the importance of glycaemic screening and obesity assessment for periodontitis patients among dental practitioners to improve their periodontal health and general well-being.

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27. PERIODONTITIS PATIENTS' KNOWLEDGE ON DIABETES AND RELATIONSHIP BETWEEN THEIR PERIODONTAL HEALTH AND GLYCEMIC STATUS

UKM PPI/11/8/JEP-2018-479

Balaramal A , Kong CY, Teo HS, Al-Khatiry E, Jamil NA, Mohd-Said S, Mohd Dom TN

Abstract. Objective: This study aimed to determine the periodontitis patients' knowledge on diabetes mellitus and the association between their periodontal health with glycemic status. **Methods:** 88 periodontitis patients were recruited in two university dental clinics in Kuala Lumpur. After the full study information was given and informed consent was obtained, a short questionnaire on the patients' socio-demographic data and knowledge on diabetes mellitus was given to patients to complete. A full periodontal charting was carried out to diagnose the periodontal status while glycemic levels of patients were determined using glycated hemoglobin (HbA1c) test on patients' venous blood. **Results:** Most of the patients were found to have currently unstable periodontitis (96.6%), severe periodontitis (67%) and CPITN-4 (79.5%), with equally high percentage falling in prediabetic and diabetic patient groups in all the three categories. Glycemic status was found to be significantly associated with the percentage of knowledge on diabetes ($p=0.026$) in which more diabetic and prediabetic patients had poor and moderate knowledge only (56.8%). Both patients who had lower-income and who received primary education and below were found to have poor knowledge of diabetes ($p=0.020$ and $p=0.033$ respectively). **Conclusion:** In this study cohort, more than two thirds of the periodontitis patients have moderate to poor knowledge on diabetes and have diabetes or pre-diabetes. Our study suggests screening for diabetes is vital in dental clinic to ensure holistic management of periodontal health.

E-poster presentation at IADR MalSec 2020 on 10 October 2020. Corresponding e-mail: shahidams@ukm.edu.my

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28. SALIVARY IGA DEPRESSION IN DRUG-INFLUENCED GINGIVAL ENLARGEMENT AMONG HYPERTENSIVE PATIENTS

USM/JEPeM/18090407

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Introduction: Drug-influenced gingival enlargement (DIGE) among hypertensive patients is commonly associated with antihypertensive drugs such as calcium channel blockers (CCBs). Immune response alteration is one of the proposed mechanisms for DIGE. Immunoglobulin A (IgA) in saliva which involves in defense mechanism was shown to be affected in patients with DIGE. **Objective:** This study aimed to determine the association of salivary IgA level with DIGE. **Materials and Methods:** This cross-sectional study comprised 47 hypertensive patients who had consumed antihypertensive drugs for at least 3 months. Twenty-one (44.7%) males and 26 (55.3%) females had participated in this study. Data was analyzed using SPSS version 26.0. The p-value of less than 0.05 at a 95% confidence interval is considered statistically significant. **Results:** Eighty-three percent and 17.0% of hypertensive patients were on CCBs and non- CCBs respectively. Amlodipine was found to be the most common (55.3%) antihypertensive drug consumed. Twenty- one (44.7%) patients presented with DIGE. The salivary IgA level was significantly decreased ($p=0.03$) among hypertensive patients with DIGE [Median 4.9 ng/mL (IQR 5.268)] compared to those without DIGE [median 15.03 ng/mL (IQR 32.246)]. **Conclusion:** This data indicates the level of salivary IgA was significantly affected in patients with DIGE which may compromise the defense mechanism of saliva.

Keywords: drug-influenced, gingival enlargement, calcium channel blocker, salivary IgA, anti-hypertensive drugs

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29. ASSESSMENT OF GINGIVAL STATUS AND GINGIVAL OVERGROWTH AMONG IMMUNOSUPPRESSED PATIENTS IN UNIVERSITI SAINS MALAYSIA HOSPITAL

USM/JEPeM/19010027

Wan Mohamad W, Mat Zaid S, Taib H, Husin A

Introduction: Drug-induced gingival overgrowth (DIGO) is defined as an abnormal growth of the gingiva due to adverse effect of some drugs such as immunosuppressant, calcium channel blocker, and anticonvulsant. Immunosuppressive drugs play an important role in controlling organ transplant rejection and were widely used to treat different diseases. **Objective:** Immunosuppressive drugs are used for prevention of transplant rejection and management of autoimmune disease. Drug-induced gingival overgrowth (GO) is abnormal growth of gingiva due to adverse effect of these drugs. This study aimed to assess the gingival status, the prevalence of gingival overgrowth and its associated factors among immunosuppressed patients. **Methods:** A total of 33 patients had participated in this cross-sectional study. Patients' data such as age, race, gender, type of medication, and dosage were retrieved from patients' medical record. Clinical oral examination was performed to assess the periodontal parameters: oral hygiene index, bleeding index and clinical gingival overgrowth index. Data were analysed using SPSS version 24.0. **Results:** The prevalence of gingival overgrowth among immunosuppressed patients is 57.6% at 95% confidence interval (40%,75%). Clinical index of gingival overgrowth shows 45.5% in grade 1 and 15.2% in grade 2. Oral hygiene status is significantly associated with gingival overgrowth based on plaque score ($p=0.01$) and bleeding index score ($p=0.05$). **Conclusion:** The presence of gingival overgrowth among immunosuppressed patients is quite evidenced which could be contributed by poor oral hygiene.

Keywords: gingival status, gingival overgrowth, immunosuppressed patients

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30. ORTHODONTIC TREATMENT NEEDS OF THE REFERRED PATIENTS IN THE EAST COAST OF SABAH

NMRR-18-3693-41641

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Aim: To assess the orthodontic treatment need of patients referred for orthodontic consultations. **Materials and Methods:** This was a cross-sectional retrospective study of 138 dental records (written case notes, radiographs, and study models) of patients who attended the orthodontic consultation clinic in 2018 in the East Coast of Sabah. All patients were examined by orthodontists. Data taken were demographic data (age, gender, and ethnic group), and source of referral. The dental records were assessed for orthodontic treatment need based on Index of Orthodontic Treatment Need - Dental Health Component (IOTN_DHC). All data were analysed descriptively. **Results:** Mean age of the patients was 16.89 0.37 years, with females being predominant (n = 101, 73.19%). Most patients were Chinese (n = 68, 49.28%) and Bumiputera Sabah (n = 55, 39.86%). The main source of referral was dentists (n = 128, 92.75%). Most patients had IOTN Grade 4 or Grade 5 (n = 114, 82.61%). The most common type of malocclusion was crowding (n = 57, 41.30%), followed by increased overjet (n = 33, 23.91%) and impacted teeth (n = 16, 11.59%). **Conclusion:** More than three-quarters of the referred patients had definite orthodontic treatment need. Crowding was the most common type of malocclusion.

Keywords: Orthodontic, treatment need, malocclusion, Index of Orthodontic Treatment Need (IOTN)

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31. PREVALENCE AND ORTHODONTIC MANAGEMENT OF MISSING PERMANENT MAXILLARY LATERAL INCISOR AT A REFERRAL CENTRE IN SABAH

NMRR-20-1736-56007

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BACKGROUND: The permanent maxillary lateral incisor is the most common developmental missing tooth and has major impact on dental and facial aesthetics, which affect the self-esteem and social well-being of the patient. Updates on prevalence and management are important to clinicians in early diagnosis and timely referral for interceptive treatment. **OBJECTIVES:** This study assessed the prevalence and orthodontic management of developmental missing permanent maxillary lateral incisor at a government orthodontic clinic in Sabah. **METHODS:** This was a cross-sectional study of the dental records of patients referred for orthodontic treatment from year 2010 to 2020. The dental records consisted of written case notes, relevant radiographs, and study models that fulfilled the inclusion criteria, were assessed retrospectively. Data taken were the demographic data, side of the missing maxillary lateral incisor, and the orthodontic management. All variables were analysed descriptively. The differences between orthodontic open space and orthodontic close space with respect of unilateral and bilateral missing permanent maxillary lateral incisor were tested using Fisher's exact test. **RESULTS:** From the total of 291 samples, there were 11 (3.78%) patients presented with missing permanent maxillary lateral incisor. The mean age of the patients was 17.46 ± 1.52 years. All 11 patients were females. There were six (54.55%) patients presented with bilateral missing permanent maxillary lateral incisor, while five (45.45%) were unilateral. From the unilateral group, there were three (27.27%) patients presented with right side missing permanent maxillary lateral incisor. Six (54.55%) patients were treated with orthodontic open space, while five (45.45%) patients were treated with orthodontic close space. **CONCLUSION:** The prevalence of missing permanent maxillary lateral incisor was low. Thus, the current treatments can be adequately delivered. All of the patients were females. More patients presented with bilateral missing permanent maxillary lateral incisor. The treatments were orthodontic open space and orthodontic close space.

Keywords: Prevalence, orthodontic, missing, lateral incisor

Poster presentation at the 9th Sabah Research Day (Sabah Medical Research and Scientific Conference 2022) on 28 September 2022.
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32. EVALUATION OF STATIC AND DYNAMIC OCCLUSION AT THE END OF ORTHODONTIC TREATMENT

Tan L

Objectives: This study evaluated the static and dynamic occlusion at the end of orthodontic treatment. It also assessed if there was an association between static occlusion and dynamic occlusion. **Materials and methods:** A cross-sectional clinical study was conducted on 53 subjects. The procedure was a non-invasive clinical examination. The occlusion was assessed with a mouth mirror and by direct observation. The subject was asked to bite in centric occlusion. The static occlusion was recorded. The subject was asked to perform lateral and anterior excursions. The dynamic occlusion was recorded. The static and dynamic occlusions were recorded with the aid of articulating paper. **Results:** The sample had 35 subjects with 'good' static occlusion and 18 subjects with 'not-good' static occlusion. The sample had 32 subjects with 'normal' dynamic occlusion and 21 subjects with 'not-normal' dynamic occlusion. **Conclusion:** There was a statistically significant association ($p < 0.05$) between static occlusion and dynamic occlusion.

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33. ORAL HEALTH-RELATED QUALITY OF LIFE IN ORTHODONTICS: A CROSS SECTIONAL STUDY ON ADOLESCENTS AND ADULTS IN ORTHODONTIC TREATMENT IN KUANTAN, PAHANG

IREC 2021-012

Cheong JM, Muhammad IK, Muhammad HI, Mohamad Shafiq MI

Introduction: Orthodontic treatment is always complementary to oral health-related quality of life (OHRQoL). The main reasons patients seek orthodontic treatment are due to aesthetics, oral-facial functionality, and psychological well-being. As known, orthodontic treatment is relevant in patients with malocclusion problems or facial disharmony. The Oral Health Impact Profile (OHIP) is an instrument frequently used to evaluate the patient's subjective perception of oral well-being.

Objective: This study aimed to assess the OHIP subscale's impact on OHRQoL and to compare the OHRQoL between adolescents and adults. **Materials and Methods:** A total of 160 subjects (60 adolescents and 100 adults) undergoing orthodontic treatment completed the Malaysian Oral Health Impact Profile (S-OHIP(M)) to assess OHRQoL. The instrument consisted of 14 items grouped into 7 subscales which were (i) functional limitation, (ii) physical pain, (iii) psychological discomfort, (iv) physical disability, (v) psychological disability, (vi) social disability, and (vii) handicap. Mann-Whitney U and Kruskal Wallis test was applied to compare the OHRQoL between both age groups and demographic characteristics. **Results:** There is a statistically significant difference in median score for quality of life between adolescents 12(9) and adults 16(8). Physical pain had the highest impact on OHRQoL in both groups whereas social disability had the least impact for both groups. **Conclusions:** Our study showed that the adult groups reported a higher score of impact on OHRQoL compared to adolescent groups. In addition, adolescents and adults reported physical pain has the highest impact on OHRQoL during orthodontic treatment and social disability was the least affected factor in OHRQoL.

Keywords: Health-related quality of life, orthodontics, adolescent, adult

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34. COMPARISON OF FIXED AND REMOVABLE RETAINERS ON ORAL HEALTH : AN ORIGINAL RESEARCH

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Aim: The purpose of this study is to compare the oral and periodontal health of the teeth retained with the use of removable and fixed retainers. **Methodology:** Thirty cases receiving comprehensive orthodontic treatment in between 10 to 20 years were randomly selected and divided into 2 groups of 15 each. One group was given removable retainers and other was given fixed retainers. The periodontal status of the patients was accessed with bleeding on probing index, Plaque index and Calculus index. **Results:** The mean plaque index in case of removable retainers at 1st, 3rd and 6th month were 0.5, 1.0 and 1.7 whereas in case of fixed retainers that were 1.8, 3.0 and 4.5. The mean dental calculus index in case of removable retainers at 1st, 3rd and 6th month were 0.0, 0.1 and 0.1 whereas in case of fixed retainers that were 0.1, 0.9 and 1.8. **Conclusion:** Removable retainers are superior in oral hygiene maintenance, yet the use of fixed retainers cannot be denied.

Keywords: Retainers, fixed, removable, oral health, periodontal status

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35. PATIENT PROFILING IN CHILDREN DENTAL CENTRE & TRAINING INSTITUTE MINISTRY OF HEALTH MALAYSIA (DENTAL), GEORGETOWN, PENANG

NMRR-19-3254-51405

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Introduction: In dental prevention and management, determining the oral health of children is a high priority since it will have a significant impact on their future quality of life. Besides, there are other characteristics that could be interrelated to a child's oral health. Meanwhile, oral hygiene is one of the principal determinants in determining a child's dental or oral health condition. Profiling the child's oral health data is required to fully comprehend the scope of the public health issue and to assess the efficacy of existing and future interventions. **Objectives:** The objectives of this study were to profile the patients who attended Children Dental Centre & Training Institute Ministry of Health Malaysia (Dental), Georgetown, Penang and to predict the model of oral hygiene by studying the relationship of oral hygiene status with all the variables evaluated. **Materials and Methods:** We obtained the data regarding sociodemographic, oral hygiene status, caries status, gingival status, caries risk level, type of treatments, frequency of dental attendance and referral to the specialist from 742 dental records of 7-17 years old schoolchildren who presented at this institution between January 2019 and December 2019. **Results:** The study discovered that the profile of patients attended this institution consist of 555(74.8%) of primary schoolchildren and 187(25.2%) of secondary schoolchildren. Of the total, 429(57.8%) were females and 313(42.4%) were males with the majority were from Malay ethnic (74.4%). (92.6%) had poor oral hygiene with the highest percentage (70.6%) were from primary schoolchildren. Overall, caries was found to be prevalent in 69.9% of schoolchildren, with the percentage being higher among primary schools (54.6%). 27.1% of schoolchildren were affected with gingivitis, while 39.2% were found to be at low risk of caries. Periodontal (95.7%), preventive (57.7%), and restorative treatments (64.2%) were the most common types of treatments. The majority of schoolchildren visited this institution once a year, either through school or as walk-in, whilst the most common referrals were to the orthodontist and paediatric dentist. By ordinal logistic regression model, primary schoolchildren and gingivitis were found to be significantly associated with oral hygiene. **Conclusion:** It could be concluded that from the patient profiles obtained in this study, the primary schoolchildren's oral health is alarming when compared to the secondary schoolchildren. Hence, this institution's dental personnel should place a greater emphasis on the oral health of primary schoolchildren, particularly their oral hygiene state.

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36. IS THE WAIST CIRCUMFERENCE OF ASIAN CHILDREN ASSOCIATED WITH DENTAL CARIES?

NMRR-18-3551-45099

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Introduction: Dietary sugar is the shared risk factor for dental caries and obesity. Both conditions are a public health concern in Asia. However, the association between these conditions was inconclusive. Body mass index (BMI) may not be the best anthropometric measurement to measure obesity for the Asian population. **Objective:** This review aimed to investigate whether waist circumference (WC) associates with dental caries among children in Asia. **Methods:** We searched twenty-six databases for published studies in the English language from inception until Jun 2019. Two calibrated reviewers independently screened and selected the studies according to the piloted eligibility criteria. The reviewers then extracted the data and assessed the risk of bias using the Agency for Healthcare Research and Quality (AHRQ) for cross-sectional studies and the NewcastleOttawa Scale (NOS) for cohort studies independently. Discrepancies were resolved by discussion and reference to the third reviewers. **Results:** Of 4532 studies retrieved, five studies were eligible, one cohort and four cross-sectional studies, with a total sample of 7738, all with low risk of bias. Harvest plot analysis demonstrated a negative association between WC and caries severity, but no significant association with caries prevalence for primary dentition. In contrast, WC has no significant association with caries severity, but revealed a negative association with caries prevalence for permanent dentition. In mixed dentition, a negative association between WC and caries prevalence was also observed. **Conclusion:** The association between WC and caries is inconclusive due to limited evidence. More studies are required to gather sufficient data for better understanding.

Poster presentation at the 6th Joint Scientific Meeting in Dentistry on 30 July -1 August 2021. Corresponding e-mail: dr.rokiah@moh.gov.my

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37. IS BMI ASSOCIATED WITH CARIES IN PERMANENT DENTITION AMONG ASIAN CHILDREN?

NMRR-18-3551-45099

Mamikutty R, Aly AS, Marhazlinda J

Introduction: Dental caries and malnutrition among children are public health concerns in Asia. Although both conditions shared similar risk factors, the association between these two conditions was inconclusive. **Objectives:** To investigate the association between body mass index (BMI) with caries in permanent dentition among children in Asia and examine if socioeconomic status (SES) of the countries affects the association. **Methods:** Twenty-six databases were searched for published studies in the English language from inception until Jun 2019. Two reviewers independently screened, selected the studies, extracted the data, and assessed the risk of bias. Discrepancies were solved by discussion and reference to the third reviewers. Meta-analyses with random-effect models with heterogeneity assessed using Higgin I^2 statistic were performed, followed by sensitivity analysis, funnel plot to report bias, and subgroup analysis by socioeconomic status (SES) of the countries. The quality of evidence was analysed using GRADE analysis. **Results:** Of 4532 studies retrieved, meta-analyses of twenty-eight eligible studies revealed no significant association between BMI and dental caries in permanent dentition among the children. Subgroup analysis, however, demonstrated that BMI was negatively associated with caries severity in high-income countries; the underweight children (SMD: 0.16; 95% CI 0.04, 0.29) have higher caries mean than normal-weight children. While, in lower-middle-income countries, BMI was positively associated with caries severity, the underweight children (SMD: -0.14; 95% CI -0.24, -0.03) have lesser caries than normal-weight children. The quality of the evidence was rated low to very low using GRADE analysis. **Conclusion:** The association between BMI and dental caries in permanent dentition among Asian children was affected by socio-economic inequalities between countries. Evidence is beneficial for strengthening health policies and for health promotion and prevention using the Common Risk Factor approach. Future longitudinal studies and more studies from low-income countries are certainly required.

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38. BEHAVIOURAL AND PHYSIOLOGICAL EFFECTS OF ORAL MIDAZOLAM PREMEDICATION IN CHILDREN WHO UNDERWENT DENTAL GENERAL ANAESTHESIA: A PRELIMINARY STUDY

USM/JEPeM/20050249

Abdul Rauf BH, Noraida MY, Ahmad Faisal I, Wan Muhamad Amir WA, Norsamsu AS

Objective: Oral midazolam premedication usually prescribed for controlling behaviour and reducing anxiety of children. This study is aimed to evaluate the effect of oral midazolam premedication on recovery behaviour and physiologic effects of children undergoing DGA. **Material and Method:** Thirty uncooperative children with ASA I or II, Frankl score 1 or 2 and aged from 2–11 years were involved in this randomised control trial study. Group I (n = 15): children received 0.5 mg/kg midazolam orally, while Group II (n = 15): children who didn't receive any premedication. Their peripheral capillary oxygen saturation (SpO₂), respiratory rate (RR), and heart rate (HR) were measured at 0, 15 and 30 minutes upon arrival at the post anaesthesia care unit (PACU). The recovery behaviour was also recorded for the evaluation using the Modified Houpt Behavior Rating Scale. Fisher's Exact test and MannWhitney test were used for data analysis. **Results:** There is no significant differences in all post behaviour and physiologic parameters for both groups ($p>0.05$). However, children in group II reported had tachycardia (13.3%, n= 2), hypoxemia (13.3%, n= 2) and bradypnea (13.3%, n= 2), compared to only one (6.7%) had bradypnea in group I at 30 minutes. Group I showed less movement and crying, but more awake, although no significant difference between both groups ($p>0.05$). No significant association of premedication oral midazolam with successful recovery behaviour ($p=0.381$). One child in group II had an episode of vomiting. **Conclusion:** Oral midazolam premedication had no significance effect on physiology effects and recovery behaviour. However, an interesting trend of positive recovery behaviour and physiology was observed among children with oral midazolam premedication. More studies with larger sample size are needed to explore the effect of oral midazolam in paediatric DGA as to discover the optimum effect of premedication.

Keywords: Oral midazolam, children, behavior/behavioural, dental general anaesthesia, premedication

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39. A COMPARISON OF SALIVARY PROPERTIES AND CARIES STATUS BETWEEN BETA THALASSEMIA MAJOR PATIENTS AND HEALTHY PATIENTS IN HOSPITAL WANITA DAN KANAK-KANAK SABAH

NMRR ID-21-01993-G1P

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Introduction: Thalassaemia is the most common inherited blood disorder in Malaysia and majority of patients are from Sabah. The disease itself poses significant morbidities and its management is costly. Previous studies showed increased caries prevalence among these patients attributed by possible change in saliva properties. **Objective:** The objective was to investigate the saliva properties and caries prevalence among patients with Thalassaemia in comparison with healthy individuals. **Methods:** 39 patients from each group aged between 13-16 years were recruited for the study. Oral hygiene was scored using OHI-S tool while the caries prevalence was scored by measuring DMFT. Saliva properties were measured using the saliva buffering kit which includes salivary flow (resting and stimulated), pH, consistency and buffering capacity. Chi-square test will be used for statistical analysis for all categorical variables and t-test to compare continuous data. **Results:** There were no significant differences in the mean age (mean age=14.4 years) and salivary properties ($p>0.05$) between these 2 groups. However, the median DMFT score for Thalassaemia is 1.00 and healthy patient is 3.00. More patients in the healthy group have good oral hygiene ($p=0.001$). Our study showed that there is no significant difference in DMFT in patients with Thalassaemia. This could be attributed to the fact that these patients are already under our regular care. **Discussion/Conclusion:** This study supports the null hypothesis that patients with Thalassemia has no changes in saliva properties. We did notice better oral hygiene among healthy patients and hence continuous preventive measures need to be emphasized among patients with Thalassaemia.

Keyword: Thalasemia, Salivary properties, Caries, DMFT, Oral hygiene

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40. PARENTAL EXPERIENCES IN THE MANAGEMENT OF CHILDREN WITH CLEFT LIP AND/OR PALATE IN HOSPITAL TAWAU

NMRR-18-4016-44337 (IIR)

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Background: Cleft lip and palate (CLP) has a profound psycho-social impact to patients and parents. It is important to assess parental experiences and satisfaction as they play an important role in the care of affected child especially during the surgical intervention phase. **Objectives:** This study assessed the parental experiences towards caring for CLP children, their level of satisfaction to treatment received and to investigate the relationship between socioeconomic factors and parental satisfaction towards cleft management. **Methods:** The study involved 70 parents of children with CLP treated in Oral & Maxillofacial Surgery Department, Hospital Tawau. A pro forma was designed to assist data collection and Cleft Evaluation Profile (CEP) was used for the assessment. Data were analyzed using SPSS version 27. **Results:** A total of 44 parents participated in this study yielding 63% response rate. Overall, 73% of respondents were very satisfied and 27% were satisfied with treatment received. Parents were most satisfied with the profile of the face (95%). The appearance of teeth and nose were the most dissatisfied features reported 43% and 16% respectively. The socioeconomic background did not affect the level of parental satisfaction whilst the amount of knowledge about cleft treatment seen to affect the level of satisfaction among parents significantly ($P < 0.05$). **Conclusion:** Our findings showed that parents had generally positive experiences in the management of CLP children especially in the events of undergoing several surgeries for the improvement of functional and aesthetic issues. Majority of parents were satisfied with the overall care and surgical outcome. The difference in ratings of CEP showed parents with different amount of knowledge related to cleft have different satisfaction level to the surgical outcome. This is valuable in continuing the service and reach out more to the orocleft community.

Keywords: Cleft, cleft lip, cleft palate, parental satisfaction

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41. UNDIAGNOSED NASAL OBSTRUCTION AMONGST DENTAL ATTENDEES AND ROLE OF DENTIST IN EARLY BREATHING DISORDER SCREENING

UKM PPI/111/8/JEP-2018-314

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Introduction: Oral health practitioners play a fundamental role in airway screening. We deal with the airway daily and are exposed to more than half of the anatomical factors that can lead to chronic mouth breathing and sleep-disordered breathing. Early detection of chronic mouth breathing is important, especially in children and young adults. Chronic mouth breathing secondary to nasal obstruction leads to breathing disorders that affects sleep. Sleep-disordered breathing leads to neurocognitive, mood and behavioral problems as well systemic health problems. Obstructive sleep apnea (OSA) and upper airway resistance syndrome (UARS) are two types of airway disorders observed during sleep that leads to sleep disorders. Our study focuses on identifying the prevalence of undiagnosed mouth breathers among young healthy adults. We aimed to come up with clinical guidelines to help airway screening in the individuals who may be undiagnosed and silently risking themselves to developing systemic health morbidities related to mouth breathing and sleep-disordered breathing. **Methods:** Our study included 156 subjects with a mean age of 23 years that underwent two phases of clinical assessment. The first phase included questionnaires and clinical examinations while the second phase involved nasal endoscopy to look for nasal pathology. **Results:** Our results showed that the prevalence of undiagnosed mouth breathers was high at 90.4%. We found that there was a mixed pattern of dental morphometry changes from the normal breather and a significant association between allergy, tongue scalloping and snoring with the presence of mouth breathing. Analyzing specific components in the Sino Nasal Outcome Test-22 and Epworth Sleep Scale related to sleep rather than just looking at the total score was highly sensitive in picking up the presence of an undetected sleep disorder. **Conclusion:** We concluded that in the undiagnosed mouth breather's upper airway resistance syndrome was a factor contributing to a sleep-related disorder. We present our clinical airway screening guideline that can be used in a dental setting to improve the oral health practitioner's role in screening for obstructive sleep apnea and upper airway resistance.

Keywords: Sleep-disordered breathing (SDB), mouth breathing, undiagnosed mouth breather and dental morphometry

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42. CONVENTIONAL AND CAMOUFLAGE SYRINGE DURING MAXILLARY DENTAL PROCEDURES: RELEVANCE TO ANXIETY AND PAIN LEVELS IN CHILDREN

Vallakatla V, Vallakatla S, Dutta S, Sengupta P, Penukonda R

To compare the effects of conventional and camouflage syringe in reducing anxiety and pain levels during maxillary dental procedures in paediatric patients. Children between 4 and 14 years who attended Dental Clinic, MAHSA University, Malaysia and required local anesthesia, were randomly selected for the present study with due consent from the parents/guardian. The materials needed for local anaesthesia were laid out in view and anxiety levels were assessed using Venham's picture test. The procedure of local anesthesia was then carried out for both conventional and camouflaged groups. Pain assessment was performed following the infiltration technique using the Wong-Baker Faces pain scale. The anxiety levels following the infiltration were re-recorded using the Venham's picture test. Camouflaged group showed a significantly lower anxiety level as compared to conventional group both before and after infiltration. A moderate positive correlation ($r=0.659$; $p=0.014$) was observed between anxiety level after infiltration and perceived pain in conventional group, but the camouflaged group did not show any significant association between anxiety level after infiltration and perceived pain. Direct sight of the conventional syringe had increased anxiety levels and in turn increased the pain perception levels. Thus, it can be suggested that in pediatric patients and/or patients with injection phobia camouflaged syringe is a good alternative.

Keywords: Camouflage Syringe, Conventional Syringe, Dental Anxiety, Pain

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43. ORAL HEALTH STATUS OF CHILDREN WITH THALASSAEMIA IN MELAKA: A PILOT STUDY

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Thalassemia is an inherited disorder that involves abnormal haemoglobin formation. This cross-sectional study with universal sampling was conducted from May 2018 to January 2019 to evaluate the oral health status of children with thalassaemia. The sample consisted of 54 transfusion-dependent patients between the ages of 3–17 years old, who were registered at the paediatric day-care centre of Hospital Melaka. Oral health status was evaluated which included soft tissue examination, recording of dental caries, malocclusion and oral hygiene status of the children, while their parents answered a pre-validated self-administered questionnaire on sociodemographic and oral health practices and attitudes. The mean dft (decayed, exfoliated and filled teeth) among the 3–5 years old was 6.71 ± 6.07 . The mean DMFT (decayed, missing and filled teeth) was 3.00 ± 3.94 among the 13–17 years old and 1.12 ± 1.42 among the 6–12 years old. Most of the 3–5 years old children exhibited good oral hygiene (71.4%). Dentofacial findings among the 3–5 years old were increased overjet (35.7%) and open bite (28.6%) predominantly. Fractured teeth (69.2%), increased overjet (46.2%) and discolouration (23.1%) were the common dentofacial findings among the 6–12 years old while increased overjet (71.4%), soft tissue lesions (57.1%) and posterior crossbite (28.6%) were seen among the 13–17 years old. In this cohort of children with thalassaemia, the prevalence of dental caries was high in preschool children and older children.

Keywords: Dental caries, dentofacial features, haemoglobinopathy, oral health status, thalassaemia

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44. A RETROSPECTIVE STUDY ON THE SUCCESS RATE OF PREFABRICATED POST RETAINED CROWNS IN RESTORATIVE DENTAL SPECIALIST CLINIC IPOH, PERAK

NMRR-16-544-29505

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Introduction: Restoring an endodontically treated teeth and retaining them throughout life are technically challenging, involved additional chair side time and increased cost. Therefore, a reasonable success rate is expected to justify the amount of effort, time and cost invested in the provision of the treatment. **Objectives:** This study aimed to evaluate the performance of prefabricated post retained crowns provided in Restorative Dental Specialist Clinic Ipoh. **Materials and Methods:** This was a cross-sectional study. Dental records of patients with prefabricated post retained crowns between 2008-2014 were searched and reviewed. The clinical examination comprised of a dental check-up and an assessment of the prefabricated post retained crowns by the restorative specialist and dental officers in the department. Only those post and cores in which the post was in situ at the final examination without any adjustments were rated as 'success'. **Results:** Out of 320 cases, 225 were included for analysis. Majority of the patients were female (130, 57.8%) and Chinese (116, 51.6%). The success rates of prefabricated post retained crowns was 204 (90.7%). There was no significant difference in the success rate between metal and fiber post (91.3 vs 88.5%, $p=0.587$). Crown with prefabricated metal post showed the highest number of failures with 15 cases, followed by crown with prefabricated fiber post (5 cases) and bridge with at least one fiber post (1 case). The most frequent reasons of failure were fractures (9 cases), followed by swelling/sinus (7 cases), decemented / debonded (3 cases) and caries (2 cases). Focusing on tooth type and position of arch, premolars have the highest success rate (91.3%), with mandibular teeth having slightly higher success rate than maxillary teeth (92.0% vs 89.9%). Success rate was highest when there were no opposing teeth (90.8%). The length of time that the prefabricated post retained crowns had functioned before failure varied from 1-8 years. **Conclusions:** The success rate of prefabricated post retained crowns which were provided in Restorative Unit Ipoh was high. The most common reason of failure was fracture of the tooth. There was no significant association of different variables with the success rate of prefabricated retained crowns.

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45. EDENTULISM AND FACTORS ASSOCIATED WITH COMMUNITY DWELLING ELDERLY IN PASIR PUTEH, KELANTAN, MALAYSIA

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Objective: To assess the prevalence of edentulism (total tooth loss) and factors associated with community dwelling elderly in Pasir Puteh, Kelantan, Malaysia. **Materials and Methods:** A cross-sectional study has been conducted among community dwelling elderly in Pasir Puteh, Kelantan. Upon completion of a face-to-face administered questionnaire of participant's socio-demographic and oral health profiles, the edentulous state was examined and recorded. Data obtained was analyzed using SPSS version 22.0. **Results:** A total of 600 elderly who participated in this study consist of 371 edentulous and 229 with at least one natural tooth. The prevalence of edentulism was 62.3% (95% CI: 58.3, 66.2). Age, level of education, last dental visit, fear of dental treatment, and denture wearing status were found to be associated with edentulism ($p < 0.05$). **Conclusion:** Edentulism was found to be higher among community dwelling elderly in Pasir Puteh, Kelantan. Increasing in age, lower level of education, frequent dental visit, less fear of dental treatment, and wearing a denture were found to be associated with edentulism.

Keywords: edentulism, community dwelling, elderly, risk factors, Malaysia

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46. PULPAL AND PERIAPICAL STATUS OF THE VITAL TEETH USED AS ABUTMENT FOR FIXED PROSTHESIS—A SYSTEMATIC REVIEW AND META-ANALYSIS

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Purpose: This is a systematic review to identify the incidence of pulp necrosis and/or periapical changes among vital teeth which are used as an abutment for crown and fixed partial dentures (FPDs). **Materials and methods:** Two reviewers independently searched two electronic databases, PubMed and Scopus. The search was complemented from references of included studies and published reviews. Studies published in the English language through January 2021 that had assessed and documented the clinical and radiographic failure of crown or FPD in vital permanent teeth due to pulpal or periapical pathology with a follow-up of at least 12 months were selected. Data screening, data collection and extraction of data was performed. Quality of studies involved was analyzed using the Newcastle-Ottawa Quality Assessment Scale for cohort studies. Meta-analysis was done using random effects model. Publication bias was assessed using funnel plots. **Results:** Electronic searches provided 10,075 records among which 20 studies were selected for systematic review and 7 studies were selected for meta-analysis. With respect to quality assessment, all the studies involved were considered as high quality as the score in scale ranged between 6 and 9 as per the Newcastle-Ottawa Quality Assessment Scale for cohort studies. The meta-analyses showed that there was no statistically significant difference in the incidence of the loss of pulp vitality or pulp necrosis through clinical and radiographic examination with the follow up period of 5 years: $p < 0.001$, 95% CI: 0.96-1.00, $I^2 = 77.84\%$; 10 years: $p < 0.001$, 95% CI: 0.88-0.95, $I^2 = 93.59\%$; 15 years: $p < 0.001$, 95% CI: 0.92-0.96, $I^2 = 94.83\%$; and 20 years: $p < 0.001$, 95% CI: 0.94-0.96, $I^2 = 95.01\%$. **Conclusions:** The meta-analysis revealed clinical and radiographic success rate ranging between 92% to 98% at different follow up periods ranging between 5 years and 20 years. Future high-quality randomized clinical controlled trials with a larger population are required to confirm the evidence as only observational studies were considered in this paper.

Keywords: Vital teeth, abutment, apical periodontitis, crown, fixed partial dentures, periapical, pulp

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47. DOES HIV INFECTION AFFECT THE SURVIVAL OF DENTAL IMPLANTS? A SYSTEMATIC REVIEW AND META-ANALYSIS

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Statement of Problem: Immunosuppression and coinfections associated with human immunodeficiency virus (HIV) infection pose a relative contraindication for dental implant therapy. However, although implants have been placed in patients with HIV with reasonable success, how HIV infection affects their survival is unclear. **Purpose:** The purpose of this systematic review of the literature and meta-analysis was to analyze the data on the survival of dental implants in patients with HIV. **Material and Methods:** A search for relevant articles published up to November 2019 was performed in PubMed/Medline and Cochrane databases, Clinicaltrials.gov, and Google Scholar. Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were adopted for the conduct of the systematic review. The most pertinent data were extracted and pooled for qualitative and quantitative analyses with 95% confidence intervals. Heterogeneity was analyzed by using I-squared statistics. **Results:** A total of 8 studies involving 411 individuals with HIV and 1109 implants were included in the meta-analysis. The mean follow-up period was 2.8 years. A pooled estimate of 95% of implant survival rate with 95% confidence interval (92% to 96%) was noted. Heterogeneity across the 8 studies was found to be 41% with moderate true variability. **Conclusions:** This systematic review demonstrated that HIV infection does not pose a serious threat to implant survival on short-term evaluation, but the evidence is of low quality.

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48. PREVALENCE OF TRAUMATIC INJURIES TO PRIMARY ANTERIOR TEETH AMONG CHILDREN AGED 2–6 YEARS IN NATIONAL CAPITAL REGION OF DELHI, INDIA

Sharma HK, Gupta K, Singh S

Aims: The aim of this study was to assess subject wise and tooth wise distribution and prevalence of traumatic injuries to the anterior teeth of 2- to 6-year-old children. **Materials and methods:** A cross-sectional survey was performed. Primary maxillary and mandibular anterior teeth of 1,800 children aged between 2 years and 6 years, who attended 20 pre-schools in National Capital Region Delhi, India, were examined by a single examiner, and a questionnaire was filled in person by the parent/guardian. Andreasen's classification was used to classify the traumatic injuries. The Chi-square test was used to statistically analyze the variation in traumatic dental injuries (TDIs) with age and gender. Multiple logistic regression was used to determine the influence of independent variables on the occurrence of TDIs. **Results:** The prevalence of TDIs was 17%. Significant and highly significant differences were found between boys and girls for cause and location of trauma ($p < 0.05$) and tooth type involved ($p < 0.001$) with boys being more prone to such injuries. The commonest cause of injury was due to falls and the location was playground. The teeth most commonly affected were the maxillary central incisors (36.9%) followed by maxillary lateral incisors (3.3%), and the least affected were the maxillary and mandibular canines (0.3%). **Conclusion:** The prevalence of traumatic injuries to the anterior teeth in 2- to 6-year-old children in National Capital Region of Delhi, India, was 17%. There is a need to run educational programs to increase parents' awareness of the risks of dental trauma and emphasize preventive measures. Clinical significance: Parents should be made aware of the widespread prevalence, risk factors, and consequences of trauma to primary dentition, so that they can seek appropriate care timely. The time elapsed between injury and dental care is of utmost importance.

Keywords: Anterior tooth trauma, Oral health, Pre-school children, Prevalence of dental injury, Primary teeth

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49. QUALITY OF LIFE AND SUPPORTIVE CARE NEEDS OF ORAL CANCER CAREGIVERS

NMRR-20-3197-56291

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Introduction: Caregivers looking after their loved ones who are afflicted with oral cancer often bear their caregiving burden silently which compromise their quality of life and thus need supportive care too. However, to date, support programs for such caregivers are yet to exist in Malaysia. **Objective:** This study aims to explore the association between family caregivers' quality of life and their supportive care needs while caring for oral cancer patients. **Materials and Methods:** This cross-sectional study had employed convenience sampling technique on oral cancer patients from five oral cancer referral centres in the country, where only one family caregiver for each patient were recruited. The Malaysian version of the Comprehensive Needs Assessment Tool for Cancer Caregivers (M-CNAT-C) and the Caregiver Oncology Quality of Life Questionnaire (M-CarGOQoL) were self-administered by 56 family caregivers between October to December 2021. Descriptive statistics and bivariate correlations were used for analyses. **Results:** The mean score for caregivers' QOL was 76.16 ± 16.01 , with lowest scores in the psychological well-being (64.87 ± 30.12), self-esteem (68.64 ± 28.29) and relationship with health care (71.16 ± 30.75) domains. The mean score for caregivers' SCN was 36.42 ± 24.16 , with highest scores in the healthcare staff (58.44 ± 33.80) and information (55.35 ± 29.98) domains. There was a negative moderate correlation between QOL and SCN ($r[54] = -0.58, p = 0.001$). **Conclusion:** Poorer QOL among family caregivers are associated with higher levels of SCN. This study findings indicate that supportive care services for caregivers should not be overlooked. Integrating supportive care program for caregivers together with oral cancer patients is an option to explore further as part of holistic patient care management in tertiary referral centres in Malaysia.

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50. RELATIONSHIP BETWEEN HABITS AND CELLULAR DIFFERENTIATION IN ORAL SQUAMOUS CELL CARCINOMA

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Introduction: Oral squamous cell carcinoma (OSCC) is well known for its link to high-risk habits. These habits could worsen cellular differentiation and affect treatment planning for patient. **Aims:** This study aimed to analyse the demographic, clinical features, habits and cellular differentiation of OSCC in patients with or without habits in Negeri Sembilan and to determine the association between habits and location of tumour together with cellular differentiation. **Methodology:** This study was a retrospective study involving a 7-year review of patient's records from year 2012 until 2018. Patient's demographic characteristics, presence and type of habits, location of cancer and cellular differentiation of biopsy were gathered. Descriptive analysis was performed to determine the distribution of cancer among patient's demographic profile, and tumour location. Fisher's exact test was performed to determine the association between habits and location of tumour as well as cellular differentiation. **Results:** 72 patients were included in this study. The mean age of patients diagnosed with OSCC was 62.5 years old. OSCC was predominantly found in females (70.8%) with an Indian predilection (52.8%). Among patients with habits (51.4%) that were diagnosed with OSCC, most of them had non-cigarette related habits (40.3%). The most common site for development of OSCC was the tongue (43.1%) followed by buccal mucosa (30.6%). Histopathologically, tumour cells in most patients was moderately differentiated (48.6%). No significant association was found between habits to the cellular differentiation ($p=0.398$), but significant association was seen between habits and location of tumour ($p=0.000$). **Conclusions:** There was no strong evidence showing that habits influence the cellular differentiation in this study. More detailed studies with larger sample size or multi-centre involvement are required to investigate the influence of habits with cellular differentiation.

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51. EFFECTIVENESS OF “ORALDETECT”: A REPETITIVE TEST-ENHANCED, CORRECTIVE FEEDBACK METHOD COMPETENCY ASSESSMENT TOOL FOR EARLY DETECTION OF ORAL CANCER

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Early diagnosis of oral cancer results in less aggressive treatment and improves the quality of life and overall 5-year survival rate. Well-trained dental professionals can play a crucial role in the early detection of oral cancers. The present study aims to determine the effectiveness of the training program "OralDETECT", a spaced repetitive, test-enhanced learning tool with a corrective feedback mechanism for early detection of oral cancer. Thirty-two dentists and 259 dental students from three Malaysian dental schools were involved in this study. All participants were trained and calibrated to recognize oral potentially malignant disorders (OPMD) and oral cancer using "OralDETECT", which is comprised of a series of pre-test, lecture, post-tests and review sessions. The percentage of correct answers (scores) for each test given by the participants was calculated and analysed using a paired t test. It was found that the overall percentage of diagnostic accuracy for both dental professionals and student groups increased to above 80% from the pre-tests to the final post-tests. There was a significant improvement in overall scores between the pre-tests and all three post-tests for the dental professional groups and the student groups. The diagnostic accuracy for individual OPMD and lesions suspicious of oral cancer also increased to above 80% for both groups. The results of our study demonstrate that the "OralDETECT" is an efficient and effective competency tool which can be used to train dental professionals and students for the early detection of OPMD and oral cancer.

Keywords: Clinical competence, Corrective feedback, Oral cancer, Oral potentially malignant disorders (OPMD), Spaced repetitive learning, Test-enhanced learning

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52. A RETROSPECTIVE STUDY ON THE ETIOLOGICAL FACTORS OF OROFACIAL PAIN IN A MALAYSIAN SAMPLE

IREC 2018-047

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Introductions: Orofacial pain is presented with different aetiologies. Previous studies showed that there was no definite classification of orofacial pain and lacking of data recorded to explain on the aetiologies. This study was done to examine the aetiological factors of orofacial pain for patients attending dental clinic Kulliyyah of Dentistry of IIUM. **Materials and methods:** This retrospective study investigated the data of 248 patients who have suffered from orofacial pain. The data were collected over the past 8 years which was from January 2010 to November 2018. The aetiologies were classified into two major types of orofacial pain which are odontogenic and non-odontogenic. In addition, both major diagnoses have been correlated with regard to age and gender. The data were analysed using the chi-square test and the significance level which was set to 0.05. **Results:** Data collection showed that orofacial pain has different aetiologies among the patients attending the dental clinic Kulliyyah of Dentistry of IIUM. In addition to that, there was a relationship between orofacial pain towards gender and different age group. **Conclusions:** In conclusion, the findings proposed the orofacial pain has a variety of common aetiological factors among patients attending dental clinic of Kulliyyah of Dentistry of IIUM.

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53. ORAL CANCER IN RELATION TO E6 AND E7 ONCOPROTEINS OF HPV16: *IN SILICO* APPROACH

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Objectives: The aim of this research is to study the biological impacts of mutation on specific amino acid sequences encoded for E6 and E7 oncoproteins of human papillomavirus type 16 (HPV16) with oral cancer progression. **Materials and Methods:** This retrospective study primarily involved bioinformatics approached. HPV16 E6 and E7 oncoprotein sequences were retrieved from NCBI database and their 3D protein structure templates from Protein Databank (PDB). 3D protein structure models were constructed by using SWISS MODEL tools. The structural visualisation and comparison made by using RasMol and DEEP VIEWER. The biological impacts due to mutations and structural changes were further studied by reviewing current scientific articles. **Results:** The results indicate that E6 and E7 oncoproteins of HPV16 have significant roles in HPV-associated oral cancer which are best known for their ability to bind and inactivate the tumour suppressor proteins, p53 and pRb, respectively. As a consequence, p53 and pRb growth arrest and apoptosis-inducing activities are abrogated. This study successfully designed E6 and E7 oncoprotein 3D models based on fourteen-point mutations recently reported. Mutated E6 oncoprotein with the range of RMSD value, 0.00-0.01Å exhibits increased in trimetric complex formation and later increasing p53 degradation. In addition, impairment in ternary complex formation and p53 degradation revealed slightly wider range of RMSD value, 0.02-0.03Å. Mutated E7 oncoprotein with range of RMSD value, 0.00-0.04Å shows increased in binding and degradation of pRb. **Conclusion:** In conclusion, point mutations present on E6 and E7 oncoproteins altered their protein structures and binding capacity to p53 and pRb, respectively. These changes affect the transformational potential of HPV16 in oral cancer progression.

Keywords: Oral cancer progression, In-silico, human papillomavirus 16, E6, E7

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54. COMPARATIVE SERA PROTEOMICS ANALYSIS OF DIFFERENTIALLY EXPRESSED PROTEINS IN ORAL SQUAMOUS CELL CARCINOMA

Wong Y, Ramanathan A, Yuen KM, Mustafa WMW, Abraham MT, Tay KK, Rahman ZAA, Chen Y

Background: Oral squamous cell carcinoma (OSCC) has increased in incidence from 1990 to 2017, especially in South and Southeast Asia. It is often diagnosed at an advanced stage with a poor prognosis. Therefore, early detection of OSCC is essential to improve the prognosis of OSCC. This study aims to identify the differentially expressed serum proteins as potential biomarkers for oral squamous cell carcinoma (OSCC). **Methods:** Comparative proteomics profiling of serum samples from OSCC patients, oral potentially malignant disorder (OPMD) patients, and healthy individuals were performed using two-dimensional gel electrophoresis (2-DE) coupled with mass spectrometry (MS) (n = 60) and bioinformatics analysis. The enzyme-linked immunosorbent assay (ELISA) (n = 120) and immunohistochemistry (IHC) (n = 70) were used to confirm our findings. **Results:** The 2-DE analysis revealed that 20 differentially expressed proteins were detected in OPMD and OSCC (p < 0.05). Bioinformatics analysis indicated that the activation of classical complement, liver X receptor/retinoid X receptor (LXR/RXR) activation, and acute phase response signaling pathway are associated with the development and progression of OSCC. Most of the detected proteins are acute-phase proteins and were related to inflammation and immune responses, including apolipoprotein A-I (APOA1), complement C3 (C3), clusterin (CLU), and haptoglobin (HP). The expression levels of CLU and HP in ELISA are consistent with the findings from the 2-DE analysis, except for the mean serum level of HP in OPMD, whereby it was slightly higher than that in control. IHC results demonstrated that CLU and HP are significantly decreased in OSCC tissues. **Conclusion:** Decreased expression of CLU and HP could serve as complementary biomarkers of OSCC. These proteins may assist in predicting the outcomes of OSCC patients. However, a larger cohort is needed for further investigation.

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55. PRELIMINARY STUDY OF BRF2 EXPRESSION IN SUBSET OF HEAD AND NECK CANCERS

Nam NA, Halimi SNA, Abd Razak MIM, Ilham Fitri MS, Tuan Mahmood TN, Mohd Rasoul A

Introduction: Head and neck cancers (HNC) are abnormal cell proliferation in the mucosal surfaces involving several anatomical sites such as oral cavity, sinonasal cavity, pharynx, and larynx. In Malaysia, HNC especially involving the nasopharyngeal cancer is the fourth most common cancer, with total new cases of 2,222 detected in 2020. Determination of the potential biomarkers for early diagnosis of this disease is crucial. Transcription factor II B (TFIIB)-related factor 2 (BRF2) is one of the important transcription factors, regulating the RNA Polymerase III (Pol III) gene transcription. Dysregulation of Pol III transcription mediated by BRF2 lead to abnormal cell growth and cancer progression. **Objectives:** This study aimed to compile and analyse data on BRF2 expression related to HNC using online database and immunohistochemistry (IHC) analysis. **Methods:** Information regarding BRF2 protein and specific mRNA transcripts were retrieved from Human Protein Atlas (HPA), Oncomine, GEPIA, and cBioPortal databases. IHC analysis was performed on tissue microarrays (TMA) containing normal and a subset of HNC involving the lip tissues using BRF2 and PCNA antibodies as comparison. **Results:** HPA revealed overexpression of BRF2 protein in the nuclear region, detected in 25-75% cancer cells of all HNC cases (n=499) with staining intensity ranging from moderate to strong. In Oncomine, BRF2 shown differential expression between normal vs tumour tissues whereby 4/8 datasets showed upregulation of BRF2 transcripts. GEPIA also reported mRNA overexpression for BRF2 (8.6 vs 5.32) in head and neck squamous cell cancer (HNSC) compared to normal tissue. IHC staining revealed varying degree of BRF2 expression in HNC involving the lip as compared to normal tissue controls. **Conclusions:** Compiled data suggest that BRF2 is commonly overexpressed in HNC studied. Further study is essential to evaluate BRF2 expression in more HNC subsets as tissue distribution is heterogenous and involved large anatomical sites.

Keywords: RNA Polymerase III, BRF2, Head and Neck Cancers, Oral Cancers, Biomarkers

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56. ONLINE DATA MINING OF BRF1 AND BRF2 EXPRESSION IN HEAD AND NECK CANCERS

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Introduction: Head and neck cancer (HNC) was the seventh most common cancer worldwide in 2018 with 890,000 new cases and 450,000 deaths. Having the highest prevalence rate in South East Asia, Brazil and central Europe, the mortality rate has not significantly improved in recent decades. It is crucial to determine the potential candidate biomarkers for early diagnosis and prognosis of this disease. BRF1 and BRF2 are important transcription factors, regulating the RNA Polymerase III (Pol III) gene transcription. Dysregulation of Pol III transcription mediated by BRF1 and BRF2 may lead to abnormal cell growth and cancer progression. **Objectives:** To compile and analyse data on BRF1 and BRF2 expression related to HNC by online database data mining. **Methods:** Information for BRF1 and BRF2 protein and specific mRNA transcripts were retrieved from Human Protein Atlas (HPA), Oncomine, GEPIA, and cBioPortal databases. **Results:** HPA revealed overexpression of BRF1 and BRF2 protein in the nuclear region, detected in 25-75% cancer cells of all HNC cases (n=499) with staining intensity ranging from moderate to strong. In Oncomine, BRF1 and BRF2 shown differential expression between normal vs tumour tissues whereby 8/12 HNC datasets revealed upregulation of BRF1 specific mRNA transcripts and 4/8 datasets showed upregulation of BRF2 transcripts. GEPIA also reported mRNA overexpression for both BRF1 (13.06 vs 7.85) and BRF2 (8.6 vs 5.32) in head and neck squamous cell cancer (HNSC) compared to normal tissue. Despite overexpression of both BRF1 and BRF2 in HNC, both are not prognostic indicators as revealed by HPA, GEPIA and cBioPortal databases. However, more study is needed to evaluate BRF1 and BRF2 expression in specific HNC subtypes as it is heterogenous and involved large anatomical sites. **Conclusions:** Compiled data suggest that BRF1 and BRF2 might be useful as early diagnosis biomarkers for detection of HNC cancer.

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57. COMMON LOSS OF HETEROZYGOSITY (LOH) FOUND IN MALAYSIAN ORAL CANCER PATIENTS: A STUDY OF LITERATURE

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Introduction: In Malaysia, oral cancer is reported as eighth and fourth most common cancer among Indian male and female respectively. Numerous types of molecular changes contribute to cellular transformation and progression of oral premalignant lesions to oral squamous cell carcinoma (OSCC), the predominant type of oral cancer. Identification of these molecular signatures such as loss of heterozygosity (LOH) of tumour suppressor genes and microsatellite instability (MSI) maybe useful to monitor disease progression. **Objectives:** This study aimed to gather all reported LOH and MSI changes found in Malaysian oral cancer patients, with functional significance in the pathways contributing to oral squamous cell carcinoma progression. **Methods:** A systematic literature search was performed in three public databases; Pubmed, Google Scholar and Science Direct. Search was carried out without any restrictions on date of publication however restricted to studies that comprises Malaysian oral cancer patients. **Results:** Two independent studies that met the search criteria were found. Ashazila *et al.* (2011) reported LOH for chromosome 3p with overall incidence of 37/50 (74%) cases. The two most frequent LOH was identified for marker D3S966 (chromosome location 3p21.3; 42.8%) that map to a putative tumour suppressor and marker D3S1228 (3p14.2, 36.7%) that map to FHIT gene. Highest frequency of MSI found for marker D3S966 (28.6% of informative cases). Another study by Salahshourifar *et al.* (2015) reported frequent MSI at D1S2346 (25.3 %) than LOH at D1S2345 (9.3 %) in 1q21.3 region, leading to downregulation of CRNN gene. LOH and MSI highlighted in both studies were also correlated to certain sociodemographic and clinicopathological parameters. **Conclusions:** Studies on LOH and MSI in Malaysian oral cancer patients are still scarce, which only documented the changes in chromosomes 3p and 1q. Regardless, these changes are associated with progression of OSCC in Malaysia.

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58. HOST IMMUNE RESPONSE AS PREDICTIVE AND PROGNOSTIC INDICATORS FOR ORAL CANCER

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The prognostic value of tumour-infiltrating lymphocytes (TILs) and lymphocytic host response (LHR) in oral squamous cell carcinoma (OSCC) and oral potentially malignant disorders (OPMD) remains controversial. The aim of this study was to investigate the prognostic value of TIL and LHR levels in OSCC and explore the LHR role in the development of oral cancer by assessing the association of LHR patterns in OPMD and OSCC. **Methods:** This study examined 40 OSCC and 19 OPMD Formalin Fixed Paraffin Embedded (FFPE) tissues from Malaysian Oral Cancer Database and Tissue Bank System (MOCDBS) coordinated by Oral Cancer Research and Coordinating Centre, Faculty of Dentistry, University of Malaya (OCRCC-UM). The predictor variables were the TIL level and LHR pattern. The main outcome assessment parameter was overall survival. **Result:** Nineteen (19) OSCC tissues (47.5%) showed high level of TIL, eleven (11) OSCC tissues (27.5%) and three (3) OPMD tissues (15.8%) showed strong LHR pattern. Strong and intermediate LHR profile is associated with OSCC ($p < 0.01$) in comparison to OPMD. Kaplan-Meier analysis showed that both strong LHR and high TIL were prognostic factors for overall survival ($p = 0.020$ and $p = 0.014$ respectively) **Conclusion:** Both LHR and TIL showed its potential as prognostic indicators for OSCC in this study. However, their role as independent prognostic indicators is yet to be shown in this preliminary study, thus recommending future studies to explore this aspect of research with a larger sample size.

Keywords: Oral cancer, Immune, prognosis, oral potentially malignant disorders

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59. ASSESSING THE POTENTIAL ASSOCIATION BETWEEN EPSTEIN-BARR VIRUS AND ORAL SQUAMOUS CELL CARCINOMA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: This study aims to qualitatively and quantitatively review the association between Epstein-Barr virus (EBV) and oral squamous cell carcinoma (OSCC). **Methods:** PubMed, Scopus, and Web of Science databases were searched using the keywords "EBV or Epstein Barr virus and Oral cancer or Oral squamous cell carcinoma" for published case-control studies in the English language upto August 2019. **Results:** The search yielded 985 articles out of which 966 articles were excluded by screening their titles and abstracts as they were irrelevant or duplicates. Based on the full-text assessment of the remaining 19 articles, only 7 satisfied the inclusion criteria and were included in the qualitative analysis, out of which only 4 were compatible to be included in the meta-analysis. The diagnostic modalities used included immunohistochemistry, in situ hybridization and polymerase chain reaction. The diagnostic targets included latent membrane protein (LMP)-1, EBV determined nuclear antigen-1, EBV-encoded small non-polyadenylated RNA-2. The meta-analysis showed that there is an association between the EBV and OSCC. **Conclusions:** Determining the association of EBV with OSCC is highly tedious due to the contrasting data obtained from individuals' studies which in turn is due to the wide variations in the sensitivity and specificity of the diagnostic modalities used and diagnostic targets selected. Although the meta-analysis revealed an association between EBV and OSCC, the number and the quality of the studies included in the meta-analysis are limited, thus the association requires further validation for any conclusive inference.

Keywords: Epstein-Barr virus (EBV), meta-analysis, oral squamous cell carcinoma (OSCC)

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60. A COMPARISON OF KNOWLEDGE AND ATTITUDE BETWEEN HEALTH CARE AND NON-HEALTH CARE UNDERGRADUATE STUDENTS TOWARDS TOBACCO SMOKING IN PENANG

Ganapathy SK, Loganathan K, Chawla R, Vaithilingam B, Varghese A, Varghese T

Introduction: This study investigated the prevalence of smoking among health care and non-health care undergraduate students in Penang. Further, the knowledge, awareness and attitude levels of the respondents were also discerned. Besides, the existence of any significant difference between the knowledge, awareness and attitude levels of the two groups was also investigated. **Materials And Methodology:** The population comprised the undergraduate students of Penang. Out of this population, a sample of 162 respondents were randomly selected. Survey questionnaires were given to the respondents to ascertain their prevalence of smoking and their knowledge, awareness and attitude towards smoking. Data was collected and both descriptive and inferential analysis were carried out using SPSS. **Results:** There were proportionately less smokers among the healthcare respondents compared to the non-healthcare respondents. Additionally, it was also found that there existed a significant difference between the two groups in terms of the score for knowledge, awareness and attitude towards smoking ($t=6.19$, $p < 0.05$). **Conclusion:** Thus health care students had a lower prevalence of smoking and had greater knowledge, awareness and attitude of the dangers of smoking and were possibly aided by their greater knowledge of the health sciences.

Keywords: attitude, awareness, knowledge, prevalence of smoking

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61. DO HIGHLY ACTIVE ANTIRETROVIRAL THERAPY DRUGS IN THE MANAGEMENT OF HIV PATIENTS INFLUENCE SUCCESS OF DENTAL IMPLANTS?

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HIV infection is a global pandemic that affects CD4 cells in the immune system and leads to lethal opportunistic infections. The advent of highly active antiretroviral therapy (HAART) has induced a marked reduction in the viral load and an increase in the CD4 cell count, thereby changing the course of the disease from an acute life-threatening condition to chronic disease. Accordingly, need and demand for oral rehabilitation in HIV positive population have increased in recent years. However, few drugs used in the HAART regimen have also known to be associated with osteopenia and osteoporosis. Although HAART reduces the morbidity in HIV patients, it remains unknown to what extent the therapy influences the implant healing. Few scientific literatures have identified osteoporosis and HIV infection as an uncondusive milieu for dental implant placement and survival but demonstrated favorable outcomes in short-term assessments. The long-term impact of bone metabolic effects of HAART on implant success remains a conundrum.

Keywords: Dental implants, HAART drugs, HIV infection

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62. ANALYSIS OF OCTAMER-BINDING TRANSCRIPTION FACTOR-4 EXPRESSION IN ORAL LEUKOPLAKIA

Tegginamani AS, Shivakumar VH, Kallarakkal TG, Ismail SM, Abraham MT, Bin Zamzuri AT

Background: Oral potentially malignant disorders have a risk for malignant transformation but are difficult to reliably identify and predict which patients are at the risk for malignant transformation. OCT4 has been hypothesized to play a key oncogenic driver in a variety of solid tumors. A deeper understanding of the aberrant molecular pathways which lead to carcinogenesis needs to be identified by the potential markers. **AIMS:** To assess the OCT4 stemness factor in oral leukoplakia for its potential risk to malignant transformation. **Settings And Design:** 20 cases of oral leukoplakia were obtained from archives at Oral Cancer Research & Coordinating center (OCRCC) Malaysia **Subjects and Methods:** 20 cases of oral leukoplakia were assessed by OCT4 immunohistochemically. Oral squamous cell carcinoma was used as a control. **Result:** no expression of OCT 4 was observed in any cases of oral leukoplakia. **Conclusion:** The molecular mechanisms of Oct4 regulation and in particular of its switch on and off in tissues depends upon its microenvironment, which makes it challenging in fundamental and applied research fields of regenerative medicine and cancer therapy. It's better that patients should undergo multiple biopsies for the early detection of malignant transformation with close follow-up during the first two to three years, a large amount of work remains to be done with multi-marker panel investigation, as cure rates have remained constant over three decades.

Keywords: Malignant transformation, OCT-4, Oral dysplasia, Oral leucoplakia, Oral potentially malignant disorders, Progression to cancer

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63. ADJUNCTIVE TECHNIQUES AND DIAGNOSTIC AIDS IN THE EARLY DETECTION OF ORAL PREMALIGNANT DISORDERS AND CANCER: AN UPDATE FOR THE GENERAL DENTAL PRACTITIONERS

Pandarathodiyil AK, Vijayan SP, Milanes D, Chopra V, Anil S

Oral cancer (OC), a potentially fatal disease, is a major health concern across the world. It is reported to be the sixth most common cancer in the world with a disappointingly low 5-year survival rate, despite major advances in onco-medicine in the past three decades. The low 5-year-survival rate is associated with late diagnosis of the disease, while OC diagnosed at early stages enjoy a much higher 5-year-survival rate, comparatively. Although the oral cavity is one of the most easily accessible parts of the body for cancer screening, OC is typically diagnosed at later stages. The delay in diagnosis is one of the factors for the poor 5-year survival rate and high mortality and morbidity among patients. Therefore, an early diagnosis is of utmost importance. Visual and tactile examination and scalpel biopsy are still considered the gold standard for definitive diagnosis of oral potentially malignant disorder (OPMD) and OC. Nevertheless, adjunctive techniques could be employed to increase the ability to distinguish benign abnormalities from dysplastic/malignant changes. These would also aid in identifying areas of dysplasia/early OC that are not visible to the naked eye and tackle the delay in diagnosing OPMD/OC. These adjunctive tools are not a replacement for visual and tactile examination but are supplementary aids. They could be used to screen healthy patients for the presence of any occult cancerous change and evaluate the biological potential of clinically abnormal mucosal lesions, thus enabling early recognition and diagnosis which might increase survival rate and reduce mortality and treatment-associated morbidity.

Keywords: Adjunctive techniques, early diagnosis, oral cancer, oral potentially malignant disorder

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64. C-KIT EXPRESSION IN ORAL LEUKOPLAKIA

Tegginamani AS, Shivakumar VH, Ismail SMB, Abraham MT, Fernandes BA, Zamzuri ATB

Oral leukoplakia is the most common potentially malignant oral disorder. Oral leukoplakia's malignant potential is independent of the histopathological grade, and the malignant transformation rate varies greatly from 3% to 50% even in the case of severe epithelial dysplasia. Ethnic & environmental variables may contribute to this variation. C-kit immunohistochemistry was performed on 15 oral leukoplakia (OL), two oral squamous cell carcinoma (OSCC), and two dentigerous cysts (DC). The objective of this study was to evaluate the c-kit expression in oral leukoplakia. The use of various immunohistochemical markers to differentiate between OLs with a high and low risk of malignant transformation has been investigated. Only four OL exhibited a faint cytoplasmic expression in basal cells. Whereas, OSCC and DC were devoid of c-kit expression. Thus, this may not be a unique marker for identifying OL at high-risk. Further research with larger sample size is required.

Keywords: CD 117, Disease progression, Oral dysplasia, Oral leukoplakia, Risk prediction

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65. CORRELATION ANALYSIS BETWEEN RISK FACTORS AND MUCOSITIS ORAL IN HEAD AND NECK CANCER PATIENTS UNDERGOING RADIOTHERAPY

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Introduction: Radiotherapy is a cancer therapy that uses ionizing radiation to damage cancer cells. Ionizing radiation in the head and neck area can disrupt the function and integrity of the oral mucosa and cause oral mucositis. In Bandung, the prevalence and risk factors of oral mucositis in head and neck cancer (HNC) patients undergoing radiotherapy have not been studied. Some textbooks claim that the prevalence of radiotherapy-induced oral mucositis in HNC patients occurs at almost 100%. Various risk factors associated with oral mucositis have been studied, giving significantly different results. This research analyzes the correlation between risk factors and mucositis oral in head and neck cancer patients undergoing radiotherapy. **Methods:** This research is a cross-sectional retrospective study with secondary data from medical records of HNC patients at RSHS from January 2015 until December 2019. A consecutive sampling method was used to collect the data that match the Inclusion criteria, including diagnosis of HNC(ICD-10), receiving radiotherapy from the first cycle until the last cycle; having a complete medical record following variables (location of HNC coding by ICD-10, gender, age, education level, smoking habit, the cycle of radiotherapy, oral treatment, body mass index, and comorbid disease). All data were then analyzed using Spearman correlation. **Result:** 171 medical records showed 59 patients had oral mucositis after radiotherapy. 26.9% male and 7.6% female, with susceptible age 40-60 years. Analysis of the Spearman correlation, there is a significant relationship between body mass index (BMI) ($p = 0,001$), smoking habits ($p = 0,001$), and radiotherapy cycles ($p = 0.001$). **Conclusion:** There is a correlation between risk factors of oral mucositis in HNC patients undergoing radiotherapy in RSHS, including body mass index (BMI), smoking habits, and radiotherapy cycles.

Keywords: Head and neck cancer, oral mucositis, prevalence, risk factor, retrospective study

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66. TO ANALYSE THE MITOTIC AND KERATINIZATION CORRELATION WITH BCL-2 EXPRESSION IN VARYING GRADES OF ORAL EPITHELIAL DYSPLASIA AND ORAL SQUAMOUS CELL CARCINOMA

Pathak A, Shetty CD, Dhanapal R, Kaur GP

Context: The bcl-2 proto-oncogene was discovered at the chromosomal breakpoint of t (14;18) found in follicular lymphoma. Histological changes in dysplasia are considered the earliest signs preceding the progression into squamous cell carcinoma. Serving as critical regulators of apoptotic pathways, bcl-2 prohibits programmed cell death and subsequently assists in uncontrolled neoplastic growth. **Settings and design:** This study included 48 cases, eight each of epithelial dysplasia and squamous cell carcinoma. Immunohistochemical staining using bcl-2 antibody was performed and different histological parameters were correlated with bcl-2 positive cells in all the cases. **Materials and methods:** All 3 µm thick sections were stained with bcl-2 antibody. After identifying four representative fields at 40x, their images were obtained for assessment of bcl-2 labelled cells and their intensity along with different histological parameters in all the cases. **Statistical analysis:** The differences between different histological parameters were analysed using the Anova test, post hoc test and Bonferroni test. Pearson's Chi-square test was carried out to determine the level of correlation between the bcl-2 positive cells in both epithelial dysplasia and oral squamous cell carcinoma cases. **Conclusion:** Sequential increase in the bcl-2 expression was observed in increasing grades of epithelial dysplasia, whereas bcl-2 expression was significantly decreased in ascending stages of squamous cell carcinoma thus, suggesting a possible role of bcl-2 in disease progression from premalignancy to malignancy.

Keywords: Apoptosis, bcl-2, epithelial dysplasia, immunohistochemistry, oral squamous cell carcinoma

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67. miRNA FOR THE ASSESSMENT OF LYMPH NODE METASTASIS IN PATIENTS WITH ORAL SQUAMOUS CELL CARCINOMA: SYSTEMATIC REVIEW AND META ANALYSIS

Jadhav KB, Nagraj SK, Arora S

Background: miRNA is one of the advanced epigenetic molecular markers correlating with lymph node metastasis in patients with Oral squamous cell carcinoma (OSCC). Numerous published papers are showing correlation of miRNA with metastasis. There is a need to analyze and validate such correlation. **Method:** English language literature in major databases from the last 20 years was searched using controlled vocabulary and keywords. Strict inclusion and exclusion criteria were followed for selection of studies. The quality assessment was done as per the QUADAS tool 2 by three independent reviewers. The meta analysis was performed by using random effect model. Standardized mean difference (SMD) was considered as the effect measure. Statistical software used was STATA version 13.1. **Results:** With all inclusion and exclusion criteria, eight studies could qualify for meta analysis. The pooled estimate is found to be 0.13 (-0.35, 0.62), $P = .585$, which is statistically not significant. This indicates that there is a no significant difference in the fold change between metastasis and no metastasis groups. P-value of chi-square statistic for heterogeneity is $<.001$ (significant), and I-squared statistic is 87.2%, which indicates that heterogeneity is present to a considerable extent. Egger's test shows there is no publication bias involved ($P = .819$). **Conclusion:** The meta analysis showed no significant difference in the fold change of miRNA expression between metastasis and non-metastasis OSCC patients. Future studies can be directed to eliminate the heterogeneity among the studies noted in this analysis to confirm the role of miRNA for assessment of regional metastasis with special focus on tongue squamous cell carcinoma.

Keywords: lymph node metastasis, miRNA, oral squamous cell carcinoma

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68. DNA VACCINES TARGETING NOVEL CANCER-ASSOCIATED ANTIGENS FREQUENTLY EXPRESSED IN HEAD AND NECK CANCER ENHANCE THE EFFICACY OF CHECKPOINT INHIBITOR

Wang C, Zainal NS, Chai SJ, Dickie J, Gan CP, Zulaziz N, Lye BKW, Sutavani RV, Ottensmeier CH, King EV, Abraham MT, Ismail SMB, Lau SH, Kallarakkal TG, Mun KS, Zain RB, Abdul Rahman ZA, Thomas GJ, Cheong SC, Savelyeva N, Lim KP

HPV-independent head and neck squamous cell carcinoma (HNSCC) is a common cancer globally. The overall response rate to anti-PD1 checkpoint inhibitors (CPIs) in HNSCC is ~16%. One major factor influencing the effectiveness of CPI is the level of tumor infiltrating T cells (TILs). Converting TILlow tumors to TILhigh tumors is thus critical to improve clinical outcome. Here we describe a novel DNA vaccines to facilitate the T-cell infiltration and control tumor growth. We evaluated the expression of target antigens and their respective immunogenicity in HNSCC patients. The efficacy of DNA vaccines targeting two novel antigens were evaluated with or without CPI using a syngeneic model. Most HNSCC patients (43/44) co-expressed MAGE4B and FJX1 and their respective tetramer-specific T cells were in the range of 0.06-0.12%. In a preclinical model, antigen-specific T cells were induced by DNA vaccines and increased T cell infiltration into the tumor, but not MDSC or regulatory T cells. The vaccines inhibited tumor growth and improved the outcome alone and upon combination with anti-PD1 and resulted in tumor clearance in approximately 75% of mice. Pre-existence of MAGE4B and FJX1-reactive T cells in HNSCC patients suggests that these widely expressed antigens are highly immunogenic and could be further expanded by vaccination. The DNA vaccines targeting these antigens induced robust T cell responses and with the anti-PD1 antibody conferring excellent tumor control. This opens up an opportunity for combination immunotherapy that might benefit a wider population of HNSCC patients in an antigen-specific manner.

Keywords: DNA vaccine, FJX1, MAGE4B, cancer antigens, cancer immunotherapy, head and neck cancer

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69. TRANSCRIPTIONAL ANALYSIS HIGHLIGHTS THREE DISTINCT IMMUNE PROFILES OF HIGH-RISK ORAL EPITHELIAL DYSPLASIA

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Oral potentially malignant disorders (OPMD) are precursors of oral squamous cell carcinoma (OSCC), and the presence of oral epithelial dysplasia (OED) in OPMD confers an increased risk of malignant transformation. Emerging evidence has indicated a role for the immune system in OPMD disease progression; however, the underlying immune mechanisms remain elusive. In this study, we used immune signatures established from cancer to delineate the immune profiles of moderate and severe OED, which are considered high-risk OPMD. We demonstrated that moderate and severe OEDs exhibit high lymphocyte infiltration and upregulation of genes involved in both immune surveillance (major histocompatibility complex-I, T cells, B cells and cytolytic activity) and immune suppression (immune checkpoints, T regulatory cells, and tumor-associated macrophages). Notably, we identified three distinct subtypes of moderate and severe OED: immune cytotoxic, non-cytotoxic and non-immune reactive. Active immune surveillance is present in the immune cytotoxic subtype, whereas the non-cytotoxic subtype lacks CD8 immune cytotoxic response. The non-immune reactive subtype showed upregulation of genes involved in the stromal microenvironment and cell cycle. The lack of T cell infiltration and activation in the non-immune reactive subtype is due to the dysregulation of CTNNB1, PTEN and JAK2. This work suggests that moderate and severe OED that harbor the non-cytotoxic or non-immune reactive subtype are likely to progress to cancer. Overall, we showed that distinct immune responses are present in high-risk OPMD, and revealed targetable pathways that could lead to potential new approaches for non-surgical management of OED.

Keywords: immune cytotoxic, immune signature, non-immune reactive, oral epithelial dysplasia, oral potentially malignant disorder, oral premalignant lesion

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70. PATIENTS' SATISFACTION AND QUALITY OF LIFE AFTER DENTAL IMPLANT REHABILITATION: A CROSS-SECTIONAL STUDY

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Objective: To investigate the patients' satisfaction and quality of life after dental implant rehabilitation. **Materials and methods:** This study was conducted in Mak Mandin Government Periodontic Clinic in Penang State. All patients with dental implant placed between 2015 and 2019 were included in this study. A self-administered questionnaire consisted of demographic questions (age, gender, race, educational level, medical status and smoking status) and patient's satisfaction assessment regarding their dental implants; and the short version of Malaysian Oral Health Impact Profile, S-OHIP (M) (Saub et al. 2005) questionnaire. Nine items included in the questionnaire was focusing on general satisfaction, chewing function, speech function, comfort, cleansability, appearance, surgical procedure, maintenance procedure and cost of the implant. The S-OHIP included 7 domains representing functional limitation, physical pain, physical disability, psychologic discomfort, psychologic disability, social disability and handicap. The patients indicated their rate on a 5-point Likert scale from 0 to 4. Statistical analyses were made using the SPSS version 26, statistical significance was considered for $p < 0.05$. **Results:** A total of 54 patients (38 females, 20 males) with 91 implants completed the questionnaire were included. Mean age of the participants were 51.78 ± 10.115 . Most of them were female (65.5%), Chinese (69%), no medical illness (62.1%), non-smoker (89.7%) and highly educated (74.1%). In general, majority of participants 56 (96.6%) were satisfied with the dental implant rehabilitation. All of them were satisfied with the speech function and maintenance procedure. The higher drawback was the satisfaction pertaining to cost (5.2%). Meanwhile, the mean of OHIP-14 score was 2.1 (SD: 3.11; ranged from 0 to 12) with the highest score for psychological discomfort (mean: 0.92, SD: 1.35) and the lowest score for psychological disability (mean: 0.00, SD: 0.00). **Conclusion:** Overall, all participants had OHIP-14 score ranged from 0 to 12 which can be considered as low score as noted by Slade GD, 1994. A lower OHIP-14 score indicated higher Oral Health Related Quality of Life (OHRQoL).

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71. ASSESSING CAREGIVERS' QUALITY OF LIFE AND SUPPORTIVE CARE NEEDS: A RASCH MODEL APPROACH FOR PSYCHOMETRIC TESTING

NMRR-20-3197-56291

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Introduction: The 41 item-Comprehensive Needs Assessment Tool for Cancer Caregivers (CNAT-C) and 29 item-Caregiver Oncology Quality of Life Questionnaire (CarGOQoL) were developed to assess the supportive care needs and quality of life of the caregivers for oncology patients. With excellent psychometric properties, however, none has been validated for Malaysian population. **Objective:** This study aimed to cross culturally validate these instruments concurrently among Malaysian population using Rasch Measurement Model. **Materials and Methods:** These instruments were forward- and back-translated into Malay and English for Malaysians to produce one single instrument (M-CNAT-C and M-CarGOQoL). Validity and reliability were confirmed by caregivers for oral cancer patients from Oral Cancer Clinic, University of Malaya. A total of eight and 31 caregivers confirmed the face validity and construct validity respectively. **Results:** Overall, M-CNAT-C and M-CarGOQoL showed good fitting with Rasch Measurement Model in terms of item and person reliability (0.95 logit, 0.97 logit), item and person separation (4.45 logit, 5.70 logit), item unidimensionality (observed raw variance explained by measures 62.1%, observed unexplained variance in 1st contrast 8.3%) and person fit. However, 16 items for each instruments showed misfit, thus these were rephrased after consulting with relevant experts. The response option rating scale exhibited misfit, but after new scale was introduced, good fit was evident. The response option scale was collapsed from 4 to 3 response options for M-CNAT-C, and from 5 to 3 response options for M-CarGOQoL. **Conclusion:** The 70-items M-CNAT-C and M-CarGOQoL exhibits robust measurement properties for caregivers of oral cancer patients.

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72. ORAL HEALTH-RELATED QUALITY OF LIFE IN CHILDREN FOLLOWING COMPREHENSIVE DENTAL TREATMENT UNDER GENERAL ANAESTHESIA IN SULTAN AHMAD SHAH MEDICAL CENTRE, KUANTAN: A PRELIMINARY STUDY

IREC 2021-203

Khairunnisa AB, Umi KR, Noorhazayti AH, Norzaiti MK

Introductions: Dental caries in children is a worrying oral health disease which is known as one of the most common non-communicable diseases worldwide and is often neglected. Comprehensive dental treatment under general anaesthesia (CDTGA) is often a sustainable option for children who cannot cope with difficult dental treatment under circumstances such as young age, fear in the dental setting and severity of the oral problems. Children with dental caries associated with a significant negative impact on the oral health-related quality of life (OHRQoL). The Early Childhood Oral Health Impact Scale (ECOHIS) was used to assess oral impacts on the quality of life of preschool aged children and their families. **Objectives:** The objectives of this study are (i) to assess children's oral health-related quality of life following a comprehensive treatment under general anesthesia in SASMEC, Kuantan, Malaysia after reported by children themselves as well as by their parents and (ii) to identify the most affected domain in early childhood oral health impact scale (ECOHIS). **Materials and methods:** A sample of 37 parents of children aged 3 to 8 years who underwent comprehensive dental treatment under general anaesthesia (CDTGA) were recruited from Sultan Ahmad Shah Medical Centre, Kuantan. Parents completed the Malay-ECOHIS for pre-treatment and post-treatment via phone call and/or WhatsApp link. The Malay-ECOHIS consists of 13 questions and is divided into two main parts, namely, the child impact section (9 items) and the family impact section (4 items). **Results:** 37 parents comprise of 32 females (86.5%) and 5 males (13.5%) completed the pre-and post-treatment. The overall ECOHIS percent change exhibited a statistically significant reduction of 22.55% after the treatment while the total CIS scores shows statistically significant with ($p < 0.05$). However, FIS scores showed no significance difference in COHRQoL with ($p > 0.05$). **Conclusions:** CDTGA in SASMEC is associated with considerable improvement in COHRQoL.

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73. ASSESSMENT OF PERIODONTAL HEALTH STATUS AMONG THE MILITARY PERSONNEL VISITING KUCHING ARMED FORCES DENTAL CLINIC, SARAWAK

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Introduction: In preparing the soldier in battle and to serve in Malaysian Army, an army personnel is compulsory to be mentally and physically fit which under the responsible of Royal Medical and Dental Corps (RMDC). Ensuring a healthy and fit-to-fight-force is paramount to the success of the Malaysian Armed Forces. Soldiers removing themselves from their duty station because of dental problems can impact overall unit effectiveness and affect the ability of the deployed force to achieve mission success. Periodontal disease is considered as a risk indicator for poor physical fitness in males and should be considered the prevention and intervention of it. **Objective:** Neither the prevalence of periodontal disease nor the factors affecting the periodontal disease among Malaysia military personnel has been well studied. The authors analyzed the periodontal health status to assess the prevalence of periodontal disease and determine the associations of sociodemographic status, oral hygiene habit and social/medical history with periodontal status among Malaysia military personnel. **Case Management:** In this cross-sectional study, 153 active-duty military personnel who visited Kuching Dental Armed Forces Clinic were randomly selected and was given a WHO-approved and regionally validated questionnaire was used. Clinical observation was performed based on the Plaque Index (PI), WHO CPI-modified and gingival bleeding score. Almost all of the soldiers had gingival bleeding [98.6% (95% CI= 96.4 to 100)]. The prevalence of shallow pocketing and deep pocketing was [55.1% (95% CI= 46.4 to 63.8)] and [31.9% (95% CI= 24.6 to 39.9)] respectively. Smoking status was the only factors associated with periodontal conditions ($p<0.001$). **Conclusion:** This periodontal status indicates a relatively high level of treatment needs among military personnel. Periodontitis causes early tooth loss and compromises service deployment. The annual dental check-up must include a thorough check up by a dental officer/periodontist and assessment with and appropriate radiograph once in every 4 years advised.

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74. IMPACT OF MATERNAL AND CHILD DENTAL ANXIETY ON ORAL HEALTH-RELATED QUALITY OF LIFE OF 5–6-YEAR-OLD PRESCHOOL CHILDREN

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Background: There is a lack of evidence with regards to the association between both maternal and child dental anxiety and the mother's perception of her child's oral health-related quality of life (COHRQoL). The aim of this study was to investigate the association of maternal and child dental anxiety with COHRQoL and the effect of demographic factors as moderators in this relationship. In addition, the association between child's dental caries experience and the COHRQoL was also assessed. **Methods:** A cross-sectional study was conducted involving 1150, 5-6 year-old preschool children in Selangor, Malaysia. Mothers answered a questionnaire on socio-economic status, the Malay-Modified Dental Anxiety Scale to assess maternal dental anxiety, and the Malay-Early Childhood Oral Health Impact Scale to assess COHRQoL. Child's dental anxiety was assessed using the Malay-Modified Child Dental Anxiety Scale via a face-to-face interview prior to oral examination to assess dental caries. Data were analysed using structural equation modelling to assess the relationship between maternal and child dental anxiety and COHRQoL. **Results:** Overall, complete data on 842 mother-child dyads were analysed. The mean scores of total ECOHIS, the child impacts section (CIS), and the family impacts section (FIS) were 17.7 (SD = 4.9), 12.6 (SD = 3.7), and 5.1 (SD = 1.9), respectively. The mean dental anxiety scores for mothers and children were 11.8 (SD = 4.5) and 16.9 (SD = 4.3), respectively. Maternal dental anxiety was associated with the CIS ($b = 0.08$, $p < 0.001$), the FIS ($b = 0.01$, $p = 0.001$), and the total ECOHIS ($b = 0.14$, $p < 0.001$). Maternal education level, income, urban/rural location, and kindergarten type were moderators to the relationship. In addition, there was also a significant relationship between child's dental caries experience and COHRQoL ($p < 0.001$). **Conclusions:** Maternal dental anxiety and child's dental caries experience have significantly impacted the COHRQoL, the CIS, and the FIS domains. Demographic factors such as maternal education, income, urban/rural location, and kindergarten type acted as moderators that can strengthen or weaken the relationship between maternal dental anxiety and COHRQoL of 5-6-year-old preschool children.

Keywords: Children, Dental anxiety, Dental caries, Oral health related quality of life, Structural equation modelling

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75. FACTORS INFLUENCING ORAL HEALTH-RELATED QUALITY OF LIFE AMONG PRESCHOOL CHILDREN IN DISTRICT OF KOTA BHARU, MALAYSIA: A CROSS-SECTIONAL STUDY

USM/JEPeM/18110725
NMRR-19-206-46630

Dolah S, Eusufzai SZ, Alam MK, Ahmad WMAW

Objective: To assess caries experience and its association with oral health-related quality of life (OHRQoL) of preschool children in Kota Bharu, Kelantan, Malaysia. **Material and Methods:** A sample of 169 preschool children of 5-6-year-old at a private preschool in the district of Kota Bharu, Kelantan was participated and were subjected to an oral examination to determine their caries experience by a single calibrated dentist. The parents were responding to self-administered Malay-ECOHIS and their sociodemographic background. Descriptive, Chi-square test and Spearman correlation were done to analyse the data required in this study. **Results:** Subjects comprised of girls (55.6%) with most parents (39%) had a secondary level of education, and 47.9% of them had a monthly income of RM1000-RM2999. Caries prevalence was 74.6% with a mean (SD) dmft was 5.27(5.22). The impacts on OHRQoL were more prevalent in the family section of Malay-ECOHIS (12.5%; 95%CI: 7.5%-17.5%) than the child section (4.2%; 95%CI: 1.16%-7.24%). Items related to 'felt guilty' (22.5%; 95%CI: 16%-29%) and 'been upset' (20.2%; 95%CI: 14.1%-26.3%) were the frequently reported on the family impact section. In child impact section, the item related to 'pain' (36.7%; 95%CI: 30%-43%) and 'difficulty eating' (20.8%; 95%CI: 14.7%-26.9%) were reported more frequently. Children with caries experience were significantly associated with the impact on family OHRQoL ($p < 0.05$). **Conclusion:** The presence of dental caries was a significant predictor of poor OHRQoL.

Keywords: Dental Caries, Quality of Life, Child, Preschool, Oral Health

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76. ORAL HEALTH AND NUTRITIONAL STATUS OF CHILDREN WITH CEREBRAL PALSY IN NORTHEASTERN PENINSULAR MALAYSIA

USM/JEPeM/16120598

Ahmad R, Rahman NA, Hasan R, Yaacob NS, Ali SH

Aims: To investigate the oral health and nutritional status of children with cerebral palsy (CP). **Methods and results:** Oral health assessment included dental caries and dental plaque maturity scores (DPMS) while the nutritional assessment included children's height-for-age Z-score (HAZ), body mass index-for-age Z-score (BAZ), mid-upper-arm circumference (MUAC), nutrient intake, cariogenic food frequency (CFF) and daily sugar exposure (DSE). Ninety-three CP children were recruited. The prevalence of caries was 81.7% (95% CI: 72.7%-88.3%). The median (IQR) of the DMFT and dft scores were 0.5(4.0) and 3.0(8.0), respectively. Most of the participants had acid producing plaque (90.3%), severely stunted (81.4%), and 45% were severely thin with acute malnutrition. Intakes of calcium, iron, zinc, vitamin A, vitamin D and total fat were below 77% of the Recommended Nutrient Intakes for Malaysian children (RNI 2017). Nine types of cariogenic foods/drinks were consumed moderately, and DSE indicated that 45% of the children were at moderate risk of dental caries. **Conclusion:** Untreated dental caries, severe stunting and thinness were prevalent, and cariogenic foods/drinks were consumed moderately suggesting a moderate risk of caries. Therefore, controlling cariogenic food intake is crucial, but monitoring daily nutrient intake is needed for the optimum growth of children with CP.

Keywords: children with cerebral palsy, nutritional status, oral health

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77. DENTAL PLAQUE MATURITY, CARIOGENIC FOOD FREQUENCY AND ANTHROPOMETRIC ASSESSMENT OF CHILDREN WITH LEARNING DISABILITIES IN KELANTAN

Rosnani N, Ruhaya H, Normastura AR

Objectives: To examine dental plaque maturity score (DPMS), cariogenic food frequency (CFF) and anthropometric measurement (AM) of children with learning disabilities (LD). **Methods:** A cross-sectional study was conducted on randomly 286 children with LD aged 7 to 14 years those enrolled in primary schools with special education integrated programme in Pasir Puteh and Bachok, Kelantan. Socio-demographic information of the children were yielded. DPMS of the children was determined by using GC Tri Plaque ID Gel®. The parents/guardians were face-to-face interviewed for CFF of the children using a validated questionnaire, focused on the frequency intakes of fifteen types of cariogenic foods and drinks from never/rarely up to 2-3 times daily. Anthropometric assessment involved height- for-age Z-score (HAZ), weight-for-age (WAZ) and body mass index-for-age Z-score (BAZ) were calculated via AnthroPlus™. Statistical analysis was done using SPSS software version 26.0 (IBM, Chicago). The significant level was set at $P < 0.05$. **Results:** About 286 children with LD [mean (SD) age = 10.2(1.7)] recruited in this study, whereby 99.7% were Malays and 64.0% were intellectually deficit category. Total DPMS mean (SD) was 1.75(0.38), whereas total mean (SD) CFF was 41.2(13.71). Eleven out of fifteen types of cariogenic foods and drinks assessed were consumed moderately (34.1-55.1%) with total mean CFF score was 39.2%. Total mean (SD) for HAZ, WAZ and BAZ were -1.15(1.489), -0.48(2.165) and 0.04(1.936) respectively. About one fourth of the subjects (24.6%) were stunted and severely stunted, one third (29.7%) were overweight and obese, and one tenth (11.1%) were thin and severely thin. **Conclusions:** Matured plaque was prevalent and most of cariogenic foods/drinks types were consumed moderately, which would result in caries risk among children with LD if not intervened. Stunted and overweight children crucially need appropriate nutritional monitoring and guidance to ensure healthy and optimum growth of children with LD.

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78. THE RELATIONSHIP BETWEEN PSYCHOSOCIAL DISTRESS AND ORAL HEALTH STATUS IN PATIENTS WITH FACIAL BURNS AND MEDIATION BY ORAL HEALTH BEHAVIOUR

F.1-1/2015/ERB/SZABMU

Chaudhary FA, Ahmad B

Background: There is limited discussion on the influence of psychosocial factors on the oral health of patients with a facial burn injury. This report investigated the relationship between oral health and psychosocial distress in patients with facial burns and the role of oral health behaviour in mediating the relationship. **Methods:** The data were part of a cross-sectional study that had systematically and randomly selected patients with > 10% total burn surface area from a burn centre in Pakistan. The oral health status (DMFT, CPI, OHI-S) and severity of facial disfigurement were assessed. Validated instruments in the Urdu language were self-administered and information relating to oral health behaviour (brushing and dental visits), oral health-related quality of life (OHIP-14), satisfaction with appearance, self-esteem, anxiety and depression, resilience, and social support were collected. The statistical analyses included simple linear regression, Pearson correlation, t-test, and ANOVA. Mediation analysis was carried out to examine the indirect effect by oral health behaviour. **Results:** From a total of 271 participants, the majority had moderate to severe facial disfigurement (89%), low self-esteem (74.5%), and moderate to high levels of social support (95%). The level of satisfaction with appearance was low, whereas anxiety and depression were high. Disfigurement and satisfaction with appearance were associated with lower self-esteem and social support ($p < 0.05$). Greater severity of disfigurement, higher levels of anxiety and dissatisfaction with appearance, and lower levels of self-esteem and social support were associated with greater DMFT and OHIP-14 scores, worse periodontal and oral hygiene conditions, and less frequent tooth brushing and dental visits ($p < 0.05$). The main barriers to oral healthcare utilization were psychological and social issues ($p < 0.05$). The indirect effect by oral health behaviour was not significant for anxiety but was significant for disfigurement, satisfaction with appearance, self-esteem, and social support. **Conclusion:** There is an association between the psychosocial factors and oral health of patients with facial burns through a direct effect and mediation by oral health behaviour.

Keywords: Behaviours, Burn, Disfigurement, Mediation, Oral health, Psychological

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79. ACCEPTABILITY OF DIFFERENT BEHAVIOUR MANAGEMENT TECHNIQUES IN PAEDIATRIC DENTISTRY: A STUDY OF CHINESE, INDIAN AND MALAY PARENTS

USM/JEPeM/19070410

Rahman MT, Kamarudin A, Eusufzai SZ, Mamat N, Zakaria AS, Karobari MI

Introduction: Uncooperative behaviours of Paediatric patients disrupt the quality of the treatment rendered, thereby increasing the treatment time, triggering restlessness amongst the young patients and in some instances increase risk of accidental injury. **Objective:** To assess the parental acceptance of different behaviour management techniques (BMTs) used during the dental treatment of children in three major ethnic groups (Chinese, Malay, and Indian) in Malaysia. **Methods:** A total of 72 parents were included in the study, further divided 3 groups depending on ethnicity. Two university hospitals within Malaysia were chosen for data collection in the years 2019 and 2020. A videotape was used according to American Academy of Paediatric Dentistry (AAPD) derived BMTs to showcase consenting parents ten of the AAPD approved BMTs in the following order: Tell Show Do, Voice Control, Modelling, Action Restraints, Distraction, Parents Present or Absent (PP/A), Hand Over Mouth (HOM), Nitrox Oxide (NO), Oral sedation (OS) and General Anaesthesia (GA). The parents were asked by a coordinator to mark on the scale. **Results:** Statistical analysis of individual BMTs revealed a significant difference in the three ethnicities ($P=.05$) with all other techniques remaining unremarkable when compared in the three groups. **Conclusions:** Tell-show-do, distraction and modelling parental presence/absence and reinforcements have been shown to produce similarly acceptable results amongst. Physical restraint, oral sedation and general anaesthesia were the least approved in the current study.

Keywords: Behavior management techniques, Dental treatment, Paediatric dentistry, Ethnic groups, Chinese, Malay, Indian

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80. ORAL HEALTH STATUS OF VISUALLY IMPAIRED CHILDREN AND ORAL HEALTH KNOWLEDGE, ATTITUDE AND PRACTICE OF THEIR CAREGIVERS AT HOSPITAL UNIVERSITI SAINS MALAYSIA: A PRELIMINARY STUDY

USM/JEPeM/19120856

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Introduction: Oral health status among visually impaired (VI) children have shown to be poorer when compared with their normal peers. This preliminary study aimed to determine the oral health status of VI children and knowledge, attitudes and practices of their caregivers. **Methods:** A preliminary, cross-sectional study were conducted on VI children and their caregivers attending Ophthalmology clinic Hospital USM. The assessment of oral hygiene was done using Sillness-Loe plaque index and dental caries using DMFT/dft index. Self-administered, validated questionnaires on knowledge, attitudes and practice towards a child's oral health was distributed to the caregivers. **Results:** A total of 27 VI children along with their caregivers participated in this study. The mean age of VI children and their caregivers was 11.4(3.05) and 41.7(7.10) respectively. The children showed a fair oral hygiene status. The median (IQR) for caries experience for deciduous teeth (dft) and permanent teeth (DMFT) was 0.0(5.00) and 1.0(4.00) respectively. Caries prevalence among VI children was high at 85.2% (95% CI:70.86% - 99.51%). The caregivers showed a relatively good attitude and practice towards their child's oral health with mean (SD) score of 23.2(2.95) out of 28 and 12.8(2.15) out of 19 respectively in comparison to low oral health knowledge of 5.5(1.50) out of 11. **Conclusion:** The oral hygiene status was fair with high prevalence of dental caries. Based on the score, although the caregivers showed to have minimal understanding on children's oral health, their attitude and practice towards children's oral health are relatively high.

Keywords: Oral hygiene, Knowledge, Visual impairment, Children, Caregivers

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81. UNDERSTANDING THE BEHAVIORAL PROBLEMS AND ORAL HEALTH STATUS OF CHILDREN WITH AUTISM SPECTRUM DISORDER: A NARRATIVE REVIEW

Mah RM, Abd Rahman N, Adnan MM, Bakar RS

Autism Spectrum Disorder (ASD) is a neurodevelopment disorder with an unidentified etiology and wide-ranging functional impact. This narrative review aimed to identify various behaviours and oral health problems among children with ASD, recognize the barriers towards oral health care, and identify the strategies for oral health care management. Online databases (Scopus, PubMed and Google Scholar) were used by using various search terms. All types of articles with different level of evidence were included. Articles which were not in English and were not available in full text were excluded. Various behavioural problems among ASD contributed to various oral healthcare challenges that lead to compromise oral health status. Caregivers and dental professionals have to identify these problems towards strategizing an effective oral health management for them. Therefore, this narrative review provides an insight towards controlling the oral health problems faced through preventative and practical approach for the children with ASD.

Keywords: Autism spectrum disorder, Behavioural problem, Oral health problems, Oral health management, Barriers to oral health care

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82. PERCEIVED ORAL HEALTH RELATED QUALITY OF LIFE SCORE AMONG DIFFERENT CATEGORY OF GENERAL HEALTH, ORAL HEALTH, DEVELOPMENTAL PROBLEMS AND ORAL SYMPTOMS OF CHILDREN WITH DOWN SYNDROME BY THEIR CAREGIVERS IN KELANTAN

Siti Nur Baiduri MJ, Normastura AR, Munirah MA

Background: Down syndrome (DS) children facing a marked challenge in maintaining optimal oral health (OH) that affect their oral health-related quality of life (OHRQoL). **Objectives:** To determine the proportion of perceived general health, OH, developmental problem, oral symptoms and OHRQoL score among DS children by their caregivers in Kelantan. **Materials & Methods:** A cross-sectional study was conducted on 34 caregivers of DS children aged 9-12 years old. Self-administered online validated questionnaire was distributed. Child Oral Health Impact Profile (C-OHIP) was measured the OHRQoL. Data were analysed using SPSS version 26.0. **Result:** Most of the caregivers were Malay (94.1%), mothers (64.7%) with the mean (SD) age of 46.8(1.15) while DS children age was 10.6(1.11) years old. Majority were in B40 group (below RM 4,849.00). Proportion of perceived general and OH status of their DS children was rated as good at 55.9% and 47.1% respectively. The highest perceived developmental problems were crooked teeth/spaces between teeth (73.5%), and oral symptoms were toothache and food sticking both at 55.9%. Based on C-OHIP domain, mean (SD) score for bad breath [1.56(0.82)], anxious [3.12(0.95)], avoid smiling [3.12(0.98)], felt different [3.12(1.09)], difficult paying attention [3.03(1.14)], avoid speaking [3.03(1.34)] and not having good teeth [2.50(1.02)] were scored lowest compared to the other items. **Conclusion:** Caregivers perceived good general health and OH for their DS children. However, they scored low on some of items in each of C-OHIP domains. Therefore, highlighting OH related issues affecting QoL of DS children is crucial to the caregivers towards improving the QoL of their children.

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83. AGE AND FACTORS OF SMOKING INITIATION AMONG MILITARY COMMUNITY IN KELANTAN

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Background: Cigarette smoking is one of the risk factors for chronic diseases which may affect the health readiness of army personnel. **Objective:** To determine age and factors of smoking initiation among army personnel in Kelantan. **Materials & Methods:** A cross-sectional study was carried out on Dec 2020 among 134 voluntarily involved infantry army personnel who smoked in Kelantan. A validated Bahasa Malaysia questionnaire was used to assess army personnel's history of smoking used. Descriptive statistics were calculated using SPSS version 26. **Result:** All (100%) respondents were male, and the majority (83.6%) were Malays with the mean age of 26.6 (SD 7.10) years. Most of them received the highest level of education at secondary school (89.6%), while others (10.4%) went to the higher institution. Most of them were having marital status of single (59.7%) and lived in the camp (69.4%). The mean age to start smoking among respondents was 15.8 (SD 3.20). Factors associated with the initiation of smoking includes curiosity (59.2%), influence by friends (53.8%), stress (17.7%) and influence by family members (3.1%). Twelve respondents (9.0%) had a history of using drug and four (3.0%) with a history of addiction to alcohol. **Conclusion:** Army personnel-initiated smoking before enlisted in the force. Curious about smoking, influence by friends and family members and stress were found to be the factors of smoking initiation among army personnel in Kelantan.

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84. CONSTRUCT VALIDITY AND RELIABILITY OF CARIOGENIC FOOD FREQUENCY QUESTIONNAIRE (CFFQ) FOR GUARDIANS OF 6-11 YEARS OLD CHILDREN IN KOTA BHARU, KELANTAN

Anis Nadia I, Ruhaya H, Wan Muhamad Amir WA

Background: The Cariogenic Food Frequency Questionnaire (CFFQ) on sugary foods and beverages is a tool to assess the consumption of cariogenic food among school children. Objective: This study aims to conduct the construct validity and reliability of Bahasa Malaysia CFFQ. **Materials & Methods:** The CFFQ consisting of 65 items was administered twice. The pilot study was conducted on 40 respondents. Internal consistency reliability was assessed using Cronbach's alpha. Exploratory Factor Analysis (EFA) (principal components with Varimax rotation) was used to determine dimensionality. The questionnaire was revised and items that were found to have reliability less than 0.7 and items that were not grouped together in EFA were removed. For the extensive study, the revised questionnaire was distributed to 50 respondents and reassessed. **Result:** Analysis of CFFQ in the pilot test showed that 7 domains had very good internal consistency while 3 domains had an unacceptable level of internal consistency. In this case, the value of Kaiser-Meyer-Olkin under EFA indicates the suitability of the data structure, and the p-value of Bartlett's Test of Sphericity is less than 0.05, with an acceptable factor loading. The extensive study showed very good internal consistency for 7 domains while 3 domains had an acceptable level of internal consistency. In this study, the value of Kaiser-Meyer-Olkin under EFA indicates the appropriateness of the data structure, and the p-value of Bartlett's Test of Sphericity is less than 0.05, with an acceptable factor loading. **Conclusion:** These results provide evidence for the reliability and validity of the Bahasa Malaysia CFFQ.

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85. PREVALENCE AND FACTORS ASSOCIATED WITH SMOKING STATUS AMONG CHILDREN IN BACHOK COASTAL LINE, KELANTAN

Nurul Zatil Ismah I, Munirah MA, Normastura AR

Background: Smoking initiation at an early age among children is worrying in Malaysia. **Objective:** To determine the prevalence of ever smoker among children aged 10 to 12 years old and factors associated with the smoking status. **Materials & Methods:** A cross-sectional study was conducted from 12th to 14th March 2020 on conveniently selected 23 children aged 10 to 12 years old from Perupok, Bachok, Kelantan. A self-administered questionnaire adapted from a validated Tobacco and E-Cigarette Survey Among Malaysian Adolescents questionnaire was used for data collection. The statistical analyses were run using IBM SPSS 24. **Result:** Amongst the children, 52.2% were males, the mean age 11(SD2), and 100.0% Malays and Muslims. The prevalence of ever smoker was 21.7% (95% CI:8.29,44.21), with the mean age of smoking initiation of 6.4(SD1.14). Of the ever smokers, the youngest age to initiate smoking was five years old, 20.0% (95% CI:1.05,70.12) females, 40.0% (95% CI:7.26,82.96) smoked cigarette, and 60.0% (95% CI:17.04,92.74) smoked both cigarette and e-cigarette. The smoking initiation was significantly associated with seeing friends ($p=0.017$) and school security ($p=0.040$) smoking, and exposure to the anti-smoking campaign from the radio ($p=0.048$). Only 43.5% knew that nicotine could cause addiction, and the knowledge was significantly higher among children who smoked ($p=0.038$). **Conclusion:** The prevalence of ever smoker was alarming and initiated at a young age. Seeing a friend and school security smoking, exposure to the anti-smoking campaign from the radio, and knowledge related to smoking were significantly associated with the smoking initiation.

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86. CHILDREN WITH AUTISM SPECTRUM DISORDER : COOPERATIVENESS DURING ORAL EXAMINATION AND ORAL HEALTH STATUS

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Introduction: Autism spectrum disorder (ASD) is a behavioral problem which can affect oral health care of the children and compromised their oral health status. **Objectives:** To assess cooperativeness during oral examination and oral health status of children with ASD. **Methods:** A cross-sectional study was conducted among children with ASD aged 7-12 years. Sociodemographic profiles were obtained. Children's cooperation during oral examination was assessed using the Frankl Behavioural Rating Scale. Dental plaque and gingival status were recorded using the Simplified Oral Hygiene Index (OHI-S) and Gingival Index (GI) respectively, while caries experience was determined using the DMFT/dft index. Statistical analysis was performed using IBM SPSS version 26.0. **Results:** Thirty-two Malay children were recruited with mean (SD) age at 8.7 (1.52) years and mostly were presented with moderate ASD (62.5%). The majority of the children displayed cooperativeness during the oral examination. 84.4% were capable to enter the dental clinic and sit in the dental chair (84.4%), 93.8% were willingly to open their mouth and show their teeth, and 78.1% were successfully examined with a mouth mirror. 43.8% displayed good oral hygiene status with mean (SD) OHI-S score at 0.8 (0.76). In addition, 71.9% of the children were free from gingivitis with mean (SD) GI score at 0.1 (0.27). Caries prevalence in the permanent and deciduous dentition were 34.4% (95% CI : 18.6, 53.2) and 68.8% (95% CI :50.0, 83.9) respectively. **Conclusion:** In this study, children with ASD showed cooperativeness during oral examination, satisfactory oral hygiene status and low prevalence of gingivitis. Nevertheless, high caries experience was noted among these children.

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87. STIGMA AND DEPRESSION AMONG TUBERCULOSIS PATIENT IN KEDAH, MALAYSIA

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Introduction: Tuberculosis (TB) related stigma is one of the important barriers in global TB control and prevention programme. TB stigma often cause psychological distress among patients which can impede their disease coping ability, affect treatment adherence, and reduce quality of life. More importantly, stigma may also lead to depression and these conditions frequently coexist, exerting negative impact on the management of TB. **Objective:** To determine the level of stigma among TB patients and the factors associated with it as well as to ascertain the relationship between level of stigma and depression. **Methods:** This is a cross sectional study using convenient proportionate sampling method. We recruited 200 TB patients from three tertiary government hospitals in Kedah. Case report form, a Malay version of 12 item TB stigma scale (TSS) and Beck Depression Inventory were used for data collection. Data were then analyzed using simple and multiple linear regression. **Results:** The mean score of tuberculosis stigma from patient perspective was 13.3 (6.87). The TSS scale has a minimum score of 0 while maximum score is 36. Younger age patient, currently married, higher education, unemployment, and HIV co-infection were significantly associated with higher stigma experienced. In addition, there was a moderate, positive correlation between stigma and depression which was statistically significant ($r = 0.345$, $p < 0.001$). The mean score of tuberculosis related stigma was not as high as we initially postulated. Nevertheless, higher level of stigma was found to be statistically correlated with higher depression level. **Conclusion:** Thus, intervention to reduce stigma among tuberculosis patients can be helpful as it may reduce the depression level.

Keywords: Tuberculosis, TB, stigma, depression

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88. KNOWLEDGE, ATTITUDE AND STIGMA ON TUBERCULOSIS AND THE ASSOCIATED FACTORS FOR ATTITUDE AMONG TUBERCULOSIS CONTACTS IN ALOR SETAR, KEDAH

Loh SY, Zakaria R, Mohamad N

Introduction: Tuberculosis (TB) is a worldwide public health crisis and it infects millions of people each year worldwide. Malaysia was categorised as an intermediate TB-burden country. TB contact is referring to any individual who was exposed to a person with TB disease. TB contacts are at higher risk of acquiring TB infection and they are candidates for active and latent TB infection screening and eventual treatment. Thus, the World Health Organization (WHO) considers investigation of TB contacts as an essential programme to control TB. **Objective:** The aim of the study was to explore the level of knowledge, attitude and stigma on TB and the associated factors for attitude score among TB contacts in Kedah, Malaysia. **Methods:** A cross-sectional study was performed among TB contacts using a validated structured knowledge, attitude, and stigma on TB questionnaire. There were 338 respondents selected via convenience sampling from the 5 health clinics in Kedah, Malaysia. The data was analysed using simple and multiple linear regression. **Results:** The mean (SD) for knowledge, attitude, and stigma scores for participants are 73.48% (17.06), 82.95% (10.33), and 66.99% (16.72) respectively. Income, knowledge score and stigma score were found statistically significantly associated with attitude score ($p < 0.001$). Our study highlighted that the TB contacts generally have a satisfactory knowledge, positive attitude, and high stigma on TB. The significant associated factors for better attitude towards TB were higher income, better knowledge, and higher stigma on TB. **Conclusions:** Implementation of TB intervention programmes particularly addressing on health education about knowledge on TB are required. More studies should be conducted across TB contacts as they are the main reservoir for new TB cases.

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89. AN OVERVIEW ON BETEL QUID AND ARECA NUT PRACTICE AND CONTROL IN SELECTED ASIAN AND SOUTH EAST ASIAN COUNTRIES

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Background: Areca nut (AN) and betel quid (BQ) chewing are ancient practices followed by an extensive proportion of the world's population. These practices are endemic in larger parts of South and Southeast Asia and selected Western Pacific countries. The prevalence of these habits varies across regions, age, gender, cultural practice, and socioeconomic status groups. Considerable variations exist between countries with respect to prevention/intervention programs, and policy guidelines of BQ usage. **Objectives:** (1) To provide an overview of the BQ chewing prevalence, practices, preventive interventions and policies in selected Asian and Western Pacific countries. (2) To explore the different terminologies associated with BQ use. **Method:** A narrative review of the current literature related to BQ, AN, and oral cancer was conducted by searching PUBMED, CINAHL, and GOOGLE databases. **Results:** The literature review revealed that the prevalence of BQ was found to be highest in Papua New Guinea, followed by Bangladesh, India, Pakistan, Myanmar and Sri Lanka. While, Cambodia, Malaysia, Indonesia and Taiwan had comparatively lower prevalence. Smokeless tobacco, BQ with tobacco, BQ without tobacco, AN were some of the terminologies used for BQ in various studies. **Conclusions:** The prevalence, and the interventional policies related to BQ and AN chewing habit varies widely among the selected countries. With the increasing awareness and association of BQ with oral cancer, there is a need to have better awareness, prevention and interventional strategies in place. We also found considerable variation in the use of terminologies associated with BQ.

Keywords: Areca nut, betel quid, chewing tobacco, intervention, piper betel, prevalence, terminology

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90. A NEW FLAP DESIGN COMPARED WITH OTHER FLAP DESIGNS ON POSTOPERATIVE POCKET DEPTH FOLLOWING SURGICAL REMOVAL OF MANDIBULAR THIRD MOLAR

Loganathan K, Mohan J, Vaithilingam B, Chawla R, Gandhi NR, Ganapathy SK

Introduction: Surgical removal of mandibular third molars is the most frequently performed minor oral surgical procedure. **Aims:** This study aims to evaluate its effect on periodontal status of second molars at 3 and 6 months' follow-up comparing extractions done by three different flap techniques. **Settings and Design:** Prospective randomized control clinical study. **Subjects and Methods:** Ninety medically healthy controls of both gender, aged between 18 and 50 years who underwent surgical removal of impacted mandibular third molars were divided into Group A, Group B and Group C wherein Bayonet flap, modified envelope flap and envelope flap was raised, respectively. Pocket depth at distobuccal and distolingual aspect of adjacent second molar was measured and compared for each group at preoperative as well as 3 and 6 months' follow-up. **Statistical Analysis Used:** ANOVA, paired t-test, and Tukey post hoc test using SPSS software. **Results:** There was no statistically significant difference found between pocket depths distal to second molars following impacted third molar extraction between three different flap groups. However, a significant reduction of pocket depth was noted from 3 to 6 months' follow-up for all three flap groups. **Conclusions:** Flap designs used for impacted third molar extractions do not contribute toward the alteration of periodontal health of second molars.

Keywords: Impacted third molars, new flap design, periodontal health, pocket depth

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91. COMPARATIVE ANALYSIS OF RETENTION AND BITE FORCE IN COMPLETELY EDENTULOUS PATIENTS WITH TORUS PALATINUS RESTORED WITH TWO DIFFERENT DENTURE DESIGNS

Vaithilingam B, Mohan J, Loganathan K, Lnu M, Varghese T

Aim and objective: This study aimed to investigate the retention and bite force in completely edentulous patients with torus palatinus rehabilitated with two designs, one with window to accommodate the tori which is later modified to a horseshoe-shaped complete denture. **Materials and methods:** A total of 66 patients, with tori requiring complete denture, were included in the study. The retention was measured during 3 months follow-up with both designs. The denture bases with different designs were subjected for evaluation of retention using a Handheld Digital Push-Pull Force Gauge Meter to evaluate the retentive values of the denture bases. The bite force was measured at the first molar region by a custom-built occlusal force meter at 1 week, 1 month and 3 months intervals during follow-up. **Results:** The results of the study showed that there was not much significant difference between the two denture designs in terms of their retention. The mean biting force was statistically significant different between both the designs, with the horseshoe design showing higher values compared to the denture with window. **Conclusion:** Among the two designs, retention values were approximately the same with both the designs and there was a significant difference in bite force values with the horseshoe-shaped denture. **Clinical significance:** Some intraoral anatomical features can negatively affect certain patients and complicate prosthodontic intervention. In this study, the horse shoe-shaped complete denture proved to be an effective treatment option compared to the denture with the window.

Keywords: Bite force, Denture designs, Retention, Torus palatinus

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92. PREVALENCE, PATTERNS AND PERCEPTION OF TOBACCO USE AMONG HEALTH SCIENCES UNDERGRADUATE STUDENTS IN MALAYSIA: A CROSS SECTIONAL STUDY

Priyadarshini R, Bennete F, Avita R

The aim of this study was to determine the prevalence and patterns of tobacco use among health sciences undergraduate students. A cross-sectional study was conducted among 422 students in four health sciences faculties at a private university in Kota Damansara, Selangor Malaysia. Data was collected through a self-administrated validated questionnaire, adopted and modified from the Global Youth Tobacco Survey. The survey was administered online using a Google Form for the participants to fill. Data was analysed using SPSS version 22. Descriptive statistics was used to express results in percentage. Chi-square test and multivariable logistic regression was used to test the association of smoking status and demographic variables. p value of <0.05 was considered as statistically significant. Results showed that more than 90% of the respondents were aware of the harmful effects of tobacco and effects of passive smoking. About one fifth of the participants had used tobacco (19%) in our study. Out of the tobacco users, 95% had used tobacco in more than one form. The most important reasons for smoking were peer pressure (36%) and stress (35%). No significant differences were found between age, faculty, year of study, or nationality, with the use of tobacco. Multivariable logistic regression analysis showed significant gender differences in smoking with more smokers among males than females. In conclusion, about one fifth of the health science undergraduate students had used tobacco products in our study reflecting a seemingly inappropriate portrait as compared to their future careers as health professionals. Therefore, there is an urgent need for reinforcement of education and assistance on quitting tobacco usage among the undergraduates of health science faculties.

Keywords: tobacco use, health sciences students, prevalence, pattern

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93. CLINICAL AND CYTOLOGICAL FINDINGS IN ORAL CAVITY OF YOUNG SHISHA SMOKERS AND NON-SMOKERS – A COMPARATIVE STUDY

SEGiEC/StR/ FOD/14/2017-2018

Ramamurthy PH, Fernande BA, Tegginamani AS, Rath A, Sidhu P, Zamzuri ATB

Introduction: Shisha, a form of smoking tobacco is known to be detrimental to oral health. Yet, the effects of shisha on oral health is not well documented. Hence, this study was undertaken to compare the clinical and cytological findings in oral cavity of young shisha smokers as compared to non-smokers.

Materials and methods: A cross-sectional analytical study was undertaken among 60 subjects including 30 young shisha smokers and 30 non-smokers. Clinical examination was carried out to record gingival status, periodontal status, oral hygiene and dental caries experience. Exfoliative cytology was used to study the cytological changes of buccal mucosal cells. Data was analysed using SPSS version 22. Student's t-test, Fisher's exact test and odd's ration was used for comparison. $p < 0.05$ was considered statistically significant.

Results: No significant differences were found between the groups with respect to proportion of subjects with gingivitis ($p = 0.071$), erosion ($p = 0.085$) and dental caries experience ($p = 0.329$). However, shisha smokers had poorer oral hygiene and more severe gingival inflammation as compared to non-smokers with $p = 0.026$ and $p = 0.007$ respectively. The odds of having atypical cells in oral mucosa among shisha smokers was 3.76 times higher than the non-smokers. **Conclusion:** The findings of our study showed that young shisha smokers had more atypical cells in oral mucosa as compared to their non-smoking counterparts. However, longitudinal studies are needed to affirm the findings of this study.

Keywords: Shisha, water pipe, tobacco, oral health, cytology

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94. SECONDHAND SMOKE EXPOSURE FROM THE INDOOR AND OUTDOOR SHISHA CENTERS LOCATED AT THE PERIMETER OF EDUCATIONAL INSTITUTIONS IN MALAYSIA: A CROSS-SECTIONAL STUDY

Veerabhdrappa SK, Yadav S, Ramachandra SS, Dicksit DD, Muttalib KBA, Zamzuri ATB

Shisha is a centuries-old traditional smoking habit rapidly gaining popularity among the students and young adults in Malaysia. The present study evaluated secondhand smoke exposure (SHS) and characteristics of 25 indoor and 25 outdoor shisha centers (SC) operating around the educational institutes such as universities in Petaling Jaya, Malaysia. We observed a significantly higher particulate matter (PM)_(2.5) concentration in indoor than outdoor SC (3595.28 µg/m³ and 65.12 µg/m³, $p < 0.001$, respectively). SCs are offering different flavors to attract clients and exposing students and young professionals to a significantly high concentration of SHS. Such exposures may pose a serious health risk. Therefore, policymakers need to strengthen tobacco guidelines and eliminate loopholes in the sale of shisha by enforcing comprehensive and strict smoke-free laws.

Keywords: Educational institutes, Malaysia, Policy, Secondhand smoke, Shisha smoking, Tobacco

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95. A CROSS-SECTIONAL STUDY TO EVALUATE THE ASSOCIATION OF BODY MASS INDEX WITH ORAL HEALTH STATUS

Ugrappa S, Pragas H, Juin HW, Han HZ, Way HJ, Jain A, Marimuthu KA

Purpose of the study: To evaluate the association between BMI and oral health status, along with the frequency of tooth brushing and frequency of food intake. **Methods:** This study was conducted at outpatient clinic, for adults who had visited to the dental clinic. The decayed, missing, and filled teeth (DMFT) index and Periodontal Disease Index (PDI) were used to determine the prevalence of dental caries and periodontitis respectively. Multiple linear regression analysis was used to determine the association between age, BMI, frequency of tooth brushing and food intake with DMFT and PDI. **Results:** A total of 100 subjects were enrolled with a mean age of 33 years. Of the 100 subjects, 10% were underweight, 56% were normal, 25% were overweight and 9% were obese upon BMI calculation. There was a positive correlation between age versus PDI and age versus DMFT and this correlation was found to be statistically significant ($p=0.00$). There is a negative correlation of BMI, frequency of food intake and tooth brushing with PDI and positive correlation with DMFT was noticed. The multiple linear regression analysis showed that age and frequency of tooth brushing was influencing PDI and DMFT significantly. **Conclusions:** A negative correlation between the PDI and BMI but positive correlation with DMFT and BMI was observed. Longitudinal studies with a larger sample size are required to confirm the association of body mass index and periodontal disease and dental caries.

Keywords: Body mass index, DMFT, frequency of food intake, PDI, tooth brushing

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96. PREVALENCE OF SELF-PERCEIVED ORAL MALODOR, ORAL HYGIENE PRACTICES AND SMOKING HABITS, AMONG PRIVATE DENTAL COLLEGE STUDENTS, MALAYSIA

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Halitosis or oral malodor is characterized by unpleasant odor arising from the oral cavity. The prevalence of halitosis however is not studied extensively. A structured questionnaire consisting of 10 questions was administered to 226 undergraduate dental students of a private dental college, Malaysia. A total of 63 out of 226 (27.9%) participants were male and 163 were female. This shows that there are more female dental students who participated in this research than male dental students. Out of 226, 35.4% students reported self-perceived halitosis. It was also seen that bad breath did not affect the social lives of the majority (97.3%) of participants. The results of this study indicate higher prevalence and awareness of halitosis among this population consisting of dental students. All participants brushed their teeth and cleaned the tongue regularly but use of dental floss was extremely low. The prevalence of smoking was very less and maximum students do not smoke. Most students have good oral hygiene and good oral health as in overall percentage. It is highly recommended both male and female students put more emphasis on self-perception of healthy conditions and behaviors as they have to be healthy role models for their patients. The awareness of halitosis as an individual entity should be promoted to the general population and the therapeutic measures should be made available to all.

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97. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF NICOTINE DEPENDENCE AMONG MALAYSIAN ADOLESCENT SMOKERS

NMRR-18-3415-44030

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It is well established that nicotine dependence could provide information regarding an individual smoking frequency and habits. Here, a cross-sectional study was conducted among students ($n = 349$) identified as smokers from four secondary schools in Negeri Sembilan, Malaysia. Students (13-17 years of age) completed a self-administrated questionnaire that sought to understand their smoking patterns and self-reported nicotine dependence level, the latter ascertained from scores of a Hooked on Nicotine Checklist (HONC). The survey revealed the majority of adolescent smokers were male (~93%), both among students attending urban and rural schools, and came from households with a total monthly income of $\leq$ MYR 3,900 (USD 933) (low income bracket). Mean $\pm$ standard deviation (SD) HONC score for adolescents from rural schools was higher (3.1 ± 2.8) compared to those attending urban schools (2.3 ± 2.4). Multiple logistic regression analysis revealed independent factors associated with nicotine dependence were male gender, exhaled breath carbon monoxide level of ~ 1 ppm, perceived ability to quit smoking, and requirement of assistance to quit smoking. These results should provide insights into problems that need to be addressed in improving smoking prevention programs targeting students, in particular taking into account differences in smoking behavior between those attending schools located in rural and urban settings.

Keywords: addiction, nicotine, adolescence, Hooked on Nicotine Checklist, smoking

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98. ANTI-PLAQUE EFFICACY OF HI-ORA MOUTHRINSE AND 0.12% CHLORHEXIDINE GLUCONATE IN PATIENTS WITH CHRONIC GINGIVITIS: A CASE-CONTROL STUDY

Mathew M, Joyshree C, Ratan VJ, Kartheek V, Thirumalai S, Banothu MN

Background: Chlorhexidine (CHX) gluconate has remained the gold standard chemical plaque control agent till date, though, being associated with several disadvantages including its tendency to stain teeth and leading to irritation of soft tissues. To overcome these inherent disadvantages, there has been a surge of studies in the recent past to evaluate the efficacy of herbal mouthrinses as against CHX. **Objective:** The present study was planned to compare the anti-plaque efficacy of Hi-Ora mouthrinse as against 0.12% CHX in patients with chronic gingivitis. **Materials And Methods:** The present study was designed as a case-control study including 90 patients with chronic gingivitis who were divided into 3 groups including Group A in which 0.12% CHX was prescribed, Group B in which patients were prescribed Hi-Ora and Group C in which normal saline was prescribed after oral prophylaxis while the mean Gingival Index (GI) and Plaque Index (PI) scores were recorded on the 5(th) postprocedural day. **Results:** The mean GI score in CHX group was found to be 0.70 ± 0.25 as against 0.66 ± 0.16 in Hi-Ora and 1.59 ± 0.55 in normal saline groups. Similarly, the mean PI score in CHX group was found to be 0.80 ± 0.31 as against 0.77 ± 0.30 in Hi-Ora and 1.86 ± 0.61 in normal saline groups. **Conclusions:** The results of the present study suggested Hi-Ora to be more effective than 0.12% CHX in reducing the mean GI and PI scores among all the 3 groups.

Keywords: Case-control studies, chlorhexidine, gingivitis, normal saline

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99. THE EFFECT OF CARIES EXPERIENCE AND PSYCHOSOCIAL STATUS TOWARDS MALAYSIAN HOMELESS ORAL-HEALTH RELATED QUALITY OF LIFE

NMRR-13-1457-18316

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Objective(s): The objectives of this research was (i) to assess the caries experience, psychosocial status and oral health-related quality of life (OHRQoL) of Malaysian homeless and (ii) to determine the impact of the homeless caries experience and psychosocial status towards their OHRQoL. **Method:** A non-probability convenience sample of homeless people residing in five different states was collected. All consented participants were interviewed to complete a questionnaire on their depression status, dental anxiety, and OHRQoL. The Depression Anxiety Stress Scale (DASS-21), Modified Dental Anxiety Scale (MDAS) and Oral Health Impact Profile (OHIP-14) were used to measure each variable respectively. Clinical examination was conducted to assess the caries experience using DMFT index. Data were examined using multiple regression analysis in SPSS. **Results:** There were 192 homeless people included in the study. Participants had high caries experience with a mean DMFT score of 9.39 (SD=7.59). Dental anxiety was high (63%), with 10% scoring as dentally phobic. Fifty-two percent were found to have experienced depression. Prevalence of OHRQoL impact was 72.9%. Homeless OHRQoL was found to be significantly predicted by their caries experience ($\beta=0.29$, $p<0.001$), dental anxiety ($\beta=0.23$, $p<0.01$) and depression status ($\beta=0.25$, $p<0.001$). **Conclusion:** The high prevalence of caries experience, depression and dental anxiety was evidently affecting the Malaysian homeless OHRQoL. These findings emphasize the importance of addressing the oral health and psychosocial needs of the homeless.

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100. DEMOGRAPHICS OF ORTHOGNATHIC CASES SEEN IN KULLIYAH OF DENTISTRY, INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

IREC 2021-026

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Introduction: Orthognathic treatment is a combination of orthodontics and surgery, aimed to restore functional occlusion and the facial aesthetics. KOD orthognathic team has been established since 2018. There was no published demographic profile of the orthognathic patients referred. **Objectives:** This study aimed to enumerate the demographic data and correlations for the orthognathic cases seen in KOD, IIUM from 2018 until December 2020. **Materials and methods:** A total of 28 patients were referred for consultation. One patient was excluded as no referral letter was attached. Data were obtained from patients' case notes, photos and study models. Data collected were then categorized into patients' demographic profiles, clinical features, patients' psychological status and treatment. The demographic pattern and correlations were analysed using SPSS version 25.0. **Results:** Out of 27 patients, most patients were females (66.7%), Malay (55.6%) and within the age group of 21 to 30 years old (44.4%) and originated from Pahang (88%). Majority of patients presented with Class III skeletal base discrepancy (66.7%), facial asymmetry (76.0%), increased vertical dimension (51.9%), shifted chin point (83.3%), Class III incisal relationship (70.4%), reversed overjet (70.4%), reduced overbite (56.0%) and crossbite (77.7%). Significant relationships were found between skeletal base discrepancy with incisal relationship, overjet, crossbite, canine relationships and right molar relationship. 57.1% agreed to orthognathic surgery, 32.1% opted for orthodontic treatment alone whilst 10.7% refused any treatment. **Conclusions:** It is hoped that this baseline demographic data may aid in the management and resource planning for this team in the future.

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101. HIGH LEVEL OF ORAL DISEASE AND SELF-REPORTED PERFORMANCE IMPACTS IN MALAYSIAN ELITE ATHLETES

DF RD1904/0038

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Background: Oral health can affect performance, including athletes who always need to be in their best conditions during training and competitions. However, oral health awareness has never been a priority among Malaysian athletes. **Objective:** This study primarily aimed to assess the association between oral health status and self-reported impact on athletes' sports performance, using the Oral Health Screening Toolkit for Athletes developed by University College London, UK. **Design/Setting/Participants:** This is a cross-sectional study using convenience sampling. Data were collected among elite athletes registered under the National Sport Council (NSC), Malaysia. **Interventions/Outcome:** measures Demographic data, self-reported questionnaire and clinical oral examination were recorded and collected. **Result:** We recruited 249 athletes with the median age of 20 (range 13–43). Active caries (ICDAS code ≥ 3) was found in 66.8% athletes with periodontal diseases (BPE code ≥ 1) in 84.9%. A quarter of those with both diseases were youth athletes. Pericoronitis was also found in 4.7% athletes while 9% have pulpitis, abscess or ulcer (PUFA). Approximately 23.2% of athletes felt their oral health was not good during data collection with 32.5% reported moderate-to-severe impact of oral-related problems on their sports performance over the past 12 months: oral pain (10.5%), difficulty participating in training and competition (11.4%), performance affected (6.4%) and reduction in training volume (6.3%). Chi-square test of independence showed that there is a relationship between both diseases with ethnicity and sports type (individual-team or endurance-strength-mixed). Periodontal diseases were also seen related to age and education level. Approximately 5.5% of the athletes reported never seeing a dentist before. **Conclusion:** High levels of oral diseases were found in Malaysian elite athletes with common self-reported impacts on performance. This study hopes to create oral health awareness among Malaysian athletes and authorities so that it will be proportionately integrated into athlete health programmes in the future.

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102. ASSESSING THE POTENTIAL ASSOCIATION BETWEEN EPSTEIN-BARR VIRUS AND ORAL SQUAMOUS CELL CARCINOMA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: This study aims to qualitatively and quantitatively review the association between Epstein-Barr virus (EBV) and oral squamous cell carcinoma (OSCC). **Methods:** PubMed, Scopus, and Web of Science databases were searched using the keywords "EBV or Epstein Barr virus and Oral cancer or Oral squamous cell carcinoma" for published case-control studies in the English language upto August 2019. **Results:** The search yielded 985 articles out of which 966 articles were excluded by screening their titles and abstracts as they were irrelevant or duplicates. Based on the full-text assessment of the remaining 19 articles, only 7 satisfied the inclusion criteria and were included in the qualitative analysis, out of which only 4 were compatible to be included in the meta-analysis. The diagnostic modalities used included immunohistochemistry, in situ hybridization and polymerase chain reaction. The diagnostic targets included latent membrane protein (LMP)-1, EBV determined nuclear antigen-1, EBV-encoded small non-polyadenylated RNA-2. The meta-analysis showed that there is an association between the EBV and OSCC. **Conclusions:** Determining the association of EBV with OSCC is highly tedious due to the contrasting data obtained from individuals' studies which in turn is due to the wide variations in the sensitivity and specificity of the diagnostic modalities used and diagnostic targets selected. Although the meta-analysis revealed an association between EBV and OSCC, the number and the quality of the studies included in the meta-analysis are limited, thus the association requires further validation for any conclusive inference.

Keywords: Epstein-Barr virus (EBV), meta-analysis, oral squamous cell carcinoma (OSCC)

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103. PREVALENCE AND ASSOCIATION OF BRUXISM AND EMOTIONAL STRESS AMONG MALE AND FEMALE DENTAL UNDERGRADUATE STUDENTS AT AIMST UNIVERSITY, MALAYSIA

Leneena G, Venkayala B, Sen JC, Jie JC, Yin KC, Anand P

This study aimed to assess the prevalence and association of Bruxism and emotional stress among dental undergraduate students at AIMST University, investigate the association between bruxism and emotional stress among dental undergraduate students at AIMST University, investigate the association between bruxism and year of study among dental undergraduate students at AIMST University, and investigate the prevalence of emotional stress among dental undergraduate students at AIMST University. A cross sectional study was conducted at AIMST University. Final sample included 104 undergraduate dental students. Bruxism was diagnosed by the presence of aligned dental wear facets associated with the presence of one of the following signs or symptoms: self-report of tooth-grinding, painful sensitivity of the masseter and temporal muscles, discomfort in the jaw musculature upon waking. The Stress Symptoms Inventory (SSI) was applied to evaluate emotional stress. AIMST BDS programme is a 5 year programme, year 2 and year 5 were being assumed as more stressful as year 2 is subjected to greater amount of theoretical examinations and year 5 students need to fulfil significant amount of clinical quota to complete the course. Results show prevalence of stress among dental students was 75% regardless of year of studies the student belonged to. Prevalence of bruxism in the 104 selected AIMST dental students was 27.9%. Chi-square test indicated there is significant association between Bruxism and Emotional Stress ($P<0.05$) No significant association between Bruxism and Gender ($P=0.069$) or between Bruxism and Year of Study, and no significant association between stress and year of study. Hence it can be concluded that emotional stress was associated with bruxism, independently of gender and the year of studies of dental undergraduate students of AIMST University.

Keywords: Bruxism, Stress, wear facets

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104. AWARENESS AND EVALUATION OF ROLE OF PERIODONTAL STRUCTURES IN RELATION TO PERIMPLANT HEALTH AMONG DENTAL PROFESSIONALS- A QUESTIONNAIRE STUDY

Mahajan A, Namburi C, Bhargeva SS, Nayar S, Kondreddy K, Tiwari RVC, Tiwari H

Introduction: A basic awareness of the peri implant health is expected in the Dentists as the implants are being commonly placed. Hence in the present study we evaluated the role of the periodontal structures in relation to the peri implant health among the dentists. **Material and Methods:** A prospective, web-based, cross-sectional study was done among 100 dentists by a questionnaire using Google forms. The awareness was assessed about the periodontal structures for the periimplant health. Appropriate statistical tools were used to calculate the significance. **Results:** Almost half of the participants were interns. Nearly 92% had moderate knowledge about peri-implant diseases. Good knowledge was seen among the specialists. With the experience the greater knowledge and awareness was seen. **Conclusion:** The knowledge of the Dentists for the peri-implantitis diseases was moderate. Experienced dentists' have a higher awareness of the periodontal structures on the peri-implant health.

Keywords: Periodontal structures, Peri-Implant health, Knowledge

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105. TOOTH LOSS, PROSTHETIC STATUS, AND PROSTHODONTIC TREATMENT NEEDS OF AN INDIAN FISHING COMMUNITY

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Background: The disadvantaged communities are often susceptible to poor oral health due to low incomes, lack of awareness, and low health-care utilization. Untreated dental diseases can lead to loss of teeth which may result in unmet prosthodontic needs. The present study assessed tooth loss, prosthetic status, and treatment needs of a fishing community in Mangalore, India. **Materials and Methods:** Oral examination of 400 individuals from a fishing community was done through a house-to-house cross-sectional survey using the World Health Organization oral health assessment form 1997. Data on demography, personal habits, and dental utilization were collected using a questionnaire. **Results:** The prevalence of tooth loss was 43%, and the mean number of missing teeth was 2.32 ± 5.21 . More tooth loss was observed in older age groups and smokers. About 97% of the participants did not use any prosthesis, whereas it was needed in 23% in the maxillary arch and 33% in the mandibular arch. Prosthetic need was higher in older age groups. Majority of the participants had never visited a dentist before. **Conclusions:** Tooth loss was associated with age and smoking in this population. Utilization of oral health services was low, and prosthetic need was high. Targeted health promotion is recommended to prevent tooth loss and improve prosthetic status.

Keywords: Fishermen population, prosthetic status, prosthodontic need, tooth loss

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106. A SURVEY ASSESSING THE KNOWLEDGE AND PERCEPTION OF DENTAL PRACTITIONERS ON THE NEED FOR PROPHYLACTIC ENDODONTIC TREATMENT IN ABUTMENT TEETH FOR FIXED PARTIAL DENTURES

Mani R, Thomas AR, Reddy TVK, Ramaswamy H, Kumar SA, Elavarasu P

Background: Tooth preparation for fixed prosthodontic procedures often induces enough thermal or mechanical stresses on the pulp. The extent of pulpal injury and ability to repair depends on factors like amount of remaining dentin, extent of heat produced, and permeability of dentinal tubules. However, there is no infallible method to predict the pulpal response and so the treatment outcome. **AIM:** This survey tries to assess the knowledge and perception among dental practitioners on the need for prophylactic endodontic therapy in abutment teeth for fixed partial denture (FPD). **Setting And Design:** Questionnaire-based survey. **Methodology:** An observational study was then conducted among 303 dental practitioners in the state of Tamil Nadu and 250 participants responded. **Statistical Analysis Used:** Descriptive statistics and multiple linear regression analysis. **Results And Conclusion:** The survey further imparts light on the clinical outcomes that help minimize the incidence of biological failure underneath a FPD.

Keywords: Abutment teeth, intentional root canal, prophylactic endodontics

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107. INFLUENCE OF CRP ON ANTIBIOTICS PRESCRIPTION PATTERN FOR DENTAL INFECTIONS: A PROSPECTIVE INTERVENTIONAL STUDY

George AM, Mayya A, Mayya A, Xuan CB, Velappan DLAP, Selvan SAPT, Jalal RBM

Introduction: Over the years, antibiotic prescription rates have increased dramatically for the treatment of dentoalveolar infections. A byproduct of this indiscriminate antibiotic prescription by dentists is the antibiotic resistance. Antibiotic resistant infections are a severe global health problem, putting the capacity to treat common diseases and perform complex medical procedures at risk. **Aim:** To compare the amount of antibiotics prescribed for dental infections with and without analysing C-reactive Protein (CRP) value. **Materials and Methods:** A prospective interventional study was conducted in Manipal University College Malaysia (MUCM), Melaka, Malaysia, dental clinic between October 2020 to March 2021 to record the antibiotic prescription by dentists. The study was divided into two phases where phase I had 28 subjects and phase II had 21 subjects and permission from Institutional Ethical Committee clearance was obtained for the study. The study was done to evaluate the effectiveness of C-reactive protein (CRP) to reduce antibiotic prescriptions in MUCM Dental Clinic. Data was summarised by computing frequency and percentages. The antibiotic prescription rate during phase I (n=28) (conventional method or routine pattern of prescribing antibiotics was done) and phase II (n=21) (CRP rapid test was done and the decision whether to prescribe antibiotics or not was done accordingly) was compared. The data was analysed by using Statistical Package for the Social Sciences (SPSS) software program, version 15.0 (South Asia, Bangalore) and compared applying the Chi-square test. **Results:** There was no significant difference in the distribution of the presence of medical condition ($p=0.201$) and distribution of clinical features ($p=0.804$) of subjects included in phase I and phase II. The antibiotics prescription rate reduced significantly from 89.3% in phase I to 52.4% in phase II ($p=0.0014$), indicating that CRP rapid test helps in reducing antibiotics prescription. **Conclusion:** The CRP rapid test aid in lowering antibiotic prescription in dental clinic settings. This may be useful to combat antibiotic resistance in general.

Keywords: Antibiotic misuse, Antibiotic resistance, C-reactive protein, Inappropriate prescription

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108. BARRIERS TO EARLY DETECTION AND MANAGEMENT OF ORAL CANCER IN THE ASIA PACIFIC REGION

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Objective: Oral cancer is amenable to early detection but remains a prominent cause of mortality in the Asia Pacific region. This study aimed to identify barriers to early detection and management of oral cancer in the Asia Pacific region. **Methods:** A mixed-methods approach was employed triangulating findings from a survey and focus groups. The survey was conducted among seven representative members of the Asia Pacific Oral Cancer Network (APOCNET) across six countries. Focus groups were conducted to gain deeper insights into the findings of the survey. **Results:** The identified barriers were a lack of national cancer control strategies and cancer registries and the limited availability of trained health care professionals. Overcoming these challenges in the Asia Pacific region where resources are scarce will require collaborative partnerships in data collection and novel approaches for continuous professional training including eLearning. Further, to overcome the lack of trained health care professionals, innovative approaches to the management of oral potentially malignant lesions and oral cancer including telemedicine were suggested. **Conclusion:** The findings of this study should be taken into account when charting national cancer control plans for oral cancer and will form the basis for future collaborative studies in evaluating effective measures to improve oral cancer detection and management in low- and middle-income countries.

Keywords: Asia Pacific, cancer network, oral cancer

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109. ORAL INDICATORS IN COVID-19 PANDEMICS – AWARENESS TO MEDICAL PRACTITIONERS

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Coronavirus disease 2019 (COVID-19) presents a significant and serious threat to global health. Considering its high degree of infectivity with rapid worldwide spread since January 2020, COVID was declared as pandemic by World Health Organization (WHO). This viral infection presents with enormous range of systemic and oral manifestations. Due to the high number of patients involved, the diagnosis is mostly based on clinical findings and confirmed later by appropriate laboratory tests. Although, with this rising pandemic situation, public are aware of several systemic manifestations, oral indicators of COVID-19 remains still unraveled. Range of COVID-19 manifestations in the oral cavity have broad interest in the current scenario. There still exists a question about whether these lesions are due to coronavirus infection or secondary manifestations resulting from the patient's systemic condition. Keeping social distancing related problem, oral self- examination may be one ideal tool in early detection of oral manifestations. Our article critically summarizes various oral manifestations, their possible pathogenesis to COVID-19 and their implications in medical and dental setting. This may aid as a novel tool for dental professionals to work in power with frontline medical practitioners in emergency setting and hospitalized patients for early identification of COVID condition using oral manifestations.

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110. KNOWLEDGE, ATTITUDE AND PRACTICE OF MEDICAL DOCTORS OF KUALA MUDA DISTRICT OF MALAYSIA TOWARDS THE RELATIONSHIP BETWEEN PERIODONTAL HEALTH AND SYSTEMIC DISEASES: A QUESTIONNAIRE BASED STUDY

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Periodontal diseases are common oral health problems worldwide and affect up to 50% of the population globally. The bidirectional relationship of periodontal diseases with various systemic diseases has been reported in several studies. The successful prevention and management of periodontal diseases depend on the knowledge and attitude of medical practitioners towards the oral health. Hence, this study was undertaken to assess the knowledge, attitude and practice of medical practitioners of Kuala Muda district towards the relationship between periodontal health and systemic diseases. Ninety-five medical doctors from various specialties of medicine were included in this cross-sectional study. A self-administered questionnaire was used to evaluate the knowledge, attitude and practice of medical doctors. Though the mean periodontal knowledge scores of specialists (10.37 ± 1.617) were slightly higher than the mean scores of general practitioners (9.83 ± 1.564), the difference was not statistically significant ($p = 0.105$) at the 0.05 significance level. There was a statistically significant ($p = 0.037$) negative correlation ($r = -0.215$) noted between the years of practice/experience of medical doctors and their mean periodontal knowledge scores. The study demonstrates that medical doctors had fair knowledge about the periodontal diseases and their relationship with the systemic diseases. However, the practice and attitude of medical doctors towards the screening/referral of patients for oral and periodontal health checkup needs to be improved.

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111. A COMPARATIVE STUDY BETWEEN GRAFTLESS AND GRAFTED MAXILLARY SINUS LIFT PROCEDURE FOR IMPLANT PLACEMENT

NMRR-22-04354-JPU

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Introduction: Dental implant survival requires the presence of peri-implant bone for complete and stable osseointegration. Grafted sinus lift procedures are predictable methods to augment deficient ridges, but may give rise to complications, comorbidities and additional costs. Recent evidence showed positive outcomes of graftless sinus lift technique. However, studies comparing the outcome between the grafted and graftless sinus lift procedures are still lacking. **Objectives:** To compare the implant stability, bone density and pocket depth outcomes between grafted and graftless sinus lift procedures for implant placement. **Materials and Methods:** Ten patients underwent bilateral sinus lift procedures using lateral window approach (i.e., grafted at one site, and graftless at the contralateral site). Assessments of implant stability, bone density, and pocket depth surrounding the implant were carried out at Day 0, 3 months, 6 months, and 1-year post-surgery. **Results:** There was a significant increase in implant stability ($p < 0.0001$) and bone density ($p < 0.0001$), and a reduction in pocket depth ($p < 0.0001$) one-year post-surgery. Implant stability and pocket depth assessment were similar between grafted and graftless groups ($p > 0.05$). Nevertheless, the grafted group displayed higher increment of bone density at the buccal ($p < 0.0001$) and mesial ($p = 0.0068$) sites, but not at the distal ($p = 0.0068$) and palatal ($p = 0.3934$) sites, compared to the graftless group. **Conclusions:** There were comparable and promising outcomes for healing, implant stability, and bone formation in the maxillary sinus with and without grafting or bone substitutes. Essentially, graftless sinus lift is a reliable alternative to the grafted technique, with potentially reduced risk of complications and comorbidities, and is cost-effective.

Keywords: dental implants, osseointegration, augment bone graft, osteogenesis

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112. REVISIT OF ROOT AMPUTATION PROCEDURES IN PERIODONTICS: A LITERATURE REVIEW

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Introduction: One of the most serious sequelae of periodontitis in multirooted teeth is attachment loss in the intraradicular area. Regenerative approach has been evaluated and proven to be the ideal treatment for improving molar furcation status. However, this approach was generally not suitable in treating more complex furcation involvement cases such as class II in maxillary molars and class III in all molars. Therefore, it is believed that a relatively more advanced treatment modality such as resective therapy can effectively eliminate the furcation defects and increase tooth longevity.

Objective: This review aims to provide a contemporary and comprehensive overview of root amputation in periodontics. **Materials and Methods:** Comprehensive searches in 4 different databases - PubMed, Scopus, Science Direct and Google Scholar - were performed for publications that fit with the predetermined inclusion and exclusion criteria. The retrieved articles quality was assessed based on SANRA guidelines. **Discussion:** Treating periodontally compromised molar through root amputation procedure is a viable alternative and has been documented with reasonable long-term effectiveness. However, the prognosis is highly depending on the type of case selection, optimally performed endodontic treatment, and the amount of osseous supports surrounding the remaining roots. The Guided Bone Regeneration (GBR) is a good modification and very effective in eradicating some limitations of root amputation. **Conclusion:** This narrative review provides a current overview of root amputation practice in periodontics.

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113. CONE BEAM COMPUTED TOMOGRAPHIC ASSESSMENT OF C-SHAPED CANAL IN MALAYSIAN CHINESE MANDIBULAR MOLARS

BDS I-01/2019(05)

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Introduction: C-shaped canal is defined as a root canal that is shaped like the letter C in transverse section. C-shaped canals are common in Asians and show a high prevalence in the permanent mandibular second molars. The recognition of the C-shaped canal configuration by a clinician is very important as the highly variable anatomical configuration of C –shaped canals could present as a challenge during root canal treatments. **Objectives:** The study aimed to evaluate the prevalence of C-shaped canal in mandibular molars of the Malaysian Chinese population using cone beam computed tomography (CBCT). **Materials and Methods:** CBCT scans of 187 Malaysian Chinese patients (374 mandibular first molars, 374 mandibular second molars) were analysed. Root canal morphology was observed at five cross-sectional levels of root. Fan et al. classification was used to categorise the C-shaped canal. **Results:** The prevalence of C-shaped canal in mandibular first and second molar was 1.1% and 33.2%. C-shaped canal showed statistically significant higher prevalence in mandibular second molar bilaterally and in the female population ($P < 0.05$). **Conclusions:** The high prevalence of C-shaped canal in mandibular molars of the Malaysian Chinese population highlights the need to recognise C-shaped canal in endodontic treatment.

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114. ANATOMICAL VARIATIONS OF THE OSTEOMEATAL COMPLEX IN THE LATERAL WALL OF NOSE A CADAVERIC STUDY

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The morphology of the osteomeatal complex at the lateral wall of the nose varies greatly among different races and ethnic groups, indicating mandatory study of the surgical anatomy of this area for different populations. The aim of this study is to identify the shape, variations of the middle turbinate, distances, posterior extent measured between the three turbinates and the site of opening of maxillary sinus ostium in a sect of South Indian population. Twenty hemi sections of adult cadaveric heads were utilized for this study. Direct visual measurements were performed using a vernier caliper and a protractor. Majority of the specimens i.e., 85% showed Type I shape of the middle turbinate. The mean distance between anterior attachments of superior turbinate and middle turbinate was 16.95 mm. Posterior margin of middle turbinate ended more posteriorly in 90% specimens compared to inferior turbinate. The ostium of maxillary sinus opened in posterior 1/3rd of middle meatus in 60% specimens. Accessory middle turbinate was observed in 2 hemisections. The ethnic anatomical variations were evident when compared with the Koreans. Being aware of these variations can guide the neurologist, otorhinolaryngologist, ophthalmologist and oral and maxillofacial surgeons who use the middle meatus and osteomeatal complex as a gateway to approach their respective regions of interest for surgical procedures.

Keywords: Accessory middle turbinate, Chronic rhinosinusitis, Middle meatus, Osteomeatal complex, Turbinate bones

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115. DOES ARCH LENGTH PRESERVATION IN MIXED DENTITION CHILDREN AFFECT MANDIBULAR SECOND PERMANENT MOLAR ERUPTION? A SYSTEMATIC REVIEW AND META-ANALYSIS

Arunachalam S, Sivakumar I, Jayaraman J et al.

Background: Arch length preservation strategies utilize leeway space or E-space in the mixed dentition to resolve mild to moderate mandibular incisor crowding. The purpose of this systematic review of the literature was to analyze the effects of arch length preservation strategies in on mandibular second permanent molar eruption. **Methods:** A search for relevant articles published from inception until May 2020 was performed using PubMed/Medline, Cochrane databases, Clinicaltrials.gov, Google scholar and journal databases. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were adopted for the conduct of the systematic review. Using RevMan 5.3 software, the most pertinent data were extracted and pooled for quantitative analysis with 95% confidence intervals. Heterogeneity was analyzed by using Cochran Q test and I squared statistics. **Results:** A total of 5 studies involving 855 mixed dentition patients with arch length preservation therapy were included in the qualitative analysis. Pooled estimate of the data from two studies revealed 3.14 times higher odds of developing mandibular second molar eruption difficulty due to arch length preservation strategies using lingual holding arch (95% CI; OR 1.10-8.92). There was no heterogeneity found in the analysis. The certainty levels were graded as very low. **Conclusions:** This systematic review demonstrates that arch length preservation strategies pose a risk for development of mandibular second molar eruption disturbances, but the evidence was of very low quality.

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116. CEPHALOMETRIC EVALUATION OF THE CERVICAL SPINE POSTURE FOLLOWING FIXED FUNCTIONAL THERAPY WITH FORSUS™ APPLIANCE

Malik N, Fernandes BA, Ramamurthy PH, Anjum S, Prakash A, Sinha A

Background: To investigate whether fixed functional therapy for mandibular advancement with the Forsus™ appliance would produce any changes in the cervical spine posture. **Materials and Methods:** This prospective clinical exploratory study was conducted on 12 patients (six females and six males) with a mean age of 15 ± 1.3 years, having mandibular retrusion, Class II malocclusion, who were treated with the Forsus™ appliance. Lateral cephalogram was taken twice, once at the baseline (T1) before the commencement of the treatment and once following termination of fixed functional treatment (T2). Eleven measurements representing the vertical and the sagittal craniofacial proportions, and the head posture, were taken into account. Data were analyzed using SPSS version 22. The variations between before and after treatment measurements were collated using paired t-test. $P < 0.05$ was considered statistically significant. **Results:** No significant differences were noticed in the angle linking the horizontal lines of the head and the superior crest of the spinal column before and after the treatment, with $P = 0.73$. The cervical curvature angle also failed to show any significant difference with $P = 0.14$. **Conclusion:** Fixed functional therapy with the Forsus™ device resulted in dentoalveolar and soft tissue alterations alone but did not alter the cervical spine posture.

Keywords: Cervical vertebrae, fixed, mandibular advancement, orthodontic appliances, posture

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117. PREVALENCE OF DENS INVAGINATUS AMONG THREE DIFFERENT ETHNIC GROUPS INDIAN, CHINESE, MALAY PATIENTS VISITING AIMST DENTAL CARE CENTRE - A RADIOGRAPHIC STUDY

Anand P, Vankayala B, Joyin WV, Tsean CW, Yee CW, Gudugunta L

Aim: The aim of this study was to determine the prevalence of dens invaginatus among patients visiting AIMST Dental care centre. **Materials and methods:** Intra oral periapical radiograph was taken on lateral incisor of 102 patients undergoing treatment in AIMST polyclinics and Oral Surgery clinics. Of the 102 patients, 21 patients were Malays, 52 Chinese and 29 were of Indian ethnicity. **Results:** Dens invaginatus was prevalent in 3 out of 102 patients among the three two were Chinese and was a Indian patient and all three patients exhibited Type 1 type of dens invaginatus. **Conclusion:** The occurrence of dens invaginatus appears to be prevalent among Chinese and Indian population but further study with higher sample size would help in arriving at conclusive results.

Keywords: Dens invaginatus, lateral incisor, IOPA

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118. AN ANTHROPOMETRIC STUDY TO EVALUATE THE CORRELATION OF VERTICAL DIMENSION AT REST AND LENGTH OF THUMB: A MULTI-NATIONAL, MULTI-CENTRE PILOT STUDY

Sajjan MCS, Eachempati P, Dhall RS, Fulari D, Shigli K, Soe HHK

Aim: A variety of anthropometric techniques have been proposed to determine the correct vertical dimension of occlusion. However, none have reported correlating thumb length (TL) with vertical dimension at rest (VDR). This study aimed to correlate the VDR to measurements of the thumb in a multi-national, multi-centric trial in participants with and without orthodontic treatment and establish a regression equation for each region. **Settings and Design:** A cross-sectional multi-national, multi-centric correlation trial. **Materials and Methods:** A cross-sectional study was conducted in India and Malaysia with a total of 688 participants. Measurements of thumb and VDR were obtained using a modified Willi's gauge using a standard operating procedure. **Statistical Analysis Used:** Pearson's correlation coefficient was calculated to determine the correlation between TL and VDR. A multiple linear regression was done to correlate VDR from gender, orthodontic treatment, and length of thumb. **Results:** Correlation coefficient between TL and VDR in patients with orthodontic treatment was 0.829 and 0.774 in patients without orthodontic treatment. The correlation between TL and VDR in patients with orthodontic treatment in North India was 0.484, $P = 0.010$ and Malaysia was 0.946, $P < 0.001$. There were significant correlations between TL and VDR in patients without orthodontic treatment in all regions ($P < 0.001$). Regression equations were obtained for different ethnic groups for calculating the VDR. **Conclusion:** There was an overall positive correlation between TL and VDR in patients with and without orthodontic treatment. The regression equations presented in this article could help clinicians in their clinical practice and researchers to conduct future trials.

Keywords: Anthropometric measurements, length of thumb, multi-centric study, regression analysis, vertical dimension at rest

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119. TORI IN A MALAYSIAN POPULATION: MORPHOLOGICAL AND ETHNIC VARIATIONS

Telang LA, Telang A, Nerali J, Pradeep P

Aim: Tori are nonneoplastic self-limiting, bony exostosis that are commonly called torus palatinus (TP) when seen on the hard palate and termed torus mandibularis (TM) when seen on the lingual surface of the mandible. These lesions have long been known to anthropologists and have mostly been identified incidentally during routine dental examinations. The prevalence of tori varies in different populations from 0.0% to 66% for TP and between 0.1% and 63.4% for TM. The exact etiology is still unclear, but the most accepted theory today is 30% attributed to genetics and 70% to environmental factors. Hence, the aim of this study was to determine the prevalence of tori and study their morphology among various ethnic groups of a Malaysian population. **Materials and Methods:** A cross-sectional study was conducted involving the screening of patients that reported to the oral medicine clinics over a 2-year period. Age, gender, ethnicity, morphological variations in shape and size, number, and location of tori were recorded in all positive cases. **Results:** Fourteen percent of individuals ($n = 624$) among the total 4443 who were screened were found to have either palatine tori, mandibular tori, or both. The prevalence of PT and MT was 10.8% and 0.9%, respectively. Tori were found in people in the age range of 5–85 years, with the maximum in the age range of 20–29 years (24.7%). The male-to-female ratio for PT and MT was 1:1.4 and 1:0.68, respectively. The morphologic shapes of palatine tori that were observed were flat (10%), spindle (10%), linear (15%), and nodular (59%) with up to six lobules. Mandibular tori were located either unilaterally or bilaterally; they were nodular in shape (89%) and/or band like (15%), with the band-like shape being described for the first time. Size variations ranging from 0.5 to 5 cm were observed. **Conclusion:** The relatively high prevalence of tori among major ethnic groups of this region supports the probable hypothesis of the role of environmental factors. A wide variation in the morphology was also noted, along with a new morphologic variant of band-like TM, which may be due to the influence of diet or an unknown environmental factor.

Keywords: Band-like torus, mandibular tori, morphology, palatine tori

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120. SIGNIFICANCE OF THE MALAYSIAN MONGOLOIDS' PALATAL MORPHOLOGY FOR INTRAORAL IMAGING TECHNIQUES

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Background: To determine ethnic and gender variations of palatal vault height and palatal shape of Mongoloids (ethnic Malays and Chinese) in Peninsular Malaysia. Subsequently, the palatal height will indicate the feasibility of the intraoral paralleling technique to be employed in these populations. **Methods:** Ninety-seven ethnic Malay Cone Beam Computed Tomography (CBCT) scans (47 males, 50 females) and 91 ethnics Chinese CBCT scans (48 males, 43 females) were examined. From coronal view of CBCT image, the palatal vault heights were measured at the maxillary first molars and first premolars. Palatal height of midway of right & left palate was measured after palatal width was determined. The shape of palatal vault was classified as normal, furrowed, shelf-like or stair palate, torus and square shaped. **Results:** The palatal height showed no gender difference at the premolar region, but slight statistical difference was noticed in the midway of the right and left palate in the molar region. The palatal height on both ethnic Malays and Chinese was not significantly different, but there were significant differences in palatal height in the first premolar area between males and females. The mean palatal height in the molar region for males was 21.12 (SD 3.19) mm and 20.16 (SD 2.62) mm for females. In addition, palatal shape distribution was not different between gender of either ethnic group, although the most common palate type was the palate with torus. **Conclusions:** Malaysian Mongoloids have insufficient palatal height dimensions for employing true paralleling technique and bisecting angle technique should be preferred for intraoral imaging.

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121. PREVALENCE AND MORPHOLOGY OF TORUS PALATINUS AND TORUS MANDIBULARIS IN MALAYSIAN PATIENTS

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Aim: The purpose of the present study were to determine prevalence of torus palatinus (TP) and torus mandibularis (TM), association of TP and TM with the age, gender and ethnicity and to describe size, shape, location and number of the TP and TM among Malaysian patients. **Materials and Method:** A total of 108 patients were screened during the study taking into account of the inclusion and exclusion criteria. Demographic details such as age, gender and ethnicity were recorded. Intra-oral examination was done and clinical diagnosis was given based on presence of palatal torior mandibular tori. Patient with torus, alginate impression was made, and cast was fabricated. Shape, size and location of tori were observed for each patient. The data were statistically analysed using Chi square test and Fisher Exact test. Significance level was set at 0.05. **Results:** Overall prevalence of TP was 47.22% and that of TM was 6.48%. Majority of TP are spindle shaped, falls into size of less than 3mm and found mainly in the molar region. Majority of TM falls under unilateral single and bilateral single and mainly located in the canine premolar region. There was no significant association between age and gender with tori. No significant association was present between TP and TM with ethnicity. ($P=0.146$ and $P=0.734$ respectively). **Conclusion:** Prevalence of TP was high, and TM was low in Malaysians. However, there were differences among the shape, size and location of tori among the Malays, Chinese and Indians and this may reflect multifactorial etiology such as genetic factors as well as environmental factors. **Clinical significance:** Both adults and children must be screened for palatal and mandibular tori as these could be manifestations of sleep disordered breathing which are not diagnosed yet. Such cases need a referral to a sleep physician for diagnosis and further management. Moreover, huge tori may necessitate the need for modifications during fabrication of complete denture.

Keywords: oral tori, prevalence, torus mandibularis, torus palatinus

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122. SALIVARY BIOMARKER POTENTIAL FOR EARLY DETECTION OF ORAL SQUAMOUS CELL CARCINOMA BY SURFACE ACOUSTIC WAVE TECHNOLOGY: A NARRATIVE REVIEW

Alexander PN, Nastiti FR, Yeka R, Riski RPR, Ayu ABN, Tengku NEBTAN

Oral squamous cell carcinoma (OSCC) is the most frequent oral cancer that occurs with a prevalence of about 90%. OSCC ranked as the sixth most common oral cancer in the world with morbidity and mortality rates of more than 50%. Southeast Asia has the highest prevalence compared to other countries, which is 6.4/100.000, 20-40% of new OSCC cases are detected after experiencing metastasis to the lymph nodes that cause further complications. Therefore, OSCC early detection is needed for better patient management. Surface Acoustic Wave (SAW) is the latest technology that can detect OSCC using salivary biomarkers. Analysis of the potential of saliva-containing biomarkers for early detection of OSCC using Surface Acoustic Wave technology. Salivary biomarkers such as IL-1 β , IL-8, and Galectin-3-binding protein (LGALS3BP) increased significantly even in the early stages of OSCC. SAW technology provides accurate label-free detection of various analytes, from molecular to cellular levels through the inverse piezoelectric effect of interactions between specific biomarkers as good as gold standards ELISA. SAW electromechanical between the piezoelectric crystal and the single input electric crystal that combines sends a surface wave to the SAW substrate then binds to OSCC biomarkers and changes SAW frequency. SAW velocity is sensitive to changes in mass loading, causing shifts in latitude and design phases that allow high sensitivity detection. The concentration of IL-1 β , IL-8, and LGALS3BP can be defined by this frequency shift measurement, then OSCC can be detected earlier. Salivary biomarkers potentially utilized for early detection of OSCC disease using Surface Acoustic Wave technology.

Keywords: Non-communicable disease, Oral Squamous Cell Carcinoma, Cancer, Dentistry, Medicine

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123. EFFECTS OF MANDIBULAR ADVANCEMENT APPLIANCES AT DIFFERENT MANDIBULAR PROTRUSIONS FOR OBSTRUCTIVE SLEEP APNOEA: A RANDOMISED CONTROLLED TRIAL

NMRR -19-2539-50557

Chin MH, Lau MN, Fayed MM, Govindaraju R, Kulasegarah J

Introduction: Mandibular advancement appliance (MAA) is recommended for patients with mild to moderate obstructive sleep apnoea (OSA) and for patients with severe OSA who were unable to tolerate continuous positive airway pressure (CPAP). It is suggested to set mandibular advancement at 50% as further advancement did not show further improvement. However, evidence of advancement below 50% is lacking. **Objectives:** To compare the two mandibular protrusion positions of MAA constructed at 25% and 50% of maximal mandibular protrusion in their efficacy in treating OSA patients by assessing the apnoea-hypopnoea index (AHI) and their side effects. **Materials and Methods:** This is a single-centre, parallel-arm, randomised controlled trial involving subjects diagnosed with mild to severe OSA (N = 24). Subjects were allocated randomly in a 1:1 ratio into 25% group (MAA at 25% of maximal mandibular protrusion) or 50% group (MAA at 50% of maximal mandibular protrusion). Baseline and 6-month post-intervention AHI were measured using polysomnography (PSG). Side effects were assessed using (1) Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for temporomandibular joint (TMJ) assessment, and (2) other side effects recorded via structured interview. Statistical analysis conducted was Wilcoxon signed-rank test for AHI and descriptive statistics for side effects. **Results:** Baseline AHI was not significantly different between 25% and 50% groups. However, at 6-month post-intervention, AHI was significantly reduced in the 50% group ($p = .015$) but not in the 25% group ($p = .182$). None of the participants had persistent changes to TMJ in both groups based on DC/TMD. The occurrence of reported side effects was similar in both groups (13 events in 25% group and 14 events in 50% group). All reported side effects were mild and transient in both groups. The most reported side effects were aching in the jaw or jaw muscles, hypersalivation, and gum irritation. **Conclusions:** MAA at 50% of maximal mandibular protrusion improved AHI for OSA patients better than MAA at 25% of maximal mandibular protrusion. MAA at 50% mandibular advancement did not cause more side effects than MAA at 25% mandibular advancement. Hence, MAA treatment with a therapeutic position of 50% mandibular advancement is recommended.

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124. BARODONTALGIA AMONG PILOT; A CROSS-SECTIONAL STUDY

IREC 2020-112

Sofia AMN, Nurhidayu M, Muhammad SMD, Sulhi A, Munawarah SAM, Atina NMI, Mohamed HH

Introduction: Barodontalgia is pressure-induced damage that can occur at both high and low pressures commonly occur among pilots that presented with a history of dental problems. Barodontalgia will lead to dental pain and disturb the performance during flight. Many studies had been conducted in other countries, but no official data had been published regarding barodontalgia among pilots in Malaysia. **Objectives:** To investigate the prevalence of barodontalgia during flight among Royal Malaysian Air Forces (RMAF), factors and consequences on flight performances. **Methods:** 190 pilots from RMAF took part in this study. The questionnaire was developed in English medium and distributed to all active pilots in service in RMAF. In this survey, they were asked regarding personal and professional data in pilot services. Besides, they were also asked about any episodes regarding barodontalgia, the treatment that was carried out and the diagnosis by the dentist. The pilots were asked to complete the survey and submit it via the google form provided. **Results:** 190 pilots from 300 active military aircrews participated in this study with a response rate of 63%. The age of the pilots ranged from 22 to 49 years old with the mean age was 31 years old. The prevalence of barodontalgia among pilots was 12.1% with at least one episode during flight. **Conclusion:** Dental pain due to Barodontalgia among pilot is not a rare episode and may affect their performances. The preventive measure should be implemented to reduce the incidence and complication.

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125. BARODONTALGIA AMONG DIVERS IN MALAYSIA: A CROSS-SECTIONAL STUDY

IREC 2021-287

Karim AAA, Sulhi A, Anis ZM, Muhammad FH

Introduction: Barodontalgia is defined as the pressure-induced toothache caused by the ambient pressure changes during diving. It is commonly presented with previous history of dental defects. It may lead to localized dental pain or systemic problems such as breathing difficulty and even loss of concentration. **Objectives:** To find out the prevalence of barodontalgia among divers, to explore the contributing factors causing dental pain, and to determine the consequences of barodontalgia among divers. **Methods:** 100 Malaysian divers were chosen to participate in this study. The questionnaire was distributed via an online platform. Subjects were asked regarding their personal and demographic data, their oral health care, the variety of symptoms experienced during diving, and oral health awareness in managing the consequences of barodontalgia. **Results:** 63 respondents of 100 active divers participated in this study with a response rate of 63%. The age of the divers ranged from 20 to 67 years old. The prevalence of barodontalgia among divers was 25% in which 44% experienced multiple episodes of barodontalgia during diving. Divers reported symptoms like loss of concentration (38%), headache (25%), dental related problems (6%), and breathing difficulty (6%). The factors that contributed to barodontalgia were decayed teeth (44%), faulty restorations (38%), and gum related problems (6%). **Conclusion:** the factors that contributed to barodontalgia are all important elements that engage to dental pain however, there was no single contributory factor that is strongly associated with dental pain.

Oral presentation at the 11th IIUM Dental Student's Scientific Conference, Kulliyah of Dentistry, International Islamic University Malaysia 28 March 2022. Corresponding e-mail: drsulhi@iium.edu.my

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126. CORTICAL BONE ANALYSIS IN TYPE 2 DIABETES MELLITUS & NON-DIABETIC PATIENTS BASED ON PANORAMIC RADIOGRAPH

IREC 2021-138

Aina NA, Zainul AR, Izzati NI

Introductions: Type 2 Diabetes Mellitus (T2DM) may have effects on the mandibular cortical bone alteration that can be assessed through dental panoramic radiograph based on previous studies. **Objectives:** This study aimed to assess the mandibular cortical bone changes associated with T2DM by comparing the Mental Index (MI) in T2DM and non-diabetic patients. Further aimed is to investigate the influence of gender and age on mandibular cortical bone changes based on digital panoramic radiographs. **Materials and methods:** A retrospective record review (radiological data) of 35 T2DM and 35 non-diabetics panoramic radiographs were assessed on Planmeca Romexis Digital Software using Mental Index (MI) as the morphometric parameter. The mean MI for T2DM and non-diabetic patients were statistically analysed. Intraobserver agreement was assessed using Intraclass correlation coefficient (ICC) for MI. **Results:** The mean MI showed significant difference between T2DM and non-diabetic patients ($p < 0.05$). Whereas, the mean MI showed no significant difference between genders ($p > 0.05$). The correlation between age and MI showed no significant correlation ($p > 0.05$). **Conclusions:** In conclusion, T2DM may affect mandibular cortical bone structure. However, gender and age have no influence on the mandibular cortical bone changes. MI is a useful morphometric index to assess the mandibular cortical bone changes.

Oral presentation at the 11th IIUM Dental Students' Scientific Conference (DSSC), Kuliyah of Dentistry, International Islamic University Malaysia on 28 March 2022. Corresponding e-mail: zainulrajion@iium.edu.my

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127. THE OMISSION OF PUMICE PROPHYLAXIS ON BRACKET FAILURE RATES USING SELF-ETCH PRIMERS: A RANDOMIZED CONTROLLED CLINICAL TRIAL

DF CD1909/0057(P)

Thevadass K, Zakaria NN, Othman SA

Introduction: There are currently two methods of bonding orthodontic brackets to enamel, which are the conventional acid-etch technique, which uses acid etching, prior to the application of a primer and self-etch primers, which combine both these steps into one material. **Objective:** To determine the effects of omitting pumice prophylaxis on orthodontic bond failure rates in the self-etch primer (SEP) method. **Materials and Methods:** A total of 20 patients were recruited into this randomized controlled clinical study. Prior to bonding, a contra-lateral split mouth technique with block randomization was used to determine which quadrants would and would not receive pumicing. A total of 320 teeth were prepared with SEP (Transbond Plus, 3M Unitek) and stainless steel orthodontic brackets were bonded using Transbond XT adhesive. Data collected were the number of bracket failures, along with the location, arch, arch wire type and the adhesive remnant index (ARI) scores for each bracket failure. Data collection was stopped when patients had spent one month in the final 19x25 stainless-steel arch wire. **Results:** 14 failures (4.4%) were recorded, with six (1.8%) in the pumiced group and eight (2.5%) in the non-pumiced group. The upper arch had five failures (1.6%) while the lower had nine (2.8%). Eight (2.5%) of the failures were anterior brackets and six (1.9%) were posterior brackets. The majority of the ARI scores were one (57.1%), and the majority of bracket failures occurred on the 0.014 NT arch wire (71.4%). The Fisher's exact test was used to compare bracket failure rates. No statistically significant difference was found between bracket failure rates in both the pumiced and non-pumiced groups ($p>0.05$), arch, location, ARI and the type of arch wire. **Conclusions:** The omission of pumice prophylaxis prior to the use of SEP for orthodontic bonding does not significantly reduce bracket failure rates.

Poster presentation at Malaysian Association of Orthodontists Postgraduate Study Day on 21 March 2022. Corresponding e-mail: nornadiazakaria@um.edu.my

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128. PULPAL AND PERIAPICAL STATUS OF THE VITAL TEETH USED AS ABUTMENT FOR FIXED PROSTHESIS - A SYSTEMATIC REVIEW AND META-ANALYSIS

Kohli S, Bhatia S, Al-Haddad A, Pulikkotil SJ, Jamayet NB

Purpose: This is a systematic review to identify the incidence of pulp necrosis and/or periapical changes among vital teeth which are used as an abutment for crown and fixed partial dentures (FPDs). **Materials and methods:** Two reviewers independently searched two electronic databases, PubMed and Scopus. The search was complemented from references of included studies and published reviews. Studies published in the English language through January 2021 that had assessed and documented the clinical and radiographic failure of crown or FPD in vital permanent teeth due to pulpal or periapical pathology with a follow-up of at least 12 months were selected. Data screening, data collection and extraction of data was performed. Quality of studies involved was analyzed using the Newcastle-Ottawa Quality Assessment Scale for cohort studies. Meta-analysis was done using random effects model. Publication bias was assessed using funnel plots. **Results:** Electronic searches provided 10,075 records among which 20 studies were selected for systematic review and 7 studies were selected for meta-analysis. With respect to quality assessment, all the studies involved were considered as high quality as the score in scale ranged between 6 and 9 as per the Newcastle-Ottawa Quality Assessment Scale for cohort studies. The meta-analyses showed that there was no statistically significant difference in the incidence of the loss of pulp vitality or pulp necrosis through clinical and radiographic examination with the follow up period of 5 years: $p < 0.001$, 95% CI: 0.96-1.00, $I^2 = 77.84\%$; 10 years: $p < 0.001$, 95% CI: 0.88-0.95, $I^2 = 93.59\%$; 15 years: $p < 0.001$, 95% CI: 0.92-0.96, $I^2 = 94.83\%$; and 20 years: $p < 0.001$, 95% CI: 0.94-0.96, $I^2 = 95.01\%$. **Conclusions:** The meta-analysis revealed clinical and radiographic success rate ranging between 92% to 98% at different follow up periods ranging between 5 years and 20 years. Future high-quality randomized clinical controlled trials with a larger population are required to confirm the evidence as only observational studies were considered in this paper.

Keywords: Vital teeth, abutment, apical periodontitis, crown, fixed partial dentures, periapical, pulp

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129. COMPARATIVE EVALUATION OF THE REMAINING DENTIN THICKNESS USING DIFFERENT ROOT CANAL RETREATMENT TECHNIQUES: A CONE-BEAM COMPUTED TOMOGRAPHY STUDY

Subramanian P, Al-Marzok MIK, Murugeshappa DG, Kacharaju KR, Hanapi NSM, Nambiar P

This study was to evaluate the best technique to preserve radicular dentin after performing different retreatment procedures. Twenty maxillary central incisors were cleaned and shaped with the ProTaper Next and later obturated. The dentinal thickness were then measured from the axial views in the scanned CBCT images at 0mm, 5mm, 10mm and 13mm from the root apex. The teeth were then randomly placed into four groups and different systems were employed to remove the gutta percha. These were Hedstrom file without and with xylene (Groups 1 & 2) and ProTaper Universal Retreatment files without and with xylene (Groups 3 & 4). The dentin thicknesses dimensions were then measured again on subsequent CBCT scanned axial views. Group 1 showed significant difference in the pre and post retreatment dentinal thickness at 0 and 5 mm ($p < 0.05$). Group 2 and 4, which were the groups with xylene showed significant difference in the dentinal thickness at 5 and 13 mm. Interestingly, Group 3 showed significant difference only at 0 mm. In conclusion, H-files and Protaper Universal Retreatment files (with or without xylene) were effective in the removal of the obturating material. However, ProTaper Universal Retreatment system without xylene, showed the least amount of changes in dentinal thickness.

Keywords: Root canal retreatment, dentinal thickness, retreatment files, CBCT

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130. THE EFFECT OF FERRULE DESIGNS ON THE FRACTURE RESISTANCE OF ENDODONTICALLY TREATED PREMOLARS

Sulaiman E, Al-Haddad A, Alarami N

Objective: This study investigated the effect of different ferrule heights on endodontically treated premolars. **Materials and Methods:** Fifty sound mandibular first premolars were endodontically treated and then restored with 7-mm fiber post (FRC Postec Plus #1 Ivoclar-Vivadent) luted with self-polymerized resin cement (Multilink, Ivoclar Vivadent) while the coronal section was restored with hybrid composite core build-up material (Tetric Ceram, Ivoclar-Vivadent), which received all-ceramic crown. Different ferrule heights were investigated: 1-mm circumferential ferrule without post and core (group 1 used as control), a circumferential 1-mm ferrule (group 2), non-uniform ferrule 2-mm buccally and 1-mm lingually (group 3), non-uniform ferrule 3-mm buccally and 2-mm lingually (group 4), and finally no ferrule preparation (group 5). The fracture load and failure pattern of the tested groups were investigated by applying axial load to the ceramic crowns (n=10). Data were analyzed statistically by one-way ANOVA and Tukey's post-hoc test was used for pair-wise comparisons ($\alpha=0.05$). **Results:** There were no significant differences among the failure load of all tested groups ($P<0.780$). The control group had the lowest fracture resistance (891.43 ± 202.22 N) and the highest catastrophic failure rate ($P<0.05$). Compared to the control group, the use of fiber post reduced the percentage of catastrophic failure while increasing the ferrule height did not influence the fracture resistance of the restored specimens. **Conclusions:** Within the limitations of this study, increasing the ferrule length did not influence the fracture resistance of endodontically treated teeth restored with glass ceramic crowns. Insertion of a fiber post could reduce the percentage of catastrophic failure of these restorations under function.

Keywords: Ferrule designs, fracture resistance, failure mode, premolars

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131. VERTICAL ROOT FRACTURE RESISTANCE AND DENTINAL CRACK FORMATION OF ROOT CANAL-TREATED TEETH INSTRUMENTED WITH DIFFERENT NICKEL–TITANIUM ROTARY SYSTEMS: AN *IN-VITRO* STUDY

Lin GSS, Singbal KP, Noorani TY, Penukonda R

To compare the vertical root fracture (VRF) resistance of root canal-treated teeth instrumented with four different nickel-titanium (NiTi) rotary file systems and examine the dentinal crack pattern and direction using a new classification. Eighty mature mandibular premolars were selected and decoronated, leaving 13 mm of the root. The root samples were mounted in acrylic resin and divided randomly into five groups of different NiTi file systems: Group 1-control, Group 2-T-Pro, Group 3-HyFlex CM, Group 4-TG6 and lastly Group 5-ZenFlex. Samples in Group 2 and Group 3 were instrumented up to size 25/0.04, whereas Group 4 and Group 5 were instrumented up to size 25/0.06. Obturation was performed with AH Plus sealer and gutta-percha using single cone technique. Subsequently, all samples were subjected to occlusal compressive force until they were fractured. The force (N) needed to cause root fracture was recorded. The crack patterns and directions were also inspected under magnification and classified using a new and simple classification. The highest (VRF) resistance was noted in the control group (453.15 ± 92.23 N), followed by T-Pro (387.43 ± 76.81 N), HyFlex CM (381.88 ± 52.73 N), ZenFlex (369.15 ± 89.41 N) and finally TG6 (346.05 ± 72.08 N), but there was no significant difference between T-Pro and HyFlex ($P = 0.438$). A significantly higher prevalence ($P = 0.001$) of Type 1 crack pattern was observed, especially in samples instrumented with TG6. Majority of the cracks ran buccolingually except in some samples instrumented with ZenFlex ($P = 0.898$). Smaller file taper increased the VRF resistance of root canal-treated teeth. Majority of the dentinal crack exhibited Type 1 pattern and ran buccolingually.

Keywords: Canal taper, Dentinal crack, Nickel–titanium, Root canal, Vertical root fracture.

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132. ASSESSMENT OF THE PROGNOSIS OF ROOT CANAL THERAPY COMPLETED AT PIDC IN 2012: A CROSS SECTIONAL SURVEY

Pradeep P, et al.

Aim: The aim of the study was to evaluate the prognosis of root canal treatment done in the year 2012 in Penang International Dental College (PIDC), a 10 year retrospective institutional study and to identify the rate of success of root canal treatment performed by faculty members and students of the institution. **Methodology:** This retrospective cohort study involved a total of 136 respondents whose case files were collected and were interviewed telephonically for the follow up of 198 root canal treated teeth of those patients who came to the clinic in the year 2012, out of which 121 teeth could be followed up with and 77 teeth could not be followed up with due to the failure of reaching out to those respondents. A simple random sampling was conducted and data was collected from patients who gave consent. Information about the root canal treated tooth such as extractions, pain, swelling and infection, were collected and reasons regarding the extractions and retreatment were recorded. These reasons were considered to be failures of the root canal treatment while an intact tooth which did not require retreatment, extractions or experience any pain after 3 months of treatment were considered to be a success. The success and failures of root canal treated teeth were manually calculated and results were tabulated. **Results:** The results were calculated based on number of teeth that underwent root canal treatment of those patients who were reachable. The number of teeth of female patients was 61 and male patients were 60 giving a total of 121 patients who were reachable, out of which 49 teeth were treated by faculty members and 72 teeth were treated by students. The reasons of failures were recorded as pain (faculty = 3 teeth, students = 2 teeth) giving a percentage of 4.1% total, swelling (0%), extracted (faculty = 5 teeth, students = 6 teeth) giving a percentage of 9.1% total, retreatment (faculty = 4, students=2) giving a percentage of 5.8% total and infection (faculty = 1, students = 0) giving a percentage of 0.8%. Total of 97 teeth were successful (80.2%) and a total of 24 teeth were failures (19.8%). **Conclusion:** The 10 year retrospective study of the success rate of root canal treatment done in the year 2012 in PIDC is 80.2%.

Keywords: Root Canal Treatment, PIDC, Success, Failures

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133. EVALUATION OF ORAL STEREOGNOSIS IN COMPLETELY EDENTULOUS PATIENTS WITH PALATAL TORI

Sivakumar I, Shien RCH, Johar NLMBM, Xuan SW, Xian SP

Background: The corollary is not investigated in the completely edentulous patients with palatal tori. **Objective:** The aim of this study was to assess the oral stereognostic ability in completely edentulous patients with palatal tori. **Material and Methods:** Thirty-four completely edentulous patients aged 50 to 89 years were allocated to Group 1 (without palatal tori, n=18) and Group 2 (with palatal tori, n=16). The oral stereognostic test was conducted using 6 intraoral test pieces (circle/ square/ rectangle/ triangle/ plus/ toroid) that were fabricated to standard dimensions using the light cure acrylic resin. Each test piece was placed in the patient's mouth and was asked to manipulate the test piece between the tongue and the palate. The patients identified the shapes by matching them on a shape chart. Each correct identification was assigned a score of 1. The response time taken to identify each shape was recorded. Statistical computation was done using a chi - square test and Mann-Whitney U test. **Results:** Significant difference was observed in the overall scoring percentages between the 2 groups ($p<0.05$). Group 2 had lower oral stereognostic scores compared to group 1 ($p<0.05$). There was no statistically significant difference in the mean response time for identifying the shapes among the groups, however group 2 patients had longer response time. **Conclusion:** Oral stereognostic ability of the completely edentulous patients with torus palatinus was lower when compared to completely edentulous patients without tori.

Keywords: Stereognosis, form perception, exostoses, hard palate, edentulous mouth, complete denture

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134. ANALYSIS OF CLINICAL CHARACTERISTICS AND MANAGEMENT OF ECTOPIC THIRD MOLARS IN THE MANDIBULAR JAW: A SYSTEMATIC REVIEW OF CLINICAL CASES

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Objective: To perform a systematic review of the characteristics of ectopic mandibular third molar (EMTM) in terms of its clinical presentation, radiographic findings, associated lesions, management and post-operative complications. **Materials and Methods:** We searched the Pubmed, Medline, Embase and EBSCO databases for full-text, peer-reviewed journal publications from January 1965 to August 2020. Data extraction was done using preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. **Results:** Our search yielded 45 case reports involving 48 EMTM teeth. The mean age of the patients was 46.3 years with an age range of 22-80 years. Thirty-two cases were seen in women as compared to 13 cases in men. The majority of the cases (42) were unilateral, with only three bilateral cases. Among the 48 EMTM teeth, 21 were seen in the condylar region followed by 13 in the ramus, seven in the sigmoid notch, three in the angle and two each in the coronoid process and the lower border of the mandible. Twenty-five EMTM teeth had histopathologically confirmed dentigerous cysts, eight teeth had chronic infection/ inflammation/ granulation tissue, two had radicular cysts, two had infected cysts, two teeth had normal follicular spaces, and associated lesions were not mentioned for nine teeth. The most common symptoms were swelling (33 teeth) and pain (29 teeth), and six teeth were asymptomatic. Surgical removal through intraoral approach was carried out for 27 teeth, while an extra-oral approach was adopted in 15 teeth, a spontaneous regression of the pericoronal radiolucency was noticed in one tooth, four teeth were not treated and choice of treatment was not mentioned for one tooth. Mild transient paraesthesia was frequently observed; however, serious post-surgical complications were not reported. **Conclusions:** The present review found that EMTM can present with complex clinicopathological characteristics, with a majority of the cases being asymptomatic in the beginning and turning out to be symptomatic with lesions at later stages, requiring surgical intervention.

Keywords: Abnormal, ectopic teeth, heterotopic, mandibular, position, ramus, third molar

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135. LACTATE DEHYDROGENASE: THE BEACON OF HOPE?

Pandarathodiyil AK, Ramanathan A, Garg R, Doss JG, Rahman FBA, Ghani WMN, Vijayan SP

Lactate dehydrogenase enzyme (LDH) helps in the conversion of glucose into pyruvic acid during aerobic glycolysis and is found in the cytoplasm of most cells in the human body. When oxidative stress occurs in the body, LDH may be released extracellularly and its level is usually indicative of the severity of tissue damage. LDH has proved to be an inestimably resourceful marker in early prediction of serious diseases involving extensive tissue or cellular damage. This short communication explores the potential of LDH as a salivary biomarker of cell injury and death.

Keywords: LDH, enzyme, saliva, smokers, vapers

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136. COMPARATIVE EVALUATION OF EFFICACY OF INTRAVENOUS SEDATION REGIMENS IN DENTISTRY: AN ORIGINAL RESEARCH

Thomas Raja AV, Pendyala SK, Tiwari RVC, Kaur S, Qadri F, Ibrahim M, Tiwari H

Aim: Purpose of our research was to compare and analyze the efficacy of sedation regimens frequently used in dentistry by intravenous approach. **Methodology:** A total of 50 patients were provided one of four treatments: placebo; midazolam provided (mean dose, 8.6 milligrams); fentanyl (1.4 micrograms/kilogram) plus midazolam to get similar amount of sedation (mean dose, 5.7 mg); or fentanyl (1.4 µg/kg), midazolam (mean dose, 5.8 mg) and methohexital (mean dose, 61.0 mg) used in the surgery. **Results:** Each drug regimen decreased anxiety during surgery when compared with placebo, with the combination of midazolam, fentanyl and methohexital resulting in drastically less anxiety in as compared to other treatment groups. Pain felt by patients during surgery decreased significantly by the combination of fentanyl, midazolam and methohexital. **Conclusion:** It was observed that drugs and doses evaluated resulted in therapeutic benefit for patients undergoing dental procedures, with less possibility of potentially serious adverse effects.

Keywords: intravenous sedation, conscious sedation, anxiety, therapeutic benefit

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137. IMPACT OF DRAINS ON THE POSTOPERATIVE SEQUEL FOLLOWING THIRD MOLAR SURGERY: AN ORIGINAL RESEARCH

Ibrahim M, Jadon SS, Sharma P, Pendyala SK, Tiwari H, Hotkar SS

Purpose: This paper is aimed at assessing the role of a rubber drain in the postoperative sequel following third molar surgery. **Materials and method:** A comparative split-mouth study has been implemented on 60 patients with identical partially erupted bilateral wisdom teeth necessitating their removal. All surgical interventions for the removal of impacted third molars were performed using a modified Ward's incision followed by bone guttering and tooth sectioning. The right side of the patient was designated as the test side where following the surgical intervention a rubber drain was placed and stabilized at the anterior release of the surgical incision while on the left side of the patient was designated as control side where following the surgical intervention the anterior release of the surgical incision was not sutured to facilitate drainage. The impact of the drains in the postoperative sequel following the removal of wisdom teeth surgically was evaluated using parameters like postoperative swelling, pain, trismus and wound infections. **Results:** The results of this study reveal that there is no appreciable positive impact of using a drain on postoperative sequel like pain, swelling and trismus following third molar surgery. Pain was relatively more in the test side on the third postoperative day when compared to the control side. With regards to wound infections, 3 patients on the test side developed wound infection in the postoperative period while none experienced wound infection on the control side. **Conclusion:** It can be concluded that the use of a rubber drain do not have any positive impact on reducing the postoperative sequel.

Keywords: Impacted molars, postoperative swelling, Trismus, postoperative pain

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138. COMPARATIVE EVALUATION OF THE EFFICIENCY OF CARIES REMOVAL USING VARIOUS MINIMALLY INVASIVE TECHNIQUES WITH CONVENTIONAL ROTARY INSTRUMENTS USING CONE BEAM COMPUTED TOMOGRAPHY: AN *IN VITRO* STUDY

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Aim: The aim of this *in vitro* investigation was to assess the most efficient minimally invasive technique (MIT) by comparing the change in volume after caries removal using cone beam computed tomography (CBCT) and the time taken for each technique. **Materials and Methods:** Forty human extracted molars, stored in 0.1% thymol solution, with carious lesions extending into the dentin were used in the study. The caries status of dentin was judged initially by visual inspection and probing and confirmed by caries detector dye. A pre-scan CBCT was performed before assessing the volume of the carious lesion. Teeth were assigned into four groups (n = 10): Group 1 = Carisolv gel, Group 2 = Carie Care, Group 3 = ultrasonic tips, and Group 4 = slow-speed rotary instruments. The caries removal was performed according to the manufacturer's instructions. Time taken was recorded for each method. A postoperative scan was conducted, and volumetric analysis was carried out. The amount of removal of sound tooth structure was assessed to determine the most MIT. Descriptive and inferential statistics were used to analyze the data. The intergroup volume change of caries was carried out using the Kruskal–Wallis test, whereas comparison within the group was carried out using Wilcoxon signed-rank test. The assessment of time taken during each procedure was analyzed with one-way analysis of variance and Tukey honest significant difference test. The results were tabulated accordingly. Significance was set at P value ≤ 0.05 . **Results:** The chemomechanical agents (Carisolv and Carie Care) showed minimal change in volume when compared to conventional diamond points. The time taken with conventional diamond point was minimum, and it was maximum for ultrasonic tips. **Conclusion:** Chemomechanical caries removal is the most minimalistic approach when compared to the other techniques.

Keywords: Carie Care, Carisolv, Cone Beam Computed Tomography, Minimal Invasive Technique, Ultrasonic Tips

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139. EFFECT OF FLAP DESIGN AND NUMBER OF SUTURES PLACED ON THE WOUND DEHISCENCE AFTER SURGICAL REMOVAL OF MESIOANGULAR IMPACTED MANDIBULAR THIRD MOLARS

Pendyala SK, Kondreddy K, Singh S, Wei KZ, Ting KK, Jin KS

The objective of the study was to evaluate the effect of two commonly used flap techniques (envelop flap and triangular flap) for the removal of impacted mandibular third molars on the postoperative wound dehiscence. The effect of the number of sutures placed distal to the second molar on the wound dehiscence was also assessed in the study. Fifty patients requiring surgical removal of partially-erupted mesioangular impacted mandibular third molars were randomly assigned to either envelop flap group or triangular flap group with twenty-five patients in each group. Surgical removal of impacted mandibular third molars was performed in both the groups. Wound dehiscence was evaluated on the seventh postoperative day. There was a strong negative correlation ($r_s = -0.404$) existed between the number of sutures placed and the incidence and severity of wound dehiscence which was statistically significant ($p = 0.004$) at the 0.01 significance level. Though the severity of wound dehiscence was slightly higher in triangular flap group (Mean rank = 28.12) than envelop flap group (Mean rank = 22.88), the difference was not statistically significant ($p = 0.183$) at the 0.05 significance level. The results of our study reveal that though, the incidence and severity of wound dehiscence was slightly higher with the triangular flap than with the envelop flap, the difference was not statistically significant. In regards to the number of sutures placed distal to the second molar, the incidence and severity of wound dehiscence decreases as we place more number of sutures.

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140. A COMPARISON OF EXTENT OF TRAUMA CREATED TO THE MUCOPERIOSTEAL FLAP BY TWO DIFFERENT RETRACTORS

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The reflection and retraction of mucoperiosteal flap is an essential step in most of the surgical procedures. Austin's and Langenbeck's retractors are most commonly used for flap retraction during intraoral surgical procedures. There is no literature on the amount of trauma created to the periosteal layer of the flap by these retractors. Hence, the present study aims at assessing and comparing the extent of trauma created to the periosteal layer of the flap when retracted with Austin's and Langenbeck's retractors during surgical removal of impacted mandibular third molars. The results show that 72% of flaps retracted with Austin's retractor and only 16% of flaps retracted with Langenbeck's retractor exhibited trauma to the periosteal layer as a result of flap retraction. Thus results indicate a significant increase in trauma rate to the periosteal layer of the flap when Austin's retractor is used. Pearson Chi-Square test revealed a significant correlation between duration of the flap retraction and trauma rate in Austin's group ($p < 0.05$), but no such correlation was evident in Langenbeck's group ($p = 0.466$). Austin's retractor causes more trauma to the periosteal layer of the mucoperiosteal flap compared to the Langenbeck's retractor during the flap retraction.

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DOMAIN 2

Oral Health Intervention and Empowerment



141. ASSOCIATION OF ORAL HEALTH LITERACY WITH DENTAL TREATMENT NEEDS AND BARRIERS

NMRR-20-3287-56780

Kamal NS, Ramlay MZ, Mohd Arif BM, Kamarozaman DMS, Saidin NI

Introduction: Health literacy empowers individuals to use health information effectively. Adequate health literacy often results in better health decision-making. The aim of this study was to determine the relationship between OH literacy (OHL) with perceived dental need and barriers among patients attending government dental clinics in Seremban. **Methods:** A validated questionnaire (OHLI-M) was distributed. Information about patients' socio demographic profile, OHL, self-perceived dental treatment needs and barriers to OH service were collected. Self-perceived dental treatment need was based on dental problems reported by the participants. Three domains on dental barriers were assessed including individual factors, dental fear and quality of service. The relationship was tested using Pearson Correlation in SPSS. **Results:** Out of 199 participants, 82.4% were Malays, female (66.3%) and obtained tertiary education (58.3%). More than half (63.8%) has adequate level of OHL. Majority (82.4%) perceived at least one dental problem. More than 40% perceived that they have toothache (40.7%), dental caries (49.2%) and bad breath (40.7%). All participants reported at least six barriers towards the oral health service. OHL was found to be significantly correlated with perceived dental treatment need related to gum disease ($p < 0.05$) and barriers related to quality of OH service ($p < 0.05$). **Discussion/Conclusion:** Patients with higher OHL perceived higher dental treatment need that led them to appropriate disease management. Similarly, those with higher literacy had more exposure to the service delivery, hence possessed the ability to inform what is needed to augment the quality of service.

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142. ORAL HEALTH LITERACY AMONG PATIENTS IN SEREMBAN GOVERNMENT DENTAL CLINICS

NMRR-20-3287-56780

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Background: Health literacy empowers individuals to use health information effectively. Adequate health literacy often results in better health decision-making. **Objectives:** The aim of this study was to assess the oral health literacy among patients attending government dental clinics in Seremban. **Methods:** A validated questionnaire (Oral Health Literacy Instruments for Malaysian -OHLI-M) was distributed from January 2022 to February 2022. The level of oral health literacy was categorized into inadequate, moderate and adequate. Information about patients' socio demographic profile, oral health literacy, self-perceived oral health status, self-perceived dental problems and dental visit were collected. The relationships were tested using chi-square analysis in SPSS. **Results:** Out of 199 participants, 82.4% were Malays, female (66.3%) and obtained tertiary education (58.3%). Less than three quarters (65.5%) of the participants had an adequate level of oral health literacy. More than half (54.3%) rated themselves as having moderate to poor oral health. Majority (82.4%) perceived at least one dental problem. Only 55.8% were satisfied with their current oral health. Almost 60% visited dental clinics the past one year. Oral health literacy was found to be significantly associated with last dental visit ($p < 0.05$), with those with inadequate literacy visiting dental clinics more than one year ago. **Conclusions:** Most of the patients in Seremban government dental clinics acquired adequate levels of oral health literacy. As this study was conducted among appointment patients during pandemic, it is not surprising to find that they poorly rated their current oral health and perceived that they have oral health problems. This study evidently showed that patients with poor literacy levels tend to make unhealthy decisions related to their dental visits.

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143. SMILE PERCEPTION AMONGST PATIENTS UNDERGOING ORTHODONTIC TREATMENT AND DENTISTS IN RURAL PAHANG: A CROSS-SECTIONAL STUDY

NMRR 20-2734-57397

Paramanathan CCR, Rajadorai S

Introduction: Many adults and adolescents perceive their smile as unpleasant and seek orthodontic treatment to improve it. Therefore, understanding the impact of smile perception between a dental professional and laymen is imperative in making the best treatment result without compromising the aesthetic of the face and the teeth. **Objectives:** This cross-sectional study was designed to analyse the perceptions of patients undergoing orthodontic treatment and dental professionals with respect to changes involving the dental midline shift of the anterior maxillary teeth, the differing overbite depths, and canting of the maxillary occlusal plane. **Materials and Methods:** A photograph of a woman's smile was digitally altered in relation to three variables: dental midline, overbite depth, and occlusal canting. Ninety-one evaluators rated sixteen photographs. The evaluators were divided into two groups: the patients undergoing orthodontic treatment (n=45) and dentists (n=46) in rural Pahang. A total number of sixteen photographs, thirteen digitally altered, and three original photographs were randomly compiled into a catalogue of four pages. Both groups scored the photographs using a Visual Analog Scale (VAS). Each evaluator was allocated approximately 15 minutes to answer the questionnaire by scoring the attractiveness of each smile separately. Data was analysed to evaluate the different parameters assessed in the digitally altered smiles using SPSS Version 22.0. The mean, and standard deviation values were tabulated and calculated for each group. The comparison between both groups was conducted using an Independent T- test. **Results:** There were no remarkable differences in the perception of the dental smile between patients undergoing orthodontic treatment and dentists for midline deviation and overbite. The results showed a significant difference between varying levels of discrepancy in occlusal canting (p value<0.05). Patients undergoing orthodontic treatment perceived the canting of the smile more critically, as shown through the changes in 1 mm (p value<0.022), 2 mm (p value<0.022), and 3 mm (p value<0.027) of the occlusal plane. **Conclusion:** The overall aesthetic perception was similar for deviated upper midline position and overbite level between patients undergoing orthodontic treatment and dentists. However, there is a significant difference in which patients undergoing orthodontic treatment are more aware of the occlusal canting. Therefore, it is of paramount importance to understand different aesthetic norms to achieve excellent treatment results in line with expectations for each patient.

Oral Presentation at ICDOI 2022: XVI. International Conference on Dentistry and Orthodontic Implants. Corresponding e-mail: sindhu.raj20@gmail.com

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144. EFFECT OF SUBGINGIVAL IRRIGATION WITH PERIOFLUSH ON CLINICAL PERIODONTAL PARAMETERS AS AN ADJUNCT TO SUBGINGIVAL ROOT DEBRIDEMENT

NMRR-17-759-35724 (IIR)

Tan SX, Yap HF, Zainol Abidin K

Introduction: Local delivery of antimicrobials has been investigated as an adjunct to conventional therapy. **Objective:** The objective of this study was to determine the efficacy and clinical outcomes of nanocolloid silver irrigation as an adjunct to mechanical root debridement in the management of periodontitis. **Materials and Methods:** Fifty-one (51) healthy patients aged between 21 to 85 years old with the presence of at least 1 pocketing site of ≥ 6 mm in both contralateral half mouth after periodontal assessment were enrolled. In this split mouth design study, pocketing sites of ≥ 6 mm were treated with root surface instrumentation in combination with either Perioflush or saline subgingival irrigation. Baseline and post-treatment (6 to 8 weeks) clinical assessments including probing pocket depth, full mouth plaque score and full mouth bleeding score were recorded. **Results:** Data were analysed using Wilcoxon Signed Rank test and Mann-Whitney U test. Bleeding score showed a significant reduction over the observation period in control group ($p = 0.034$) but not in the test group ($p = 0.139$). The probing pocket depths were reduced for both groups, with a significant treatment effect ($p < 0.001$) from baseline to post-treatment review. Also, there was a notable reduction in pocket depth in both genders, with an improvement of the overall median depth from 6.5mm to 4.9mm in males ($p < 0.001$) and 6.5mm to 5.0mm in females ($p < 0.001$). Nevertheless, intergroup comparison showed no statistically significant differences between control group and test group at post-treatment reviews for all studied parameters. **Conclusion:** Within the limitations of the study, no additional benefits were observed with the use of nanocolloid silver irrigation following mechanical debridement.

Oral presentation at Perak Annual Medical Research Conference 2022 on 6 September 2022. Corresponding e-mail: drkhamiza@yahoo.com

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145. KNOWLEDGE, ATTITUDE AND ORAL HEALTH PRACTICE (K.A.P) TOWARDS PERIODONTAL HEALTH AMONG HEALTHCARE WORKERS

NMRR-20-1996-54342

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Introduction: Periodontal disease is considered a common disease exists within Malaysian, especially in adults. **Aim:** To assess the Knowledge, Attitude, Practice (K.A.P) and awareness of periodontal health among healthcare workers. **Materials:** A total 24-item questionnaire which was adopted from the similar scientific studies that met the objective of this study were used, with validation done by 2 experts. Questionnaire were compiled into questionnaire booklet, attached along with informed consent form and Patient Information Sheet. **Method:** Cross-sectional, self-administered questionnaire booklet was delivered to 209 participants from 14 investigated sites (government facilities) in Perlis. **Results:** Highlighted findings and outcome from the study includes: 11% (23/209) have loose tooth; 10% (21/209) have gum disease; 62.2% (130/209) said dental plaque is hard deposit on teeth; 19.2% (41/209) do not know relationships in periodontal disease to diabetes; 55.5% (116/209) do not know that periodontal disease sufferer in pregnant mother likely to have preterm low birth weight baby delivery; 48.3% (101/209) brushing their teeth less than 2 mins; 79.5% (166/209) do not perform interdental cleaning once a day. **Conclusion:** K.A.P and awareness in periodontal health among healthcare worker are poor. Oral health education should be empowered and further highlighted in both dental and medical personnel. This could be achieved by collaboration in Continuous Medical/Dental Education (CME/CDE) sessions involving both medical and dental personnel with aim to achieve better outcome in improving periodontal health. Additionally, it is important to start cultivating correct dental hygiene practice in the community by instilling correct tooth-brushing method in recommended duration and inter-dental cleaning as extra-care. Emphasis on importance of bi-annual dental check-up should be done to encourage the community to seek professional advice and care for better oral hygiene status.

Oral presentation at the 22th NIH Scientific Conference 2021 on 21-23 September 2021. Corresponding e-mail: drmabel@moh.gov

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146. CONSCIOUS SEDATION IN DENTISTRY: KNOWLEDGE, AWARENESS AND EXPOSURE OF MALAYSIAN DENTISTS

NMRR-20-799-54299 (IIR)

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Aim(s): There is dearth evidence on the knowledge, awareness and exposure of conscious sedation among Malaysian dentists. This study aims to assess Malaysian dentists' knowledge, awareness and types of exposure that they have received on conscious sedation in dental settings. **Methods:** An online survey was conducted using Qualtrics software to 385 registered Malaysian dentists with only 166 completed the survey (60.5% response rate). Data was analysed using SPSS IBM version 26.0. **Results:** Most of the respondents (n=147) were familiar with the term conscious sedation (87%) and majority had exposure to inhalation sedation using nitrous oxide (52.5%) during their undergraduate training (46.8%). However, less than one third of respondents offered conscious sedation in their current workplace. Nevertheless, the majority perceived the need for conscious sedation to be offered to their patients (82.9%). **Conclusions:** Majority of Malaysian dentists knew and were aware about conscious sedation in dentistry. Yet they have limited practical training on this. Most of them were interested in receiving further training in conscious sedation and expecting to offer the service in the future for their patients.

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147. PERCEIVED CONFIDENCE IN PERFORMING PERIPHERAL VENIPUNCTURE AMONG DENTAL PRACTITIONERS IN NEW ZEALAND AND MALAYSIA

NMRR-20-285-53211 IIR

Mohamed Ashri MH, Ting G, Tong D, Hamzah SZ

Aims: This research described the perceived confidence in performing peripheral venipuncture among dental practitioners in New Zealand and Malaysia and determined the preferred mode of training in peripheral venipuncture from the dental practitioners' perspective. **Introduction:** This exploratory cross-sectional correlational, quantitative study involved the participants completing online questionnaires. The study populations were registered dental practitioners holding the current Annual Practising Certificates during the data collection in 2020 and were either registered with the Dental Council of New Zealand or the Malaysian Dental Council. The data analysis was performed using Microsoft Excel and Statistical Package for the Social Sciences version 25. **Results:** The response rates received from eligible dental practitioners in New Zealand and Malaysian represented 4.7% and 4.3% of registered, actively practising dental practitioners for each country, respectively, in 2020. In New Zealand, 44% of dental practitioners reported exposure to peripheral venipuncture as undergraduates, while in Malaysia, it was 45%. 47% of New Zealand dental practitioners reported confidence in performing peripheral venipuncture during routine dental practice and 29% during medical emergencies. In Malaysia, 21% felt confident performing peripheral venipuncture during routine dental practice, while 9% felt confident performing peripheral venipuncture during medical emergencies. In New Zealand, 65% perceived peripheral venipuncture training as essential, while in Malaysia, 81%. Both New Zealand and Malaysian dental practitioners would prefer peripheral venipuncture training through clinical activities, workshops, simulated practice with a mannequin arm, and inclusion in undergraduate and postgraduate curriculum programmes. **Conclusion:** Peripheral venipuncture is a very commonly performed and essential medical procedure. A competent level of skill in performing peripheral venipuncture is a valuable asset for dental practitioners. The results of this study could be used to inform training programmes in peripheral venipuncture for dental practitioners. It is hoped that these educational resources could be deployed to maintain competence, improve skills and boost confidence in this area of patient care.

Thesis submitted for the Degree of Doctor of Clinical Dentistry - DCLinDent, University of Otago. Corresponding e-mail: drhakimin@moh.gov.my

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148. COMPARISON OF THE KNOWLEDGE ON HEALTH EFFECTS OF CIGARETTE SMOKING AMONG ARMY PERSONNEL IN 8TH BRIGADE INFANTRY, KELANTAN

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Introduction: Smoking is one of the risk factors for chronic diseases which may affect the health readiness of army personnel. **Objective:** To compare the knowledge on health effects of cigarette smoking between non-smoker, smoker and ex-smoker army personnel. **Methodology:** A cross-sectional study was carried out among 234 randomly selected fit infantry army personnel in the 8th Brigade Infantry, Kelantan on 11 -19 April 2018. A validated Bahasa Malaysia questionnaire was used to assess army personnel's knowledge on the health effects of cigarette smoking. Descriptive statistics and Pearson Chi-square test were done using SPSS ver22 with statistically significant at $p < 0.05$. **Results:** There were 42 (17.9%) non-smokers, 178 (76.1%) smokers and 14 (6.0%) ex-smokers army personnel involved in the study. All (100%) were male and the majority (92.7%) were Malays with a mean age of 25.8 (SD 5.06) years. Most of them received the highest level of education at secondary school (90.6%) while others went to the higher institution (9.4%). Knowledge on health effects among the army personnel was relatively moderate with the lowest proportion was 14.3% and the highest was 80.3%. Knowledge on cigarette smoking effect on erectile dysfunction was significantly higher proportion in ex-smoker compared to smoker ($p = 0.032$). **Conclusions:** Level of knowledge on health effects among army personnel is moderate. There is no difference on the knowledge level on health effects of smoking among army personnel between different smoking status except for the item on erectile dysfunction. Health education and promotion activity on smoking issues may increase knowledge, instill motivation and initiate quit smoking among the army personnel.

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149. APPLICATIONS OF HYALURONIC ACID FOR DENTAL IMPLANT IN ANIMAL STUDY: A SYSTEMATIC REVIEW

Abdullah Thaidi NI, Ghazali AB, Halim M

Introduction: Hyaluronic acid has a long history and is widely used in cosmetics, medicine, and dermatology. It is still relatively in dentistry. **Objective:** This study aims to review at the current literatures about application of hyaluronic acid in dental implant treatment with a focus on animal studies. **Material and Methods:** A search in the PubMed, Science Direct and Cochrane databases was conducted in May 2022 using the keywords "hyaluronic acid", "hyaluronan," and "dental implant." **Results:** The literature search identified 1018 articles, and thirteen animal studies were selected in this study. Animals involved in the studies are pigs, rats, rabbits, and beagles. There are two main groups of studies involved, surface treatment of dental implant surface with hyaluronic acid and bone graft material with additional hyaluronic acid particles. Analysis conducted in the studies includes histology, histomorphometry, micro-CT, and immunohistochemistry. **Conclusion:** The results from multiple studies showed positive effect on bone formation, and one study showed no signs of inflammatory reaction. Overall, there are encouraging results regarding the use of HA in dental implant therapy from the animal study that can be progressed into human trials.

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150. THE PHARMACOKINETICS OF 38% SILVER DIAMINE FLUORIDE (SDF) IN HEALTHY CHILDREN WITH DENTAL CARIES

RSCH ID-22-05016-TXE

Lim SP, Zainal Aalam N, Chik Z, Musa S

Introduction: Silver Diamine Fluoride (SDF) is medication that arrests dental caries. **Aim:** To determine pharmacokinetics (PK) of silver and fluoride following 38% SDF application in healthy children with dental caries. **Materials and methods:** Fifteen subjects aged four to ten with at least one cavitated primary tooth was recruited. Urine samples were collected at baseline, first 24-hour (F1) and second 24-hour (F2) after SDF treatment and analysed for silver and fluoride. Hair samples were collected at baseline and 7, 14, 30, 60, 75, and 90 days after SDF treatment, to analyse silver. **Results:** Eight subjects' urine samples was eligible for fluoride analysis. The correlation coefficient tests showed significant correlation* between urinary fluoride taken at the baseline with F1*, and F2*. Pairwise comparison of Friedman's test showed significant difference between urinary fluoride at baseline and F1. The range of urinary silver levels (N=15) at F1 was higher compared to baseline and F2. Hair silver levels (N=15) after SDF treatment fluctuates around the baseline level. **Conclusions:** The rise in urinary fluoride and silver levels following SDF application on carious teeth are well below the toxicity level. The hair silver levels were at extremely low level. Hence, it is considered safe for children.

Note * denotes p value < 0.05

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151. STABILITY OF BIMAXILLARY PROCLINATION CASES FOLLOWING FIXED APPLIANCES TREATMENT: A RANDOMISED CONTROLLED TRIAL

DF PD1912/0028

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Introduction: Bimaxillary proclination is a feature describing proclined upper and lower dental arches and is associated with increased lip fullness. The aim of orthodontic treatment in bimaxillary proclination is to flatten the profile for enhanced aesthetics by uprighting the incisor inclinations. Therefore, it is uncertain which is the most appropriate retainer for corrected bimaxillary proclination cases. **Objective:** To identify the most effective retention strategy for corrected bimaxillary proclination cases. **Materials and method:** 27 patients who had four premolars extraction and fixed appliance treatment at Faculty of Dentistry, Universiti Malaya were recruited and allocated by block randomisation into three groups [i.e., fixed bonded retainers (FB), double retainers (DR) and vacuum formed retainers (VFR)]. Data were collected periodically from debond (T0) up to 12 months (T4). The dental tissue (DT) and soft tissue (ST) parameters were measured from manually traced lateral cephalograms (LC). Dental casts were measured for intra-arch changes. Patients' compliance and frequency of breakages were also recorded. Data were analysed by repeated measures ANOVA. **Result:** At 12 months, the ST cephalometric parameters show significant ($p < 0.05$) relapse for lower and upper lips to SN-7 line and labiomental fold angle. The DT cephalometric and study cast parameters revealed significant relapse for the upper incisor to SN-7 line, upper and lower incisor angulations and interincisal angle. Only the upper incisor angle (UIA) showed significant differences between groups ($\eta^2 = 0.296$; $p = 0.015$). Post-hoc comparisons found FB and VFR [(mean difference = 3.33 degrees; 95% CI 0.46, 6.21; $p = 0.019$) and (mean difference = 3.22 degrees; 95% CI -6.09, -0.35; $p = 0.024$), respectively] had more relapse than DR of the UIA at T4. **Conclusion:** All three types of retainers showed no differences in most of the soft and dental tissue parameters. However, DR was found to be more superior than FB and VFR in maintaining the UIA of corrected bimaxillary proclinations. Trial registration: Clinical Trials NCT04578704 Funding: Dental Postgraduate Grant DPRG/02/19.

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152. MOTIVATORS AND BARRIERS TO ORAL HYGIENE SELF-CARE AMONG ADOLESCENTS IN MALAYSIA: A QUALITATIVE STUDY

NMRR-18-3880-45396

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Background: Having good oral hygiene self-care especially a regular toothbrushing habit will promote lifelong oral health. Therefore, understanding the factors that influence an adolescent's oral hygiene behaviour is important in developing effective oral health programmes for this age group. This study aimed to explore the motivators and barriers to adolescents' oral hygiene self-care by exploring the perspectives of secondary school students from three government schools in the state of Selangor, Malaysia. **Methods:** Focus group discussions (FGD) were conducted with Form Two (14 years-old) and Form Four (16 years-old) students from selected secondary schools in Selangor using a semi-structured topic guide until data saturation was reached. Data was transcribed verbatim and analysed using framework method analysis. **Results:** A total of ten FGDs were conducted involving 77 adolescents. The motivators for good oral hygiene self-care were appearance, fear of oral disease, consequences of oral disease, and past toothache experience. The barriers for oral hygiene self-care were poor attitude towards oral care, lack of confidence in toothbrushing skills, snacking habit, and the taste of toothpaste. **Conclusion:** Understanding the motivators and barriers to adolescents' oral hygiene self-care is the first step in designing effective oral health education messages. The findings from this study can be used as a guide for oral health education programmes and the development of materials that fulfil the needs of the adolescent population.

Keywords: adolescent, focus group, oral care, oral health behaviour, oral hygiene, self-care

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153. ASSESSMENT OF PARENTS' ORAL HEALTH LITERACY AND ITS ASSOCIATION WITH CARIES EXPERIENCE OF THEIR PRESCHOOL CHILDREN

USM/JEPeM/19030211

Adil AH, Eusufzai SZ, Kamruddin A, Wan Ahmad WMA, Jamayet NB, Karobari MI, Alam MK

Purpose: To assess the oral health literacy (OHL) of parents and its association with the caries experience of their preschool children attending the Hospital University Sains Malaysia (HUSM), Kota Bharu, Kelantan, Malaysia. **Materials and Methods:** This is a descriptive cross-sectional study involving a systematic random sampling method, using a sample of 230 parent/preschool child dyads. Among 230 parents, 24 were males and 206 were females (mean age 31.43 ± 5.82); among 230 children, 92 were boys and 138 were girls (mean age 4.82 ± 1.04) attending the pedodontics clinic, HUSM, who participated and met the inclusion criteria. A structured, self-administered oral health literacy questionnaire including sociodemographic factors was used in this study. A child's oral examination was performed to check the dmft (decayed, missing, filled teeth) status. Statistical analysis was done using descriptive and Spearman's correlation analysis and multivariate regression analysis. **Results:** The mean dmft score of children in relation to the OHL level of parents showed a significant difference ($p < 0.00$). The mean dmft score of children in relation to the OHL level of parents showed the following relationships: Inadequate (7.49 ± 4.10) followed by marginal (3.28 ± 2.67) and then adequate (0.55 ± 1.55). The incidence of caries amongst children in relation to parental employment was more associated with unemployed parents (6.11 ± 4.43) than with employed parents (2.79 ± 3.65). The caries experience amongst children in relation to education of their parents revealed a significant difference ($p < 0.001$), and the mean dmft score was high amongst preschool children with primary school qualified parents (10.7 ± 4.10) followed by high school (7.04 ± 3.68), vocational (5.81 ± 3.57), diploma (2.61 ± 2.81), and university (1.29 ± 2.27), respectively. The results revealed a valid significant difference (negative correlation, $r_s = -0.753^{**}$) between the OHL of parents with the dmft score of their preschool children. The age and gender of parents was not significantly associated with OHL, whereas ethnicity (positive correlation, $r_s = 0.283^{**}$), education (positive correlation, $r_s = 0.865^{**}$), and employment (negative correlation, $r_s = -0.490^{**}$) were found to be significant. **Conclusion:** We conclude that there is a significant association between the OHL of parents with the dmft score of their preschool children. The logistic regression showed that after adjustment for sociodemographic factors, parents' gender (OR = 0.067, 95% CI: 0.012–0.360), parents' employment status (OR = 3.247, 95% CI: 0.897–11.754), parents' OHL score (OR = 0.042, 95% CI: 0.016–0.114), and child age (OR = 2.195, 95% CI: 1.249–3.857) were significantly associated with dental caries in children. **Conclusion:** Our study concluded that parents' employment status, age, gender, OHL, and child's age were significantly associated with the caries experience of their preschool children.

Keywords: HUSM, caries, dmft, oral health literacy and pedodontics

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154. SELF-PERCEIVED PREPAREDNESS OF UNDERGRADUATE DENTAL STUDENTS IN DENTAL PUBLIC UNIVERSITIES IN MALAYSIA: A NATIONAL STUDY

USM/JEPem/18010022

Mat Yudin Z, Ali K, Wan Ahmad WMA, Ahmad A, Khamis MF, Brian Graville Monteiro N', Che Ab Aziz ZA, Saub R, Rosli TI, Alias A, Abdul Hamid NF, Harun NA

Aims: To evaluate the self-perceived preparedness of final-year dental undergraduate students in dental public universities in Malaysia. **Methods:** Final-year dental undergraduate students from six dental public universities in Malaysia were invited to participate in an online study using a validated Dental Undergraduates Preparedness Assessment Scale DU-PAS. **Results:** In total, about 245 students responded to the online questionnaire yielding a response rate of 83.05%. The age range of the respondents was 23-29 years with a mean age of 24.36 (SD 0.797). The total score obtained by the respondents was ranged from 48 to 100 with a mean score of 79.56 (SD 13.495). Weaknesses were reported in several clinical skills, cognitive and behavioural attributes. **Conclusions:** The preparedness of undergraduate students at six dental institutions in Malaysia was comparable to students from developed countries. The dental undergraduate preparedness assessment scale is a useful tool, and dental institutions may be used for self-assessment as well as to obtain feedback from the supervisors.

Keywords: dental, preparedness, students, undergraduates

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155. ORAL HEALTH LITERACY OF PARENTS AND ASSOCIATION WITH CHILDREN ORAL HEALTH STATUS – A REVIEW

Adil AH, Karobari MI, Eusufzai SZ, Kamruddin A, Wan Ahmad WMA, Jamayet NB

Oral health literacy (OHL) is the capacity of the individual to gain, practise and to recognise the information on basic health and its services required for appropriate oral health (OH) conclusions. The OHL allows an individual to move relatively through the health care system rather allowing them to write, read and relate the literature on oral health. It is an important section of physical health and comfort, even more than a clean mouth, a great smile and relief from pain and infection. It also relates significantly to self-esteem and personal achievement. There is enough evidence in the literature with several studies which reveals that the oral health literacy is significantly associated with adult's oral health status, as well as children's oral health.

Keywords: Health literacy, oral health literacy, pain, infection

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156. CROSS-CULTURAL ADAPTATION AND VALIDATION OF ORAL HEALTH LITERACY INSTRUMENT (OHLI) FOR MALAYSIAN ADULTS

USM/JEPeM/140378

NMRR-13-1160-17164(IIR)

Ramlay MZ, Saddki N, Tin-Oo MM, Arifin WN

Introduction: Currently, the availability of a functional oral health literacy instrument in the Malay language is limited. **Objective:** This study aimed to cross-culturally adapt Oral Health Literacy Instrument (OHLI) into the Malay language and to determine its psychometric properties in Malaysian adults. **Methods:** Cross-cultural adaptation of the OHLI into the Malay version (OHLI-M) was conducted according to a guideline, followed by a cross-sectional study among outpatients in a selected health clinic. The psychometric evaluations were the comparison of the OHLI-M scores by education levels and last dental visits, the correlation of the reading comprehension section of OHLI-M with the Malay version of the Short Test of Functional Health Literacy in Adults (S-TOFHLA-M), the correlation of OHLI-M with decayed, missing, and filled teeth (DMFT) and Community Periodontal Index (CPI), and the test-retest reliability of OHLI-M. A total of 195 outpatients participated in this study. **Results:** The OHLI-M scores were significantly different between participants with different levels of education and timing since last dental visit. Participants with lower secondary school qualification and below, and those whose last dental visit was more than two years ago or never, had significantly lower OHLI-M scores. There was a positive correlation between the reading comprehension scores of the OHLI-M and the S-TOFHLA-M (Spearman's $\rho = 0.37$, $p < 0.001$). There was no significant correlation between the OHLI-M scores and the DMFT index scores or the CPI scores. The internal consistency was good (Cronbach's $\alpha = 0.83$ to 0.88). **Conclusions:** The test-retest reliability was excellent (intraclass correlation = 0.80 to 0.86). The OHLI-M showed good validity and reliability among adults in Malaysia.

Keywords: cross-cultural adaptation, oral health literacy instrument (OHLI), Malay version, validation studies

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157. AWARENESS AND ATTITUDE OF PATIENTS TOWARDS RETAINING TEETH AND THEIR OPTIONS FOR TEETH REPLACEMENT

Ceng TK, Rahman NA, Muttlib NA, Alawi R

Introduction: Endodontic/root canal treatment (RCT) and tooth extraction are among the most common methods to relieve pain. It is highly significant to retain a natural tooth as prosthesis only helps to replace the missing teeth with inferior physical, biomechanical and sensory properties. Retaining natural tooth and replacing missing teeth helps to preserve oral function, aesthetic and prevent occlusal disharmony. **Objective:** To determine the knowledge, attitude and practice of patients towards retaining teeth, options for teeth replacement and their associated factors. **Methodology:** A cross-sectional study was carried out on 222 patients attending Dental Clinic, Hospital Universiti Sains Malaysia (USM). Sociodemographic profiles were obtained, and the awareness and attitude were assessed using a validated questionnaire. Data were analysed using IBM SPSS Statistics Version 24.0. Results: Most of the patients were Malay (94.1%) and female (64.4%). Most of them had knowledge regarding RCT (55.4%). For the attitude, 17.6% of the patients had undergone RCT, while for the practice, 64.0% prefers RCT than extraction. 50.9% choose fixed prosthesis to replace missing teeth. RCT was significantly associated with level of education ($p=0.011$) and monthly income group ($p=0.023$). In addition, previous experience of RCT was associated with occupation ($p=0.008$), practice of RCT was associated with race ($p=0.036$) and options for tooth replacement was associated with level of education ($p=0.013$). **Conclusion:** This study indicated a moderate level of awareness and positive attitude and practice on RCT. Thus, a more comprehensive awareness activity is needed to ensure that more tooth can be retained and those that are missing being replaced in our community.

Keywords: Awareness, attitude, retaining teeth, replacement of the tooth, endodontic treatment

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158. PERCEPTION ON THE ROLE OF DENTIST IN SMOKING CESSATION AMONG ARMY PERSONNEL IN 8TH BRIGADE INFANTRY, KELANTAN

Ruzawani R, Munirah MA, Normastura AR

Introduction: Prevalence of smokers among Malaysian army personnel is high. Smoking is one of the risk factors for chronic diseases. Smoking cessation program can help to ensure the health readiness of army personnel which contributes to their military readiness. **Objective:** To compare perceptions on the role of dentist in smoking cessation activity between non-smokers and ever-smokers army personnel. **Methods:** A cross sectional study was carried out among 233 randomly selected fit infantry army personnel in the 8th Brigade Infantry, Kelantan. A validated Bahasa Malaysia questionnaire was used to measure army personnel's perceptions on the role of dentist in smoking cessation activity. Descriptive statistics and Pearson Chi-square test were done using SPSS ver22 with statistically significant at $p < 0.05$. **Results:** There were 42 (18.0%) non-smokers and 191 (82.0%) ever-smokers army personnel involved in the study. All (100%) were male and majority (92.7%) were Malays with a mean age of 25.8 (SD 5.06) years. Majority of non-smokers (81.0%) and ever-smokers (83.8%) expected their dentist to discuss about smoking with patients. Significantly more ever-smokers (30.4%) strongly agree/ agree that dentist should ask about smoking on every visit compared to non-smokers (19.6%); $p\text{-value} = 0.024$. Both non-smokers and ever-smokers have positive perceptions on the role of dentist in smoking cessation activity. Significantly more ever-smokers strongly agree/ agree that dentist should ask about smoking on every visit at dental clinic ($p\text{-value} = 0.024$). **Conclusion:** This provides an insight towards the needs of smoking cessation activity and strengthening the role of dentist in smoking cessation program among the army personnel.

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159. AWARENESS ABOUT THE PERIODONTAL DISEASE AND DIABETES MELLITUS INTERRELATIONSHIP AMONG DIABETIC PATIENTS

USM/JEPeM/18010033

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Background And Aim: The awareness about bidirectional relationship between periodontitis and diabetes mellitus (DM) is not well known among the Malaysian population. This study aimed to evaluate the level of awareness of periodontal disease (PD)-DM interrelationship and self-reported periodontal health among patients with DM. **Methods:** Patients who attended the diabetic clinic were systematically and randomly invited to participate in this cross-sectional study. Consented participants completed a validated self-administered questionnaire and provided information on socio-demographic background, oral hygiene practice, periodontal health status, and awareness about whether there is relationship between PD and DM. The level of haemoglobin A1c (HbA1c) was obtained from the medical record. Descriptive and logistic regression analyses were carried out using SPSS software with $P < 0.05$ considered as significant. **Results:** A total of 123 patients with DM with a mean age of 62.20 ± 9.55 years participated in the study. The mean duration of living with DM was 10.62 ± 6.52 years and that for HbA1c level was 9.08 ± 2.24 mmol/l. About 53% of the participants had signs of PD, but only 22% perceived that they had PD. Only 15% were aware of the PD-DM interrelationship. The odds of knowing the definition and cause of PD and believing that oral health could be better without DM were greater in participants who had the awareness compared to those without awareness ($P < 0.01$). **Conclusion:** This study showed that patients with DM had a low level of awareness about PD-DM interrelationship which could be due to a lack of understanding about PD. It is recommended that patients with DM should be referred to a dental clinic for oral health counselling.

Keywords: Diabetes Mellitus, Diabetes Complications, Oral Health, Periodontitis, Periodontal Disease

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160. PERIODONTAL PARAMETERS AND ANTI-CARDIOLIPIN ANTIBODIES FOLLOWING PERIODONTAL THERAPY IN CHRONIC PERIODONTITIS

USMKK/PPP/JEPeM (232.3(1))

Wan Mohamad WM, Saad NR, Zainuddin SLA, Taib H

Introduction: Anti-cardiolipin (anti-CL) antibodies are autoantibodies which are directed against cell membrane phospholipids. A significant number of periodontitis patients showed positive for anti-CL antibody. **Objective:** This study aimed to determine the periodontal parameters and anti-CL antibodies levels before and after non-surgical periodontal therapy in chronic periodontitis. **Methods:** This cross-sectional study had been carried out at Periodontal Clinic, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia. Thirty-five chronic periodontitis (CP) and 39 non-periodontitis (NP) patients underwent clinical periodontal examination at baseline. Plaque index (PI), gingival index (GI), periodontal pocket depth (PPD), and clinical attachment loss (CAL) were measured. Scaling and polishing were performed and blood samples were taken for IgG and IgM anti-CL antibodies analysis. Re-evaluation was performed four weeks after initial therapy. CP patients were re-examined, all periodontal parameters were recorded and blood samples were taken for reassessment of IgG and IgM anti-CL antibodies. **Results:** Significant difference means of PI ($p=0.001$), GI ($p=0.000$), PPD ($p=0.000$) and, CAL ($p=0.000$) were found between CP and NP groups. All periodontal parameters were significantly reduced ($p\leq 0.05$) after four weeks of therapy. The mean levels of IgG and IgM anti-CL antibodies at baseline were significantly higher in CP than NP group (IgG=4.46 vs 3.22, $p=0.002$; IgM=3.28 vs 2.57, $p=0.019$). No significant difference of the median levels of IgG ($p=0.82$) and IgM anti-CL antibodies ($p=0.35$) following therapy. **Conclusion:** All periodontal parameters were significantly reduced following periodontal therapy. Higher level of Anti-CL antibodies in CP indicates stimulation of autoantibodies production by periodontal infection. Nonetheless no significant changes of this anti-CL antibodies levels despite significant reduction of the clinical parameters after periodontal therapy.

Keywords: periodontal parameters, anti-CL antibodies, chronic periodontitis, non-surgical periodontal therapy

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161. EFFECTIVENESS OF ORAL HYGIENE INSTRUCTION ON THE PERIODONTAL HEALTH AMONG ADULTS: A SYSTEMATIC REVIEW

Chan JL, Ahmad B, Sanusi SY, Sinor MZ

Introduction: It is common for oral health professionals to give oral hygiene instructions during dental visits but the evidence on its effectiveness is inconclusive. **Objectives:** To review the evidence on the effectiveness of various oral hygiene instructions methods on periodontal health in adults. **Methodology:** The study searched the PubMed and Scopus databases for reports published from January 2000 to June 2020 in the English language. The quality of the selected articles was assessed using the PRISMA guidelines by two authors. **Results:** A total of five reports met the inclusion and exclusion criteria. The heterogeneity in the outcome measures between the studies did not allow a direct comparison. Verbal, brochures were among the methods used in the studies. Oral hygiene instruction was found to have short (up to 13 weeks) term effects on dental plaque levels and/or gingiva bleeding. No significant differences were found between the different methods of oral hygiene instructions affecting periodontal health. **Discussion:** The studies provided evidence for short term improvement up to 13 weeks after the intervention regardless of the mode and type of delivery, and content of instruction. The improvement is also observed in the control groups without receiving oral hygiene instruction. Studies investigating the effects of oral hygiene instruction on adults has a couple of major limitation including carry over knowledge, Hawthorne effect and interaction with colleagues and peers. All of the instruction methods evaluated provide effective patient education. **Conclusion:** There is evidence that oral hygiene instruction is effective in reducing plaque and gingival bleeding scores in adult individuals, but it is still not clear if the effect continues beyond 13 weeks. No single method can be highlighted as the best medium of instruction.

Keywords: Adults, effectiveness, oral hygiene instructions, periodontal health

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162. KNOWLEDGE AND ATTITUDE TOWARDS NEW NORM IN THE DENTAL CLINIC DURING COVID-19 PANDEMIC AMONG ADULTS IN KOTA BHARU, KELANTAN

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Background: The community must be aware of and practice preventive measures for Malaysia to win against COVID-19. Limited studies on the awareness of public regarding the new norm at dental clinic. **Objective:** The study aimed to determine the knowledge and attitude towards the new norm in the dental clinic during the COVID-19 pandemic and its associated factors among adults in Kota Bharu, Kelantan. **Materials & Methods:** A cross-sectional study was conducted on adult patients who were attending Hospital USM. A validated questionnaire on awareness of the new norm in a dental clinic during pandemic COVID-19 was administered online using a google form. Data were analysed using IBM SPSS version 26.0. The significant level was set at $p < 0.05$. **Result:** A total of 131 adult patients participated in this study. The mean score of knowledge and attitude towards the new norm in a dental clinic during the COVID-19 pandemic were 5.9 (SD=1.46) and 20.4 (SD=3.12), respectively. Statistical analysis showed that the mean score of knowledge and attitudes among master/doctorate holders was significantly higher than the higher secondary school level, with the mean difference of 1.6 ($p=0.002$) and 3.0 ($p=0.007$), respectively. **Conclusion:** The knowledge and attitude of the respondents towards the new norm in the dental clinic during the COVID-19 pandemic were relatively good. Education level was significantly associated with the knowledge and attitude towards the new norm in the dental clinic. Effective health promotion is crucial to increase the knowledge, attitude, and compliance to the recommended preventive measures against the COVID-19 pandemic.

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163. AWARENESS AND INCORPORATION OF DENTAL HOME CONCEPT AMONG THE MINISTRY OF HEALTH MALAYSIA DENTAL OFFICERS AND DENTAL THERAPISTS

Mukhtar M, Saddki N, Mahmood Z

Background: The dental home concept (DHC) is the continuous engagement between the dentist and the patient, which encompasses all aspects of oral health care provided in a thorough, always-accessible, organized, and family-centred manner. To institute a lifetime of good oral health, this engagement should start no later than 12 months of a child's age. **Objective:** To assess the awareness and incorporation of the DHC among the Ministry of Health Malaysia (MOH) Dental Officers (DO) and Dental Therapists (DT). **Materials & Methods:** A total of 154 DO and 137 DT participated in this cross-sectional study. A self-administered questionnaire comprising of seven dental home characteristics: accessible (9 items), compassionate (4 items), family-centred (4 items), comprehensive (10 items), culturally effective (5 items), coordinated (4 items) and continuous (3 items) was used. The content validity and the reliability of the questionnaire was established prior to its use. **Result:** While most MOH DO (61.7%) and DT (67.2%) were unaware of the DHC, more than 80.0% of the DO and DT responded positively to most items measuring incorporation of the DHC into their current practice. Only one item in the comprehensive characteristics (provision of special equipment and appliance therapy) had less than half of DO respond positively. **Conclusion:** Most MOH DO and DT incorporated the DHC into their oral health care practice although they were unaware of the concept. This study provides evidence that support the establishment of the DHC as an oral health care policy in Malaysia.

Keywords: dental home, dental nurses, general dentists, child oral health, dental care

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164. ASSESSMENT OF ORAL HEALTH KNOWLEDGE, ATTITUDE, AND PRACTICE OF CAREGIVERS OF CHILDREN WITH AUTISM SPECTRUM DISORDER

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Background: Caregivers have a crucial role in caring for the oral health of children with autism spectrum disorder (ASD). **Objective:** To assess caregivers' oral health knowledge, attitude, and practice (OHKAP). **Materials & Methods:** A cross-sectional study was conducted among caregivers of children with ASD aged 7-12 years. Validated OHKAP questionnaire was utilized in obtaining caregivers' OHKAP. Data were analysed using IBM SPSS version 26.0. **Result:** Thirty-two Malay caregivers recruited were mostly mothers (78.1%) with mean (SD) age of 39.1 (4.19) years. For knowledge, 65.6% knew that sugary foods/drinks are best limited to mealtimes, 75.0% did not know that child's oral hygiene care needs to start at birth, only 59.4% knew that child needs to brush twice per day although 87.5% knew that fluoride strengthens enamel, and 87.5% knew that child's dental visit is for check-up. For attitude, 43.8% strongly agreed on the need to concern about baby teeth, 68.8% strongly agreed on the importance of brushing twice-daily for 2 to 3 minutes, and 65.6% agreed on the need of assisting their child at a very young age. For practice, only 37.5% children brushed twice daily, 62.5% children used fluoridated toothpaste whereby 46.9% applied pea-sized amount. **Conclusion:** Caregivers of children with ASD displayed a basic understanding and attitude on oral health. However, their practice towards oral health care was unsatisfactory. Oral health intervention for caregivers is crucial as they play a major role in caring their children with ASD.

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165. ASSOCIATION BETWEEN ORAL HEALTH KNOWLEDGE, ATTITUDE AND PRACTICE WITH DENTAL PLAQUE MATURITY STATUS AMONG ADOLESCENTS IN KOTA BHARU, KELANTAN

USM/JEPeM/17020094

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Background: School students are young adolescents who are in a period of acquiring good oral hygiene habits that are practised as they grow up. This study aimed to determine the association between oral health knowledge, attitude and practices (KAP) of the adolescents and their dental plaque maturity status. **Methods:** A cross-sectional study was conducted among 174 school students aged 13 to 14 years in Kota Bharu, Kelantan. The oral health knowledge, attitude and practices were assessed by self-administered questionnaires, while the dental plaque maturity status was assessed using GC Tri Plaque ID gel TM (TPID). The data were analysed using IBM SPSS version 24.0. **Results:** The mean (SD) for knowledge and attitude score of the students were 4.69 (1.44) and 3.63 (0.63), respectively. The mean (SD) dental plaque maturity score (DPMS) of the students was 1.02 (0.55). Students who had answered correctly on sugar and practised tooth brushing twice daily had significantly lower mean DPMS as compared to those who had answered incorrectly and practised tooth brushing less than twice daily ($p < 0.05$). **Conclusion:** Adolescents participated in this study had moderate oral health knowledge and good oral health attitude. Correct knowledge regarding sugar and toothbrushing routines of at least twice a day significantly associated with the dental plaque maturity status.

Keywords: Oral health, Oral hygiene, Adolescent, Dental plaque, Toothbrushing

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166. INFLUENCE OF ORAL HEALTH LITERACY ON KNOWLEDGE AND ATTITUDE TOWARDS CHILDREN'S ORAL HEALTH AMONG PREGNANT WOMEN IN MALAYSIA

USM/JEPeM/18110744

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Introduction: Health literacy is an independent predictor of health outcomes, including health knowledge and behavior. This study determined the influence of oral health literacy on knowledge and attitude towards children's oral health among pregnant women. **Materials and Methods:** A total of 130 pregnant women (65 nulliparous and 65 primiparous or multiparous) attending Hospital Universiti Sains Malaysia for antenatal care who did not have any diagnosed cognitive disorders and could read and write in the Malay language participated in this cross sectional study. A structured self-administered questionnaire was used to measure knowledge and attitude towards children's oral health, and the Malay version of the Oral Health Literacy Instrument (OHLI-M) was used to assess the oral health literacy of the participants. **Results:** Multivariable linear regression analysis showed that older women and women with higher OHLI-M scores had higher mean knowledge scores than younger women ($p=0.007$) and women with lower OHLI-M scores ($p=0.001$), respectively. In addition, women with higher OHLI-M scores, women with higher mean knowledge scores, and women who had attended a talk about children's oral health were more likely to have higher mean attitude scores than women with lower OHLI-M scores ($p=0.019$), women with lower mean knowledge scores ($p=0.006$), and women who had never attended a talk about children's oral health ($p=0.001$). **Conclusion:** Pregnant women's oral health literacy was positively associated with their oral health knowledge and attitude towards children's oral health. Strategies to improve the oral health literacy of pregnant women are indicated.

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167. CROSS-CULTURAL ADAPTATION AND VALIDATION OF MALAY VERSION OF RAPID ESTIMATE OF ADULT LITERACY IN DENTISTRY (MREALD-30) AMONG ORANG ASLI POPULATION IN MALAYSIA

Rath A, Wong M, Pannuti CM, Hesarghatta Ramamurthy P, Fernandes B, Shelton A, Muttalib KA

Background: The aim of this study was to adapt, translate and validate the Rapid Estimate of Adult Literacy in Dentistry (MREALD-30) instrument for the Orang Asli population in Malaysia. **Methods:** After translation and cross-cultural adaptation, interviews were conducted with 326 participants of the Temuan tribe from village Kampung Tering in Johor, Negeri Sembilan, Malaysia. The instrument's validity was assessed using the scores of MREALD-30, which were compared based on occupation, monthly household income, educational attainment, general literacy, use of dental services, and three dental outcomes. A questionnaire containing socio-behavioral information and validated Malay Oral Health Impact Profile (M-OHIP-14) was also administered. The reliability of the MREALD-30 was assessed by re-administering it to 30 subjects after two weeks. Its correlations evaluated convergent and discriminative validity of MREALD-30 with the level of education and dental visiting habits, monthly household income, respectively. Predictive validity was assessed with M-OHIP-14, while construct validity was evaluated by exploratory factor analysis using the Rasch model. **Results:** The internal consistency of the MREALD-30 measured by Cronbach's alpha was 0.89. The test-retest reliability was excellent (ICC 0.95, $k = 0.85$). MREALD-30 exhibited good construct validity. Rasch analysis showed two factors, and infit mean-square statistics for MREALD-30 were all within the desired range of 0.50-2.0. The discriminant validity and predictive validity were statistically significant ($p < 0.05$). **Conclusions:** MREALD-30 showed very strong reliability, good construct, discriminant, and predictive validity, but poor convergent validity. Overall, it showed good psychometric properties and can be used in these community settings.

Keywords: Dental, Health literacy, Indigenous people, Orang Asli, Malay, Malaysia, Oral health, Psychometric evaluation, REALD-30

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168. COMPARATIVE EFFECTS OF CHEWING GUMS IN ORAL HEALTH: AN ORIGINAL RESEARCH

Jabeen F, Chavan MS, Kondreddy K, Tiwari RVC, Tiwari H, Vohra P

Aim: The purpose of our research was to assess the oral health status of patients while using sugar free chewing gums in comparison to those who were not using chewing gum. **Methodology:** Forty patients included in the present study, were divided into two groups- one consuming sugar-free chewing gum and other one as a control. The chewing gum group was composed of twenty patients and control gum group was composed also of twenty patients. The subjects for the study were selected randomly and they were in a good general health and were not using any medications. Oral examination of patients were carried out using the plaque index (PI) and DMFT index of the study subjects. **Results:** The study demonstrates significant differences between the chewing and control group in the amount of plaque accumulation in relation to plaque index score especially for the 1st two months of the study. Similar result was observed with respect to DMFT score, which showed less prevalence of caries in the study population. **Conclusion:** As health care providers, we should include in our dental education programmes the role of chewing gum as an adjunct to individual self-care such as routine daily brushing, flossing and regular dental check.

Keywords: Chewing gum, oral hygiene measures, plaque index, DMFT

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169. WHAT DO WE KNOW ABOUT EVIDENCE-INFORMED PRIORITY SETTING PROCESSES TO SET POPULATION-LEVEL HEALTH-RESEARCH AGENDAS: AN OVERVIEW OF REVIEWS

Tan A, Nagraj SK, Nasser M, Sharma T, Kuchenmüller T

Background: This overview aimed to synthesize existing systematic reviews to produce a draft framework of evidence-informed health priority setting that supports countries in identifying appropriate steps and methods when developing and implementing national research agendas. **Main Body:** We searched Ovid MEDLINE((R)) and the WHO Institutional Repository for Information Sharing from 2010 to 2020 for critical or systematic reviews that evaluated research priority setting exercises. We adapted the AMSTAR checklist to assess the quality of included reviews and used adapted frameworks for data extraction and analysis. The search resulted in 2395 titles, of which 31 were included. Populations included in the reviews typically involved patients, families and carers, researchers, clinicians, policymakers and research funders. The topics covered in the reviews varied from specific diseases or conditions, approaches for healthcare practice or research priority setting methods itself. All the included systematic reviews were of low or critically low quality. The studies were thematically grouped based on their main focus: identifying and engaging with stakeholders; methods; context; and health area. **Conclusion:** Our overview of reviews has reconfirmed aspects of existing frameworks, but has also identified new concepts for countries to consider while developing their national research agendas. We propose a preliminary framework for consideration that highlights four key phases: (1) preparatory, (2) priority setting, (3) follow-up phase and (4) sustainability phase, which have thirteen sub-domains to consider.

Keywords: National health research system, Overview of reviews, Research agenda, Research funding, Research priority setting, Resource allocation, Systematic review

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170. ORAL HEALTH ATTITUDES AND BEHAVIOURS AMONG UNDERGRADUATE HEALTH SCIENCE STUDENTS IN IIUM Kuantan CAMPUS

IREC 2021-097

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Introduction: Oral health is a component of overall health that has an impact on an individual's general well-being. HU-DBI questionnaire has been interested to evaluate patients' perceptions of oral health care. It is believed that individuals enrolled in undergraduate health science are expected to have a positive attitude and behaviour toward their oral health. **Objectives:** To investigate and compare the oral health attitudes and behaviours among undergraduate health sciences students at IIUM Kuantan and to evaluate between preclinical and clinical students on their oral health awareness. **Material and methods:** 100 respondents were recruited from each course. A modified online questionnaire assessing attitudes and behaviours towards oral health was used. Results were analysed by descriptive statistics, Kruskal Wallis test, and Mann-Whitney test. **Results:** 100 respondents were recruited from each course. A modified online questionnaire assessing attitudes and behaviours towards oral health was used. Results were analysed by descriptive statistics, Kruskal Wallis test, and Mann-Whitney test. **Conclusions:** The outcome for oral health attitudes and behaviour among dental students have a greater score compared to medical, nursing, allied health science, and pharmacy courses. It also highlights that overall clinical student showed better oral health care than preclinical students in all courses.

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171. GENERAL AWARENESS ABOUT IMPACTED THIRD MOLARS REQUIRING SURGICAL INTERVENTION AMONG OUTPATIENTS OF PENANG INTERNATIONAL DENTAL COLLEGE - A QUESTIONNAIRE-BASED STUDY

Varghese A, Loganathan K, Vaithilingam B, Varghese T, Pradeep P

Aim and Objectives: The objective of this study is to evaluate the general awareness about impacted third molars requiring surgical intervention and to assess the level of self-motivation towards acceptance of minor surgical intervention for removal of impacted 3rd molars. **Study design:** A random questionnaire-based study was carried out on 100 outpatients who visited Penang International Dental College (PIDC). All the patients were above 18 years of age and have not undergone either consultation or surgical removal of impacted third molar. **Result:** A major segment (80%) of the respondents were aware of the presence of wisdom teeth. But most of them (70%) were unaware about when it erupts. However, many (64%) of them were aware of the surgical intervention required for the removal of impacted third molar. Both male and female subjects exhibited similar trends but the frequency was higher in females due to the larger female composition in the sample size. Chinese had the highest frequency in terms of population size (52%). All ethnic groups showed similar trends in answering almost all the questions. There was a difference in frequency of response between ethnic groups for a few questions, indicating that there is significant difference in terms of knowledge between the Chinese and other groups. However, since the Chinese have the highest frequency in terms of population size in this study, this result may not be representative. Most of the respondents (74%) were unwilling for surgical extraction of a painless impacted tooth. When a scenario with a painful impacted tooth was presented, 84% of them opted for surgical extraction, with some of them opting for professional opinion or medicine relief. **Conclusion:** This study highlights that often pain is the main driving factor for seeking treatment instead of prophylactic surveillance. Patients may have different ideas regarding the management of their impacted third molars, but this should not affect the dentist's stand on the standard operating procedure of managing impacted third molars.

Keywords: Third molar impaction, Awareness, Surgical intervention

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172. KNOWLEDGE OF INFANT ORAL HEALTH AND EARLY CHILDHOOD CARIES AMONG UNDERGRADUATE DENTAL STUDENTS IN PENANG, MALAYSIA

Pradeep P, Dhillon IK, Vi VT, Jia CN, Fawaz S

Aim: The purpose of this study was to assess the knowledge possessed by dental students of Year 3, 4 and 5 at Penang International Dental college, regarding early childhood caries and infant oral health.

Methodology: Two hundred and twenty-three students were evaluated. A self-administered validated questionnaire was used to assess the knowledge on infant oral health and early childhood caries among the dental students in 3rd, 4th and 5th year. Data analysis was carried out using the tests in SPSS for comparing the knowledge scores between the 3rd year dental students and 4th and 5th year dental students.

Results: The mean percentage score obtained by the sample was 66 % which the researchers consider satisfactory as per the benchmark set by the researchers. There was significant difference in knowledge between Year 3, 4 and 5 pertaining to infant oral health and early childhood caries ($p < .05$). There was also a statistically weak and positive correlation between year of study and the level of knowledge pertaining to early childhood caries and infant oral health as the relationship was still found to be significant ($p < 0.05$). **Conclusions:** 4th year students had a comparatively better knowledge of infant oral health and early childhood caries as compared to 5th and 3rd year students.

Keywords: Infant Oral Health, Early Childhood Caries, Undergraduate Dental Students

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173. KNOWLEDGE, ATTITUDE, AND PRACTICE OF ORAL HYGIENE AMONG STUDENTS OF A PRIVATE UNIVERSITY

Iqbal MZ, Rath R, Prajapati SK, Omar K, Bahari MB, Rajan S, Al-Saikhani FI, Iqbal MS

Objective: The objective of the study was to evaluate the knowledge, attitude, and practice among pre-final and final year students of pharmacy, medicine, biotechnology, and business faculties about oral hygiene. **Materials and methods:** A cross-sectional observational study was conducted to evaluate the knowledge, attitude, and practice of students towards oral hygiene at a private university in Malaysia. Validated questionnaires were distributed to a convenient stratified sample of 324 students studying in the different selected faculties, namely pharmacy, medicine, biotechnology, and business, respectively. The Statistical Package for Social Science (SPSS) Version 24.0 was used to analyze the data. **Results:** With regard to knowledge, upon evaluation, it was seen that the students of the Faculty of Pharmacy had the highest percentage of adequate knowledge, which was statistically significant with a P-value of 0.001 and the effect size of 0.246. On the evaluation of attitudes, it was seen that the Faculty of Biotechnology had the highest positive attitudes. According to race, Malay students had the highest positive attitude among all the races that participated in the study, which showed a P-value of 0.037 with the effect size of 0.034. Regarding practice, the Faculty of Pharmacy had the lowest practice compared with the other faculties. This variable had a P-value of 0.001 and showed to have significance against the practice with an effect size of 0.193. **Conclusion:** Overall, a good attitude was seen amongst the students on their oral hygiene. It was also observed that the attitude, knowledge, and practice of the students in a private university increased with an increasing level of education.

Keywords: Attitude, knowledge, oral hygiene, practice, students

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174. PLAQUE REMOVAL EFFICIENCY OF CHEWABLE TOOTHBRUSHES AMONG 10–12-YEAR OLD CHILDREN: A RANDOMIZED CONTROL TRIAL

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Aim and Objectives: Toothbrushing is one of the most important factors in controlling plaque accumulation and dental caries. There are vast varieties of toothbrushes available in the market. This study was designed to evaluate the effectiveness of novel chewable toothbrushes as compared to manual toothbrushes in plaque removal among 10–12-year-old children. **Materials and Methods:** This randomized controlled trial was conducted on 40 healthy children aged between 10 and 12 years of age who were randomly assigned to either of the groups: Group I—Chewable Toothbrushes and Group II—Manual Toothbrushes. Following oral prophylaxis, baseline records of oral hygiene indices (Simplified oral hygiene index (OHI-S) in indexed teeth and Turesky modification of Quigley Hein plaque index (TMQHI) were taken. Baseline Saliva samples were collected and sent for Streptococcus mutans counts. Children were then instructed to use their respective toothbrush twice daily for a week. Oral hygiene indices and S. mutans counts were repeated after 1 week. **Results:** Differences in pre-brushing and post-brushing plaque scores and salivary S. mutans counts were statistically significant when compared using paired-sample t test and independent-sample t test. There was a significant reduction in salivary S. mutans counts after using both chewable and manual toothbrushes. However, there was no statistically significant difference between the two groups ($P = 0.08$). **Conclusion:** Chewable toothbrushes are equally effective in plaque control when compared to manual toothbrushes. These can be a reliable alternative for children who lack manual dexterity.

Keywords: Chewable toothbrush, Streptococcus mutans counts, children, manual toothbrush, plaque control

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175. ASSOCIATION BETWEEN HARMFUL AND ADDICTIVE PERCEPTIONS OF E-CIGARETTES AND E-CIGARETTE USE AMONG ADOLESCENTS AND YOUTH—A SYSTEMATIC REVIEW AND META-ANALYSIS

NMRR-19-1537-49110

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Introduction: Recognising the association between the perceived risks of e-cigarettes and e-cigarette usage among youth is critical for planning effective prevention and intervention initiatives; thus, a systematic review and meta-analysis were performed. **Objective:** This review aimed to assess the association between the perceptions of risks, focusing on the harmfulness and addictiveness of e-cigarettes, and e-cigarette use among adolescents and youth. **Methods:** Fourteen databases were searched for eligible studies from the inception of database until March 2022 to examine the effect estimates of the association between perceptions of harmfulness and addictiveness and overall e-cigarette usage among adolescents and youth. **Results:** The meta-analysis showed that in comparison to non-users, young people who were ever e-cigarette users were two times more likely to disagree that e-cigarettes are harmful (OR: 2.20, 95% CI: 1.41–3.43) and perceived e-cigarettes as less harmful than tobacco cigarettes (OR: 2.01, 95% CI 1.47–2.75). Youths who were ever e-cigarette users were also 2.3 and 1.8 times more likely to perceive e-cigarettes as less addictive (OR: 2.28, 95% CI: 1.81–2.88) or perceive e-cigarettes as more addictive (OR: 1.82, 95% CI: 1.22–2.73) than tobacco cigarettes, as compared with non-users. The subgroup analysis reported that adolescents were more likely to believe that e-cigarettes are less harmful than tobacco cigarettes, while youth users perceived otherwise. **Conclusion:** the risk perceptions of e-cigarettes are associated with e-cigarette use among adolescents and youth and could be the focus of health promotion to prevent and curb the uptake of e-cigarettes among young people.

Keywords: addictive; adolescent; e-cigarette; harmful; risk perception; young people; youth

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176.EFFECTS OF A NOVEL DYE CONTAINING TOOTHPASTE VERSUS REGULAR FLUORIDATED TOOTHPASTE FOR SUPRAGINGIVAL BIOFILM REDUCTION IN PATIENTS WITH CHRONIC GINGIVITIS: A RANDOMIZED CONTROLLED TRIAL

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Aim: To compare the effects of a plaque disclosing toothpaste with a regular fluoridated toothpaste for supragingival biofilm reduction in patients with chronic gingivitis. **Materials And Methods:** This study was a randomized controlled trial with a parallel design. Forty patients, both males and females aged 18-25 years with chronic generalized gingivitis (N=40) were randomly allocated to two groups of twenty each (n=20), using lottery method. Participants in the experimental group brushed with a plaque disclosing toothpaste, while participants in the control group brushed with regular fluoridated toothpaste. Clinically, biofilm was measured using Silness & Loe Plaque Index, both at baseline and at follow up visits by two assessors who were blinded to group allocation. Adjunctly, intraoral photographs were taken for Digital Plaque Image Analysis of the remaining dental biofilm in the upper and lower anterior labial tooth surfaces, and calculated based on the area of stained pixels. Data was analyzed using SPSS version 22. Mean plaque scores between the groups were compared using independent sample t-test and $p < 0.05$ was considered significant. **Results:** Data of all the 40 participants were analyzed as they were no drop outs. No significant differences were found in the mean plaque scores between the two groups ($p = 0.059$) at the end of the study. Similarly, Digital Plaque Image Analysis showed no significant difference in the mean plaque scores between the groups ($p = 0.93$). **Conclusion:** This study showed that there are no additional benefits of using a plaque disclosing toothpaste, in enhancing the removal of the supragingival dental biofilm during routine oral hygiene maintenance.

Keywords: dental biofilm, supragingival, gingivitis, oral hygiene, dentifrice

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177. CRESTAL BONE LOSS CHANGES IN PLATFORM SWITCHING AROUND DENTAL IMPLANT: A SYSTEMATIC REVIEW & META-ANALYSIS

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The exact mechanism by which platform switching reduces bone loss is still unknown, and there are only few reports on the extent of bone loss prevention by this technique. Hence in our study we assess the effects of platform switching in patients restored with implant supported fixed restorations on implant failure and patient satisfaction. **Materials and methods:** We searched the online data bases with the search words platform switching. Implant failure, crestal bone loss. We searched for various types of studies and trials. Also the number of the sample was not restricted. Two independently reviewers evaluated trials for accurateness. The results were stated as risk ratio or mean differences, with their 95% confidence intervals. The primary outcome was patient satisfaction and implant failure. **Results:** Out of the 500 studies only 12 were included. No difference between platform switching and matching in three years in implant failures was noted or patient satisfaction. Marginal bone loss, due to the disparities in the study was not meta-analyzed in our study. **Conclusions:** From our analysis we can conclude that with respect to the implant success and patient satisfaction, by the platform switching, there is no sufficient data to support.

Keywords: Implant success, Meta-analysis, Platform matching, Implant-abutment model

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178.EFFECT OF PIEZOCISION PROCEDURE IN LEVELLING AND ALIGNMENT STAGE OF FIXED ORTHODONTIC TREATMENT: A RANDOMIZED CLINICAL TRIAL

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This clinical trial compared the time to complete the levelling and alignment stage with flapless piezocision procedure in the treatment of severe maxillary malocclusion with premolar extraction cases. Two-arm parallel group randomized controlled trial was performed at the Orthodontics Unit of Universiti Sains Malaysia, Malaysia. Sixteen patients with severe anterior maxillary crowding (Little's irregularity index: 7-9 mm) and required bilateral first premolars extraction was recruited. The participants were randomly assigned to a study group according to a simple randomization method using a sealed envelope mentioned about the group name. Both groups were treated with fixed orthodontic appliance using the 0.022-in. slot of McLaughlin Bennett Trevisi prescription brackets. The piezocision group received flapless piezocision corticotomy about 4-5 mm in length and 3 mm depth on the labial mucogingiva between the roots of six anterior teeth. The number of days since treatment started, Little's irregularity index, gingival recession, pocket depth, pulp vitality, patient perception of the pain and satisfaction level were recorded before the treatment, at about 1 month and 2 months post-treatment, and at the completion of the levelling and alignment stage. The overall time to complete levelling and alignment stage was significantly shorter in the piezocision group than the control group (mean difference = 31.5 days, 95% CI 6.5, 56.5; $p = 0.018$). Greater reduction in Little's irregularity index and faster alignment rate in the first 2 months were found in the piezocision group compared to the control group ($p < 0.05$). No changes in the gingival recession, pocket depth, and pulp vitality in both groups were observed. Patients who received piezocision surgery experienced no or mild pain and were satisfied with the treatment. Flapless piezocision corticotomy is an effective adjunct that shortens treatment time during levelling and alignment stage without any adverse effects on the teeth and surrounding tissues. It is also painless, acceptable and satisfactory to the patients. Trial registration: ACTRN12621001350819.

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179. ADJUNCTIVE SYSTEMIC ANTIMICROBIALS FOR THE NON-SURGICAL TREATMENT OF PERIODONTITIS

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Background: Systemic antimicrobials can be used as an adjunct to mechanical debridement (scaling and root planing (SRP)) as a non-surgical treatment approach to manage periodontitis. A range of antibiotics with different dosage and combinations are documented in the literature. The review follows the previous classification of periodontitis as all included studies used this classification. **OBJECTIVES:** To assess the effects of systemic antimicrobials as an adjunct to SRP for the non-surgical treatment of patients with periodontitis. **Search Methods:** Cochrane Oral Health's Information Specialist searched the following databases to 9 March 2020: Cochrane Oral Health's Trials Register, CENTRAL, MEDLINE, and Embase. The US National Institutes of Health Ongoing Trials Register ClinicalTrials.gov and the World Health Organization International Clinical Trials Registry Platform were searched for ongoing trials. **SELECTION CRITERIA:** We included randomized controlled trials (RCTs) which involved individuals with clinically diagnosed untreated periodontitis. Trials compared SRP with systemic antibiotics versus SRP alone/placebo, or with other systemic antibiotics. **Data Collection And Analysis:** We selected trials, extracted data, and assessed risk of bias in duplicate. We estimated mean differences (MDs) for continuous data, with 95% confidence intervals (CIs). We assessed the certainty of the evidence using GRADE. **Main Results:** We included 45 trials conducted worldwide involving 2664 adult participants. 14 studies were at low, 8 at high, and the remaining 23 at unclear overall risk of bias. Seven trials did not contribute data to the analysis. We assessed the certainty of the evidence for the 10 comparisons which reported long-term follow-up (≥ 1 year). None of the studies reported data on antimicrobial resistance and patient-reported quality of life changes. Amoxicillin + metronidazole + SRP versus SRP in chronic/aggressive periodontitis: the evidence for percentage of closed pockets (MD -16.20%, 95% CI -25.87 to -6.53; 1 study, 44 participants); clinical attachment level (CAL) (MD -0.47 mm, 95% CI -0.90 to -0.05; 2 studies, 389 participants); probing pocket depth (PD) (MD -0.30 mm, 95% CI -0.42 to -0.18; 2 studies, 389 participants); and percentage of bleeding on probing (BOP) (MD -8.06%, 95% CI -14.26 to -1.85; 2 studies, 389 participants) was of very low certainty. Only the results for closed pockets and BOP showed a minimally important clinical difference (MICD) favouring amoxicillin + metronidazole + SRP. Metronidazole + SRP versus SRP in chronic/aggressive periodontitis: the evidence for percentage of closed pockets (MD -12.20%, 95% CI -29.23 to 4.83; 1 study, 22 participants); CAL (MD -1.12 mm, 95% CI -2.24 to 0; 3 studies, 71 participants); PD (MD -1.11 mm, 95% CI -2.84 to 0.61; 2 studies, 47 participants); and percentage of BOP (MD -6.90%, 95% CI -22.10 to 8.30; 1 study, 22 participants) was of very low certainty. Only the results for CAL and PD showed an MICD favouring the MTZ + SRP group. Azithromycin + SRP versus SRP for chronic/aggressive periodontitis: we found no evidence of a difference in percentage of closed pockets (MD 2.50%, 95% CI -10.19 to 15.19; 1 study, 40 participants); CAL (MD -0.59 mm, 95% CI -1.27 to 0.08; 2 studies, 110 participants); PD (MD -0.77 mm, 95% CI -2.33 to 0.79; 2 studies, 110 participants); and percentage of BOP (MD -1.28%, 95% CI -4.32 to 1.76; 2 studies, 110 participants) (very low-certainty evidence for all outcomes). Amoxicillin + clavulanate + SRP versus SRP for chronic periodontitis: the evidence from 1 study, 21 participants for CAL (MD 0.10 mm, 95% CI -0.51 to 0.71); PD (MD 0.10 mm, 95% CI -0.17 to 0.37); and BOP (MD 0%, 95% CI -0.09 to 0.09) was of very low certainty and did not show a difference between the groups. Doxycycline + SRP versus SRP in aggressive periodontitis: the evidence from 1 study, 22 participants for CAL (MD -0.80 mm, 95% CI -1.49 to -0.11); and PD (MD -1.00 mm, 95% CI -1.78 to -0.22) was of very low certainty, with the doxycycline + SRP group showing an MI D in PD only. Tetracycline + SRP versus SRP for aggressive periodontitis: we found very low-certainty evidence of a difference in long-term improvement in CAL for the tetracycline group (MD -2.30 mm, 95% CI -2.50 to -2.10; 1 study, 26 participants). Clindamycin + SRP versus SRP in aggressive periodontitis: we found very low-certainty evidence from 1 study, 21 participants of a difference in long-term improvement in CAL (MD -1.70 mm, 95% CI -2.40 to -1.00); and PD (MD -1.80 mm, 95% CI -2.47 to -1.13) favouring clindamycin + SRP. Doxycycline + SRP versus metronidazole + SRP for aggressive periodontitis: there

was very low-certainty evidence from 1 study, 27 participants of a difference in long-term CAL (MD 1.10 mm, 95% CI 0.36 to 1.84); and PD (MD 1.00 mm, 95% CI 0.30 to 1.70) favouring metronidazole + SRP. Clindamycin + SRP versus metronidazole + SRP for aggressive periodontitis: the evidence from 1 study, 26 participants for CAL (MD 0.20 mm, 95% CI -0.55 to 0.95); and PD (MD 0.20 mm, 95% CI -0.38 to 0.78) was of very low certainty and did not show a difference between the groups. Clindamycin + SRP versus doxycycline + SRP for aggressive periodontitis: the evidence from 1 study, 23 participants for CAL (MD -0.90 mm, 95% CI -1.62 to -0.18); and PD (MD -0.80 mm, 95% CI -1.58 to -0.02) was of very low certainty and did not show a difference between the groups. Most trials testing amoxicillin, metronidazole, and azithromycin reported adverse events such as nausea, vomiting, diarrhoea, mild gastrointestinal disturbances, and metallic taste. No serious adverse events were reported. **Conclusions:** There is very low-certainty evidence (for long-term follow-up) to inform clinicians and patients if adjunctive systemic antimicrobials are of any help for the non-surgical treatment of periodontitis. There is insufficient evidence to decide whether some antibiotics are better than others when used alongside SRP. None of the trials reported serious adverse events but patients should be made aware of the common adverse events related to these drugs. Well-planned RCTs need to be conducted clearly defining the minimally important clinical difference for the outcomes closed pockets, CAL, PD, and BOP.

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180. BIOFILM FORMATION FOLLOWING CHITOSAN-BASED VARNISH OR CHLORHEXIDINE-FLUORIDE VARNISH APPLICATION IN PATIENTS UNDERGOING FIXED ORTHODONTIC TREATMENT: A DOUBLE BLINDED RANDOMISED CONTROLLED TRIAL

Poornima P, Krithikadatta J, Ponraj RR, Velmurugan N, Kishen A

Background: Orthodontic treatment poses an increased risk of plaque accumulation and demineralisation of enamel leading to white spot lesion around the brackets. This parallel arm trial aims to assess the degree of bacterial plaque formation adjacent to orthodontic brackets, following the application of a chitosan-based varnish or chlorhexidine-fluoride varnish. **Methods:** A total of 200 teeth from 20 patients undergoing fixed orthodontic therapy were assessed and biofilm formation around the brackets were recorded using the Bonded Bracket Index (Plaque index) at baseline and weekly for 6 weeks. The bacterial count and plaque pH at corresponding weekly intervals were also recorded. Following bracket bonding, the patients were cluster randomised to receive chitosan-based varnish-CHS (UNO Gel Bioshell, Germiphene corp., Brantford, Canada) or chlorhexidine-fluoride varnish-CFV (Cervitec F, Ivoclar Vivadent, Schaan, Liechtenstein) every week on the representative teeth respectively. BBI proportions were compared between groups at all time intervals using Chi square test. Mean plaque bacterial count and plaque pH were compared using Mann Whitney U test and Tukey's HSD test respectively. **Results:** Baseline characteristics were similar between the groups: Mean age was CHS = 23 and CFV = 21; male to female ratio was CHS = 5/5, CFV = 7/3. At the end of 6 weeks, chitosan-based varnish performed equal to chlorhexidine-fluoride varnish ($P > 0.05$) with 98% and 95% of teeth with acceptable scores respectively. The plaque bacterial count significantly reduced at 6 weeks for both varnish compared to the baseline; The value for CHS was $0.43 \pm 0.4 \times 10(4)$ and CFV was $0.77 \pm 0.64 \times 10(4)$ CFU ($P < 0.05$), with no difference between both the varnishes. Both varnishes had no effect on the plaque pH that remained neutral. **Conclusion:** This trial showed that both chitosan-based varnish and chlorhexidine-fluoride varnish reduced bacterial count, while the plaque pH remained neutral over a period of six weeks in patients undergoing fixed orthodontic therapy. The anti-plaque effects of the natural biopolymeric chitosan-based varnish was similar to that of chlorhexidine-fluoride varnish, a known chemotherapeutic agent. Registration: This trial protocol was registered with <https://www.ctri.nic.in> (CTRI/2019/05/018896). (Date of registration 02/05/2019). **Protocol:** The protocol was not published before trial commencement.

Keywords: Bonded Bracket Index, Chitosan, Chlorhexidine, Dental plaque, Fixed orthodontic therapy

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181. EFFECTIVENESS OF PSYCHOLOGICAL TECHNIQUES IN DENTAL MANAGEMENT FOR CHILDREN WITH AUTISM SPECTRUM DISORDER: A SYSTEMATIC LITERATURE REVIEW

UKM PPI/111/8/JEP-2020-757

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Introduction: A rise in the reported numbers of children with Autism Spectrum Disorder (ASD) highlights the need for dental practitioners to be more familiar with the treatment approaches for these special needs children to ensure comfortable, well-accepted and efficient management while in dental office. **Objective:** This paper aimed to acquire a deeper understanding of some of the innovative and best approaches to managing children with ASD in dental settings. **Method:** A systematic literature search was performed in PubMed, Scopus, Web of Science, Cochrane databases, and grey literature based on the PRISMA 2020 statement, using main keywords such as: 'management', 'dental', 'children', and 'Autism Spectrum Disorder'. Original full-text papers including randomised controlled trials (RCT) and all other designs of non-randomised controlled studies (NRS) reporting relevant intervention studies in English were included without any publication time limit. The quality of the evidence found eligible for the review were then assessed using the ROB-2 and ROBINS-I tools. Subsequently, the details of management interventions and impact of treatment approaches were compared and discussed. **Results:** Out of the 204 articles found, 109 unrelated articles were excluded during the initial screening. The full papers of remaining 28 were retrieved and only 15 (7%) articles were eligible to be reviewed; eight RCTs with 'some concerns' and 'high risk' categories particularly concerning their randomisation design, and seven NSRs with 'serious' to 'critical' bias largely due to confounding factors. **Conclusion:** Our review found inconclusive evidence on the strength of recent psychological and non-pharmacological approaches used to manage children with ASD in dental settings. Small sample size and lack of a control group in certain studies affected the strength of evidence and credibility of the findings. Nevertheless, this review shared informative details on some innovative approaches for better understanding of the management of children with ASD for dental professionals.

Keywords: Autism spectrum disorders, Behaviour modification, Dental care, Dental management, Dental setting, Learning differences, Thinking differences

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182. SCHOOL-BASED FLUORIDE MOUTH RINSING PROGRAMME IN THE EAST COAST OF SABAH: A 5-YEAR FIELD STUDY

NMRR-16-1648-30814

Wong FJ, Pang KT, Asmahani A, Shahibul AW, Latifah O, Adis R, Dg Sariah J, Rathmawati A, Zaiton T

Introduction: Sabah is the second largest state in Malaysia with the population scattered throughout the state. The oral health status of school children in Sabah was generally poor compared to other states according to the National Oral Health Survey of Schoolchildren 2017 (NOHSS 2017), whereby Sabah recorded the highest caries prevalence (63.3%) with the mean DMFT (decayed, missing and filled teeth) of 2.07. This is likely attributed to poor access to oral health services and is complicated by the absence of water fluoridation. Water fluoridation was proved to be an effective population strategy to prevent dental caries. To compensate lack of fluoride exposure, a school-based fluoride mouth rinsing (FMR) programme was initiated in the late 1990s in Sabah. FMR is recommended as a community-based caries prevention strategy in fluoride-deficient areas with moderate to high dental caries risks. This study aimed to estimate caries-preventive effects of FMR in Sandakan Division, the East Coast of Sabah. **Methods:** This study is a retrospective cohort study by comparing caries activity of school children under FMR (intervention group, n = 582) with those without FMR (control group, n = 550). The baseline oral health data for both groups of school children did not differ significantly (mean DMFT, P = 0.969; mean DMFS P = 0.916). The data were obtained from the Ministry of Health (MOH) Health Information Management System (HIMS) – Oral Health Sub-System. The student's DMFT and DMFS (decayed, missing and filled surface) records at Primary 1 (baseline data) and at Primary 6 (post-intervention data) were compared. Data entered and analysed using IBM SPSS Version 24.0. The significant level was set at P < 0.05. **Results:** The difference in mean DMFT for the intervention group, 1.60 (95% CI, 1.44-1.76) was lower than the control group, 1.93 (95% CI, 1.72-2.13) (P = 0.013). In addition, the difference in mean DMFS for the intervention group, 2.40 (95% CI, 2.13–2.68) was lower than the control group, 2.71 (95% CI, 2.37-3.04) (P = 0.165). **Discussion/Conclusion:** This study reported a slower increase of caries experience (mean DMFT and mean DMFS) among schoolchildren participating in the FMR program compared to those who did not. The long-term effect of FMR in the population with high caries risk was evident as reported in many findings globally. The low socioeconomic population was benefiting more as the cost of FMR is generally low compared to other topical fluorides in dental caries prevention. In conclusion, the FMR programme is an effective dental public health measure in preventing dental caries, especially among the high caries risk population of schoolchildren in the East Coast of Sabah. Thus, FMR should be expanded to other schools in the Sabah state.

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183. PAIN PERCEPTION IN DIFFERENT INJECTION TECHNIQUES IN PAEDIATRIC DENTISTRY: AN ORIGINAL RESEARCH

Ranjana DB, Pendyala DS, Kauser DA, Mohammed DM, Khan MP, Srivastava DE, Padubidri DM, Tiwari DH

Introduction: Pediatric dentists commonly face with the task of giving the local anesthetic to the children who are dreaded of the procedure. There has been a focus worldwide to make any procedure as less as possible for all be it adult or child patient. There are very few studies regarding the efficacy of the cold and vibration application during the injection techniques. Along these lines, the reason for this examination was to assess the efficacy of a local anesthetic procedure without topical application when contrasted to the conventional insertion technique for alleviating pain in children receiving local anesthesia injections and also to compare the pain perception and comfort of patient between conventional and Buzzy system. **Materials and methods:** 150 children between the ages 3-12 was selected. Three groups of 50 each were divided as conventional, alternative and buzzy device groups. Pain response was assessed between the groups as comfort and discomfort. The observations were evaluated using Chisquare analysis. **Results:** There was a significant difference regarding the pain response between the European Journal of Molecular & Clinical Medicine ISSN 2515-8260 Volume 07, Issue 09, 2020 3057 conventional, alternative and the buzzy device technique. ($P < 0.000$). Significant difference was seen for the mandibular block in the buzzy group. ($P < 0.000$) No significant difference was observed in the response neither between the maxilla and mandible, nor between boys and girls, between the conventional and alternative techniques in a three groups. **Conclusion:** The alternative and the buzzy device techniques can lower the discomfort in child dental patients and allow the clinician to administer a successful anesthesia.

Keywords: Buzzy device, topical anesthesia, conventional local anesthesia, pediatric dentistry

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184. IMPACT OF VITAMIN C ON WOUND HEALING FOLLOWING DENTAL IMPLANTATION

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Background: Postoperative wound healing is an important part of the success of the dental implant surgery. However, in case of complex surgery or unfavorable factors, wound healing is often unsatisfactory. **Objective:** The aim of this study was to explore the effects of vitamin C supplementation in wound healing, following the placement of dental implants with or without bone grafts and patients with chronic periodontitis. **Methods:** This randomized controlled clinical trial included 128 patients requiring dental implants to replace missing teeth. Patients were divided into four groups, group A received dental implants supported by guided bone regeneration (GBR) technique, group B received dental implants with Bio-Oss Collagen, group C received dental implants in patients with chronic periodontitis, and group D received dental implants without any bone grafting or periodontal disease. Each group was divided into an experimental subgroup, who received vitamin C, and a control subgroup. Follow-up appointments were performed at day 3, day 7, and day 14 postsurgery, during which soft tissue healing and pain response scores were evaluated using the Landry index and visual analogue scale, respectively. **Results:** The experimental subgroups had significantly higher healing indices than the controls ($P < .05$) at day 7 postsurgery for group B and day 14 postsurgery for groups A, B, and C. Group D displayed no difference between the experimental and control groups at any time point. In reference to vitamin C for pain relief, there were no statistically significant differences between the study groups. **Conclusion:** Using vitamin C supplementation improves postoperative healing following dental implant surgery in patients with chronic periodontitis and patients treated with GBR or Bio-Oss Collagen grafts. However, vitamin C supplementation does not decrease the postoperative pain associated with dental implant surgery.

Keywords: dental implant, vitamin c, wound healing

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185. IS PULPOTOMY A PROMISING MODALITY IN TREATING PERMANENT TEETH? AN UMBRELLA VIEW

Lin SSG, Yew QY, Lee YH, Low T, Pillai MPM, Laer ST, Wafa TSSW/WS

Emerging evidence suggests the use of less invasive therapy such as pulpotomy in treating permanent teeth with pulp exposure and signs of pulpitis. Hence, this umbrella review aims to evaluate the available systematic reviews on pulpotomy treated permanent teeth. Articles published between January 1970 and May 2021 were searched in ten electronic databases and five textbooks. Only systematic reviews published in English that examined the use of pulpotomy on either carious or traumatic pulpal exposed in mature or immature permanent teeth with signs of pulpitis were selected. The Corrected Covered Areas (CCAs) were calculated to identify the overlap in primary studies, whereas the AMSTAR 2 assessment tool was used to analyze the risk of bias in each included review. Nine systematic reviews were chosen of which two systematic reviews focused solely on coronal pulpotomy, one on partial pulpotomy, and the remaining focused on both coronal and partial pulpotomies. Overall, only two reviews were rated as 'High Quality'. Umbrella analyses showed that both coronal and partial pulpotomies revealed overall high success rates ranging from 88.5% to 90.6%. However, the currently available evidence on the effects of different pulpal medicaments and restorative materials on the success rate of pulpotomy were still inconclusive. Pulpotomy can be regarded as a promising modality in treating mature and immature permanent teeth with carious pulpal exposure or signs of pulpitis. Nonetheless, further high-quality clinical trials with long-term follow-up and better control of confounding factors are warranted in the future.

Keywords: Endodontics, Evidence-based dentistry, Permanent teeth, Pulpotomy, Umbrella review

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186. EFFECT OF CHEMICAL DISINFECTANTS IN COMPLETE DENTURES - A COMPARATIVE STUDY

Dr. Rakhi Kumari et al.

Aim: Purpose of our research was to compare and evaluate various chemical disinfectants used to cleanse complete dentures. **Methodology:** Forty-five edentulous patients wearing dentures were divided into three categories: Group I disinfected their dentures by immersing in 0.2% chlorhexidine gluconate solution for 30 mins twice a week and Group II used 1 percent sodium hypochlorite solution for 30 mins twice a week. For immersion, Group III had a positive control group consisting of dentures that were not disinfected. The inter-molar distance was measured with Digital Vernier calipers. **Results:** Group I showed highest decline in number of bacterial colonies after 60 days followed by Group II. Least decline was seen in III. Highest dimensional changes was seen in Group I followed by Group II dentures. **Conclusion:** Soaking in sodium hypochlorite solution was effective only as a short-term disinfectant as compared to Soaking in chlorhexidine gluconate solution.

Keywords: Denture Disinfectants, Denture Cleansers, Complete Denture Hygiene

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187. ORAL CANCER AWARENESS AMONGST DENTAL PATIENTS IN THE DISTRICT OF KINTA: A CROSS-SECTIONAL STUDY

NMRR-21-1638-60719

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Introduction: In Malaysia, oral cancer contributes to about 10.6% of deaths in government hospitals whereby a more than half of the cases were detected at an advanced stage. Considering this, data with regards to the level and extent of oral cancer awareness in Malaysia is sorely lacking. **Objectives:** As such, our study was aimed to study the level of oral cancer awareness amongst patients, attending government dental clinics in the Kinta District, which includes their knowledge of risk factors, signs and symptoms, early detection and prevention of oral cancer. **Methodology:** A cross sectional observational survey was conducted across the Kinta District in Perak. Total of 404 patients were included in this study. Each respondent completed a self-administered questionnaire, which consists of 22 questions, including socio-demographic, awareness and knowledge of oral cancer. Data were analysed using SPSS version 22. **Results:** Most (317, 78.5%) respondents had heard of oral cancer but had poor overall knowledge on the details about oral cancer. Mass media was the main source of information about oral cancer (231, 57.2%). High levels of awareness were seen for nonhealing ulcers (358, 88.6%), abnormal mass (359, 88.9%) and white/red patches (334, 82.7%) as signs of oral cancer. Although only a minority (73, 18.1%) of respondents had oral cancer examination previously, most (310, 76.7%) agreed that oral cancer screening should be made mandatory. A satisfactory knowledge was observed on the following risk factors; smoking (382, 94.6%), alcohol (341, 84.4%) and betel quid chewing (319, 79%). However, unsatisfactory knowledge was observed about spicy food (148, 36.6%), sunlight exposure (85, 21%) and long-standing trauma (180, 44.6%). Meanwhile, only about half of the respondents (229, 56.7%) were able to recognize HPV infection as a risk factor. **Conclusion:** Although the majority of Malaysians had heard about oral cancer, there was still a general lack of awareness regarding the risk habits and early signs and symptoms of oral cancer. Educational strategies are needed from media campaign as well as the healthcare providers such as the dentists and general physicians to increase the awareness towards oral cancer among the publics. This research will be the stepping stone for a larger scale research.

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188. ASSESSING ORAL CANCER AWARENESS AMONG MEDICAL OFFICERS: A PILOT STUDY

NMRR-21-1547-58259

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Introduction: Medical officers (MO) have greater opportunity for early detection of oral cancer, which is vital in oral cancer prevention. Hence, it is crucial for MO to have an adequate knowledge, attitude and practice in detection of oral cancer. **Objectives:** The objectives of this study were to assess the knowledge, attitude and practices towards early detection of oral cancer amongst MO in the district of Hulu Langat. **Methods:** A cross-sectional study was conducted amongst 31 MO in the district of Hulu Langat, Selangor. The knowledge, attitude, and practice of the oral cancer were assessed using 44 questions. The structured and validated questionnaires were distributed to each respondent by Google Form link via WhatsApp. For the purpose of verification, each respondent was given a specific ID number. Collected data were analyzed using descriptive statistics and calculated as frequencies and percentages. **Results:** 100% response rate were obtained from the respondents. Majority of the MO, 96.8% were aware of oral cancer. However, almost half of the respondents, 48.4% do not know the various ways of detecting oral cancer and nearly 40.0% do not know the common sites of oral cancer. Only 29.0% of them think that they are competent in detecting oral cancer. All respondents agreed that more oral cancer awareness campaigns should be carried out. Most of the MO, 96.8% never attend any CPD course about oral cancer in the past 5 year. **Conclusions:** The findings of this study had identified several gaps in the attitude and practice of MO working in the district of Hulu Langat with regard to early detection of oral cancer. Training and education can be conducted to reinforce the knowledge and awareness of the MO in order to promote early detection of precancerous lesions and oral cancers.

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189. DEAL WITH CHEMO, DEAL WITH SORES: ORAL HEALTH CARE PROTOCOL ACCEPTABILITY AND PERCEPTION OF QUALITY OF LIFE IN PATIENTS RECEIVING CHEMOTHERAPY IN MALAYSIA

PIDC/IRB/SRP/11/18

Sharma AV, Azli DNA, Telang LA, Bin ACK, Kaur K, Tong VYY

Introduction: Oral mucositis is a common side effect of chemotherapy that can be painful, distressing and very often compromising the overall quality of life. Information regarding oral care before, during and after chemotherapy is available yet not emphasized upon enough. "Deal with Chemo, Deal with Sores" is an easy to follow, evidence based oral care guideline that was developed specifically for such patient to make information accessible and help in improving the oral health related quality of life.

Objectives: This study was carried out to obtain baseline data of oral health related quality of life (QoL) among patients undergoing chemotherapy and evaluate the acceptability of oral health care protocol "Deal with Chemo, Deal with Sores". **Materials and Methods:** The impact of chemotherapy on patients' oral health related quality of life (QoL) was obtained using S-OHIP(M) (n=49). This was followed by structured telephonic interview to assess the acceptability of the oral care protocol after two months; the results of which were analyzed qualitatively. **Results:** The most prevalently affected S-OHIP(M) domains were "physical pain" with mean score of 1.80, "psychological discomfort" 1.73 and "physical disability" 1.45. The highest additive score is 30 with mean of 11.45. Participants reported overall good acceptability of oral health care protocol as it provided "sufficient information", was "trustworthy" and "helped in decision making". **Conclusions:** It was found that chemotherapy patients experienced physical pain, psychological discomfort and physical disability. "Deal with Chemo, Deal with Sores" was very well accepted by patients, which highlights the importance of oral care in cancer hospitals.

Keywords: Chemotherapy, Quality of life, Oral health care protocol

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190. THE IMPACT OF EDUCATION LEVEL OF CAREGIVERS ON THEIR KNOWLEDGE, ATTITUDE AND PRACTICE ON ORAL HEALTH OF CHILDREN IN THE MALAYSIAN ARMED FORCES

James Lian YC

Objective: To assess the impact of education level of caregivers on their knowledge, attitude and practice on oral health of children in the Malaysian Armed Forces (MAF). **Materials and Methods:** Questionnaires with true/false/don't know components, 5-point and 4-point Likert scales were distributed to 439 caregivers of children aged 6 and below attending armed forces dental centres in Malaysia. The questionnaire was designed jointly by a paediatric dentist and community dental health specialist. The Kruskal-Wallis H and Mann-Whitney U tests were used to determine significant differences between the scores obtained from personnel with varying levels of education (higher secondary, diploma and at least a university degree) and $p \leq 0.05$ was accepted as statistically significant. **Results:** Of the 439 respondents, 363 (82.7%) of them only had higher secondary education, while 50 (11.4%) had diplomas and 26 (5.9%) at least had a university degree. For the knowledge component, respondents with a diploma had the highest median score of 6.000 (1.25) which was significantly higher than that of respondents with a SPM/STPM ($p = 0.013$). For the attitude component, respondents with a diploma had the highest median score of 19.000 (4.25). For the practice component, respondents with a diploma had the highest median score of 21.000 (4.00) which was significantly higher than that of respondents with a SPM/STPM ($p = 0.022$). **Conclusion:** Education level appears to influence the knowledge, attitude and practice on child oral health among caregivers in the MAF. Caregivers in the MAF seemed to have good knowledge but poor attitude and practice on the oral health of children. The findings highlight the impact of education level and a deficiency in the practice of caregivers on the oral health of children in the MAF.

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191. AWARENESS OF DENTAL TREATMENT AMONG MALAYSIAN PARENTS – AN EPIDEMIOLOGICAL STUDY

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Introduction: Health as defined by World Health Organization (WHO), it is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." Maintaining oral health is very important for overall wellbeing of the individual in the community.

Aims: To create an awareness of dental treatment among Malaysian parents towards children.

Methods and Material: Across-sectional study was conducted in Faculty of Dentistry, Asian Institute of Medicine, Science and Technology (AIMST) Dental Centre, Malaysia. A set of questions with multiple-choice answers formulated was personally given to a total of five hundred parents who brought their children for dental treatment and parents who came for their dental treatment in AIMST Dental Centre. Statistical analysis was appropriately used to analyze the effect of awareness of dental treatment among Malaysians. **Results:** Statistical analysis was performed for all questions individually. Overall, the results made us aware that adequate knowledge and education must be regularly given to parents in order to maintain children oral health. **Conclusions:** Parents should be a role model for their children to maintain a good oral health. Together, parents and children should practice and maintain good oral health. Good habits like tooth brushing should be inculcated to every child in the family.

Keywords: Oral health, epidemiology, oral hygiene

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192. EFFECTIVENESS OF VIDEO-BASED HEALTH EDUCATION IN IMPROVING SMOKING KNOWLEDGE AND ATTITUDES AMONGST THE ARMY SMOKERS IN KELANTAN.

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Introduction: Smoking cessation is a common risk factor approach for the prevention of many diseases and hence is vital in conserving the fighting strength of military troops. Video-based health education offers a versatile and low-cost medium yet provides an avenue for in-depth narration and multi-sensory cognitive stimulation for smoking cessation. **Objective:** This study aimed to evaluate the effectiveness of video-based health education in improving knowledge and attitudes related to smoking amongst army smokers in Kelantan. **Materials and Methods:** A quasi-experimental study was conducted at two randomly selected military camps in Kelantan, one Intervention Group and the other, Control Group. Army smokers were voluntarily invited to participate in this study through an advertisement poster and video that were distributed through their respective units. A validated self-administered questionnaire on smoking knowledge and attitudes was sent to the respondents using Google Form® at three intervals: the baseline, two weeks after intervention (post-1) and one month after intervention (post-2). Intervention Group received four health education videos on smoking were shared via YouTube® private link, at 1-week interval for two weeks, two videos at a time immediately after baseline data collection. Reminder messages were sent through Whatsapp® on alternate days using structured questions to encourage respondents to watch the videos. The Control Group received an oral health education video that acted as a placebo. SPSS version 26 was used for statistical analysis of descriptive statistics and RM ANCOVA at $p < 0.05$ significant level. **Results:** Seventy-four respondents were in the Intervention Group and 60 in the Control Group. Respondents in the Intervention Group were younger than respondents in the Control Group ($P < 0.05$). The median (IQR) age of the Intervention Group was 21.0 (4.0) years, and for respondents in the Control Group, the median (IQR) age was 30.0 (11.0) years. The Median (IQR) monthly household income for the Intervention Group was RM1600 (RM300) while in the Control Group was RM1900 (RM1500) ($p < 0.05$). Across the groups, most of them were Malays (>80%), and the highest level of education was secondary school (>90%). Respondents in the Intervention Group (71.6%) were revealed to have used e-cigarettes (dual user: other than cigarettes) compared to CG (41.7%) ($p < 0.05$). After controlling the covariates, the intervention was found to effectively improve the mean knowledge score of respondents in the Intervention Group compared to the Control Group regardless of time ($p = 0.035$) and with time*group interaction ($p < 0.001$) whereas having clinically significant findings in improving attitude score of respondents in between groups analysis regardless of time, $p = 0.028$. **Conclusion:** Video-based health education were found to be effective in improving the knowledge and attitudes related to smoking amongst army personnel who smoke in Kelantan.

Keywords: Video-based health education, smoking cessation, army personnel, health readiness

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193. ONLINE NEWS COVERAGE OF THE SUGAR-SWEETENED BEVERAGES TAX IN MALAYSIA: CONTENT ANALYSIS

REC/01/2020(MR/7)

Mohd Hanim MF, Md Sabri BA, Yusof N

Introduction: In Malaysia, the Sugar-Sweetened Beverages (SSBs) tax was announced during the parliament's 2019 Budget Speech. The tax was slated to be enforced by April 2019 but was later postponed to July 2019. The announcement has since generated significant media coverage and public feedback. **Objective:** This study presents a qualitative and quantitative cross-sectional study using netnography to examine how Malaysian online news articles responded to the SSBs tax after the announcement and postimplementation. **Materials and Methods:** Online news articles published on popular online news platforms from November 2018 to August 2019 were downloaded using NCapture and imported into NVivo for analysis using the inductive approach and thematic content analysis following the initial SSBs implementation announcement. **Results:** A total of 62 news articles were analyzed. Most of the articles positively portrayed the SSBs tax (46.8%) and highlighted its health impacts (76%). There were 7 key framing arguments identified in the articles. The positive arguments revolved around incentivizing manufacturers to introduce healthier products voluntarily, positive health consequences, the tax's impact on government revenue, and the use of the generated revenue toward beneficial social programs. The opposing arguments included increased operating costs to the manufacturer, the increased retail price of drinks, and how the SSBs tax is not a robust solution to obesity. The top priority sector considered in introducing the tax was the health perspective, followed by economic purposes and creating policies such as regulating the food and drinks industry. **Conclusions:** The majority of online news articles positively reported the implementation of the SSBs tax in Malaysia. This suggests media played a role in garnering support for the health policy. As such, relevant bodies can use negative findings to anticipate and reframe counteracting arguments opposing the SSBs tax.

Keywords: sugar-sweetened beverages, obesity, taxes, media content analysis, public health policy, media content, public health, netnography, malaysia, budget

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194. ADAPTATION OF AN ORAL HYGIENE CARE QUESTIONNAIRE FOR NURSES CARING FOR GERIATRIC INPATIENTS

NMRR Research ID: 59559

Manoharan GD, John J, Francis J, Danaee M, Kamaruzzaman SB

Introduction: The older adult population in Malaysia and around the world is increasing due to the advancement and improvement in health care delivery and awareness on healthcare needs of this population. An important area of need that is often neglected in older people is oral health, especially when they are frail and need hospitalisation. The hospital admission provides an excellent opportunity to address poor oral health in older people. Nurses are in the best position to educate and provide the daily oral hygiene care for these patients. **Objective:** This study was aimed to validate an oral hygiene care questionnaire on knowledge, attitudes, practices, and barriers (KAP+B) for nurses caring for older inpatients. **Materials and Methods:** The study was conducted in two phases to assess the validity and reliability of this adapted research instrument. The first phase was the face and content validity of the questionnaire by a panel of experts measuring the validity of the research instruments. This was followed by assessment of the construct validity in the second phase to test the reliability of the questionnaire using exploratory factor analysis. **Results:** Thirty-three nurses from the Geriatric Ward of the University of Malaya Medical Centre participated in the study giving an overall response rate of 82.5%. Following the reliability analysis, a total 24 items were adapted for the final questionnaire. It comprised of 4 items from the knowledge domain, 4 items from the attitude domain, 9 items from practice domain and 7 items from the barrier's domain. **Conclusion:** The findings of this study show that the adapted questionnaire is a suitable and valid tool to assess KAP+B, has an acceptable conceptual structure and provides reliable information about the domains being evaluated in the adapted questionnaire tool.

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DOMAIN 3

Access to Oral Healthcare



195. PREVALENCE OF WORK-RELATED MUSCULOSKELETAL DISORDER (WRMSD) AMONG DENTAL PERSONNEL IN PERAK

NMRR ID: NMRR-20-2489-56907

Ali Shibramulisi NS, Zawin Anuar NA, Azmi NA, Hew PF, Fauzi NF

Introduction: Work related musculoskeletal disorder among dental personnel had been underestimated and under reported worldwide and specifically in Malaysia. The problem will arise and progressing slowly over the time, as it's resulting from accumulated injury throughout the period of works. Several risk factors such as repetitive movement, static posture, vibration and adapting poor working postures have been identified to be contributing to WRMSD in dental practices. Dental personnel are at higher risk of getting this problem as it is their working nature and core business. This would cause pain and dysfunction syndrome among them and resulting in absence from work and substandard services to their patients. **Objectives:** This study aimed in identifying the occurrence of WRMSD among dental personnel in Perak. **Methodology:** A cross-sectional study involving 19 government dental clinics in Perak has been done during the period of 3 months, starting from June till September 2022. Primary dental clinics which were having attendance of at least 50 patients per day were chosen across Perak state. Those who met the criteria were selected to participate in this study. Malay version of Self-Reported Nordic Musculoskeletal Discomfort Form was used to identify the prevalence of WRMSD, while the intensity of pain at the respective regions were evaluated using 10-point scale according to 'Pain as The 5th Vital Sign' by MOH Malaysia and later on were analyzed using SPSS version 25. Descriptive statistic including mean and SD; and median and IQR were used for numerical data. Categorical data were described by percentage. Pearson's Chi Square Test and Spearman's Correlation were used to find the association between prevalence of WRMSD and other socio-demographic data. **Results:** 159 dentists, 73 dental therapists 26 dental lab technician, 81 dental surgery assistant and 23 dental attendants participated in this study. Mean age for the participants was 34.9 ± 7.4 and their mean years of services was 9.97 ± 7.5 . Most of them were female (78.5%), Malay (71.3%), married (69.6%) and right-handed (90.1%). The highest prevalence of WRMSD was neck (58.0%), followed by shoulder (48.1%), upper back (42.0%), lower back (40.6%), hand/wrist (31.5%), feet (21.3%), knee (12.2%), thigh 7.7%) and lastly elbow (6.9%). Most of those who reported to be having neck pain scaled their pain experiences at 2 out of 10 (19.5%), while for those who suffered upper back discomfort, most of them scaled their pain experience at 6 out of 10 (17.8%). It was found that there was a significant relationship between age and pain at neck ($p=0.007$), elbow ($p=0.027$), lower back ($p=0.032$), thigh ($p=0.039$), knee ($p=0.001$) and feet ($p=0.000$) regions. Job position also had been found to be having significant relationship with pain experienced at lower back ($p=0.018$), thigh ($p=0.011$), knee and feet ($p=0.000$). **Conclusion:** The prevalence of WRMSD among dental personnel in Perak was found to be high. Age and job position were found to be having significant relationship with pain experienced at several regions. Intervention program should be planned and conducted to prevent and reduce the occurrence of WRMSD as all harmful or unergonomic practices should be avoided at all costs.

Keywords: WRMSD, ergonomic, dentistry, dental

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196. MALAYSIAN DENTAL THERAPISTS' JOB MOTIVATION, JOB SATISFACTION, INTENTION TO LEAVE AND PERCEIVED FUTURE ROLES

NMRR-18-3736-45157 (IIR)

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Objective: To assess Malaysian dental therapists' job satisfaction, motivation, turnover intention and perceived future roles, following recent changes in the regulations that allow them to provide dental care within their scope of practice in the private sector. **Methods:** A self-administered questionnaire was distributed to public dental therapists who were selected using a stratified random sampling technique. Questions included items on social structure, job satisfaction and motivation (based on the Warr-Cook- Wall scale), turnover intention (based on four cognitive processes) and perceived future roles. Multiple logistic regression was used to assess the predictors of dental therapists' turnover intention. **Results:** Overall, a majority (>90%) of the participants had high job satisfaction and job motivation, with total mean scores of 45.70 ± 6.86 and 21.16 ± 2.63 , respectively. A total of 8.3% intended to leave the public sector to work in a different organization. Of those who chose to remain as a dental therapist in the next five years, only 7% considered working in the private sector. The significant predictors for turnover intention were educational attainment, years of working experience, job satisfaction level and future preferred working sector. **Conclusion:** Although the newly introduced Dental Act allows dental therapists to expand their roles to the private setting, very few intended to do so. This could be related to them having a high level of job satisfaction and job motivation while serving in the public sector.

Keywords: dental therapist, dental workforce, intention to leave, job motivation, job satisfaction

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197. THE FUTURE OF SPECIAL CARE DENTISTRY (SCD) IN MALAYSIA – PILLARS TO ACHIEVE THE GOALS

Hamzah SZ

Since the introduction of the SCD service in Malaysia specifically in the Ministry of Health (MOH) facilities in 2011, it appears to be expanding its unique approach to the population in needs positively and has shown significant impacts in improving the oral health care services in Malaysia especially for people with disabilities (PWD). The ten year projection of the SCD service focuses on the strengthening and enhancement of the specialty through service expansion, facility improvement, professional development and training as well as manpower resources. The service expansion involves not only within the dental disciplines but also collaborative efforts with other medical disciplines such as geriatric and rehabilitative medicine, palliative care, physiotherapy, occupational therapy and anaesthesiology. The main pillar to the success of the SCD service in Malaysia is the continuous support from the policy makers in the Oral Health Programme, MOH which is the main oral health care services coordinator and provider in the country. It overlooks the needs of each dental specialty in relation to funding, facilities, postgraduate training sponsorship etc. It is further supported by enthusiasm and determination of the professionals within the SCD fraternity to achieve the common goal in reducing the gaps and barriers for PWD to access the oral health services.

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198. SPECIAL CARE DENTISTRY – INTEGRATION AND COLLABORATION WITH MEDICAL DISCIPLINES, HOW AND WHY?

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The emerging link between oral health and some of the systemic diseases such as cardiovascular disease, diabetes, rheumatoid arthritis and Alzheimer's has made the involvement of the medical practitioners in managing oral health more important. In Special Care Dentistry (SCD), the integration and collaboration with medical disciplines are routinely practised which allow for better treatment outcome and overall wellbeing of the patients. Patients with special needs attending SCD clinics often present with various medical problems along with significant dental issues. This requires the treating dentist/specialist to be more knowledgeable and vigilant about the medical problems which may need to be discussed further and communicated with the medical colleagues. Likewise, having the knowledge about oral health among the medical practitioners can improve the patient's experience in overall medical evaluations and allow for early detections of some of the oral diseases such as periodontal diseases, dental caries, oral cancer etc. The collaborative efforts with some other related medical disciplines such as geriatric medicine, rehabilitative medicine, palliative medicines and radiology & oncology in the form of grand ward rounds, multidisciplinary clinics, systematic referral pathway, direct communication, teledentistry/medicine and integrated domiciliary care have significantly improved the overall patient's management and bridging the gap between dentistry and medicine. SCD being a hospital based dental specialty in Malaysia has encouraged involvement of the medical personnel to jointly manage the dental patients as out patients and in patients as well as in the operating theatre. This positive initiative has expanded the access to care and leads to reduction in health disparities.

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199. FACILITATORS AND BARRIERS TO UTILISING THE SCHOOL DENTAL CLINIC FOR PROVIDING SCHOOL DENTAL SERVICES: A QUALITATIVE STUDY OF PERSPECTIVES OF DENTAL THERAPISTS IN NEGERI SEMBILAN

NMRR: 22-00944-VHK (IIR)

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Introduction: School Dental Clinic (SDC) is a dental facility located in the school compound. Negeri Sembilan has 36 SDCs; 27 in primary schools and 9 in secondary schools. Of the 27 SDCs in primary schools, only 3 are fully utilised. As such, there is a fear that for those SDCs which have not been fully utilised, the school reserves the right to reclaim the space provided. **Objectives:** This study aimed to explore the facilitators and barriers to utilising the SDC for providing School Dental Services (SDS) to primary school children in Negeri Sembilan from the perspectives of Dental Therapists (DTs). **Methods:** This study used a qualitative study design with a total sampling method. Data were collected using Focus Group Discussion (FGD) and were based on self-developed leading and probing questions. Data from the FGDs were transcribed verbatim and analysed using thematic analysis. **Results:** 4 FGDs were conducted with 27 DTs. The facilitators for utilising the SDC for providing SDS to primary school children in Negeri Sembilan were identified. Six themes emerged from the FGDs, i.e. good support from the school, support from teachers, cooperation from school children, good dental administration, distance from the main dental clinic, and positive responses from parents. The barriers to utilising the SDC in primary schools in Negeri Sembilan were represented by seven themes, i.e. lack of support from the school, lack of support from school teachers, dental administration factors, safety issues, distance from the main clinic, language barrier, and high workload. **Conclusion:** The findings of this study provide an important insight into the facilitators and barriers to utilising the SDC for providing SDS to primary school children in Negeri Sembilan from the perspectives of DTs.

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200. SELECTING THE IDEAL PROFESSIONAL INDEMNITY INSURANCE-WHAT TO LOOKOUT FOR BY THE DENTAL PRACTITIONER?

Lyn CCH, Hong LY, Anuar MN, Nasim NF, Nambiar P

As countries become more developed, there will be a need for more sophisticated dental treatment provided which may bring about adverse outcomes. To protect oneself against any financial loss or any legal liability, dental practitioners have to acquire an insurance policy. This research is to determine the different benefits provided by the professional indemnity insurers. The objectives were to gather the type of cases of complaints made, to ascertain the different insurers involved in providing indemnity insurance, the various treatments covered. An interview was done with four insurer's representative and the data obtained were analysed based on the premium rates and increments, compensation limits, additional limit reinstatement, retroactive and run off covers, limit of claims made, locum dentists' cover, institutional coverage and any additional benefits according to each insurance policy. The findings indicated insurers have a lower premium rate for a reasonable compensation; another with a higher premium with a comprehensive dental insurance coverage which manages from the clinic to any court settlements. There is one to cater for those wishing an insurance based Shariah principles and another which not only covers indemnity but also any damage to clinic and any adverse action by any of the employees.

Keywords: Malpractice, Protection, Insurance, Claims, Compensation

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201. ANTIMICROBIAL STEWARDSHIP – IMPLEMENTATION AND IMPROVEMENTS IN ANTIBIOTIC-PRESCRIBING PRACTICES IN A DENTAL SCHOOL

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Background and Aim: Antimicrobial stewardship (AMS) is a coordinated systematic approach aimed at educating prescribers to follow evidence-based prescription practice to reduce misuse of antimicrobials and thus antimicrobial resistance (AMR). We aimed to improve the standards of antimicrobial prescribing in a dental school by implementing AMS. **Materials and Methods:** A retrospective (first) clinical audit of antibiotic prescriptions (n = 200) over a 6 months' period was analyzed for the following parameters: type of antibiotic, clinical condition, compliance to national guidelines, and errors in prescriptions. In response to the results of this audit, an educational intervention workshop was conducted for clinical faculty. A validated self-administered questionnaire on perception and practice of antimicrobial prescribing was given to participants (n = 31) before and after the workshop and t-test was used to compare the mean scores of responses. Prospective clinical audits were conducted 6 months (second) and 1 year (third) after the workshop assessing the same parameters. A Strengths, Weaknesses, Opportunities, and Threats analysis of the AMS program was also done. **Results:** The total number of prescriptions issued was 943 in the first audit, which reduced to 552 in the second audit and further to 435 in the third audit. The most commonly prescribed antibiotic was a combination of amoxicillin and metronidazole. The percentage of prescriptions in accordance with national guidelines improved from 19% during the first audit to 54% and 79% in the subsequent audits. The percentage of erroneous prescriptions was 23% in the first audit, which reduced to 12% in the second audit and 9% in the third audit. The pre- and posttest mean values of the questionnaire when compared suggested that there is a need for uniformity in prescribing antimicrobials. **Conclusions:** Clinical audits with educational workshops on appropriate use of antibiotics have a positive impact on conforming with prescription guidelines. This will encourage the rational prescription of antibiotics based on clinical needs of patients, thus contributing to the fight against AMR.

Keywords: Antibiotics, antimicrobial resistance, antimicrobial stewardship, clinical audit, dentistry

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202. ASSOCIATION BETWEEN STRESS DEPRESSION ANXIETY AND COPING STYLES AMONG INDIAN UNIVERSITY STUDENTS DURING COVID-19 OUTBREAK

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Introduction: Depression and anxiety are examples of psychiatric diseases that can have a significant impact on one's mental health. The most common psychiatric illness that can be diagnosed among students is depression. The study's goal was to evaluate the relationship between stress, depression, and anxiety and coping techniques among university students. **Methods:** A self-administered questionnaire consisting of socio-demographic, DASS-21 and Brief-COPE inventory were used. **Results:** The study comprised 108 university students ranging in age from 19 to 74 years old. Depression is connected to acceptance, venting, behavioural disengagement, and self-blame. Acceptance, religion, denial, venting, behavioural disengagement, and self-blame are all correlated to anxiety. Stress is associated with acceptance, self-distraction, denial, venting, behavioural disengagement, and self-blame. **Conclusion:** Maladaptive coping methods such venting, behavioural disengagement, and self-blame have a major impact on university students' stress, anxiety, and depression levels. A deeper knowledge of the underlying influence of coping strategies on stress, depression, and anxiety among university students during Covid-19 outbreak will be gained through this study, allowing for early intervention and improved outcomes.

Keywords: Psychiatric disorders, Stress, Depression, Anxiety, Student, Coping styles

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203. COVID-19 VACCINATION COMPLIANCE RATE AND SELF-REPORTED POST-VACCINATION ADVERSE EFFECTS AMONG THE MEMBERS OF DENTAL FACULTY IN MALAYSIA: A CROSS-SECTIONAL STUDY

Pandarathodiyil AK, Veerabhadrapa SK, Termizi bin Zamzuri A, Binti Abd Razak SN

Aim: To evaluate the COVID-19 vaccination compliance rate and post-vaccination Adverse Effects (AEs) among the Dental Health Care Workers (DHCW). **Materials and Methods:** An online, cross-sectional, self-administered, structured questionnaire was distributed to 54 DHCW at the Faculty of Dentistry, SEGi University to evaluate the demographic characteristics, history of infection, type of vaccine received, post-vaccination AEs, duration, and hospitalization. In this pilot study, a convenience sampling method was adopted and descriptive statistics was employed to describe the results. Chi-square test was used to compare the post-vaccination AEs among the CoronaVac® group, Pfizer-BioNTech group and AstraZeneca group and a p-value of less than 0.05 was considered statistically significant. **Results:** About 85% participants had completed the vaccination and one participant tested positive for COVID-19 after the first dose. Following the first dose, participants in Pfizer-BioNTech (88.9%) and AstraZeneca group (100%), experienced higher local AEs (pain and tenderness at the site of injection) than the CoronaVac® (33.3%) group which was statistically significant ($P < 0.006$). Although higher systemic AEs were observed in Pfizer-BioNTech (66.7%) and AstraZeneca vaccine (100%) than the CoronaVac® (30.6%) group, this was not significant. Similarly, after the second dose, higher percentage of participants in the Pfizer-BioNTech group experienced systemic (66.7%) and local AEs (66.7%) than CoronaVac® group. However, this was not significant too. The most common systemic AEs were fatigue and myalgia. One participant reported a mild allergic reaction and the majority of these AEs resolved in 24–48 hours after vaccination, without requiring hospitalization. **Conclusions:** DHCW exhibited a greater compliance rate to Covid-19 vaccination. Local AEs were more frequently encountered than the systemic ones and the common AEs were pain and tenderness at the injection site, fatigue, and myalgia. **Clinical Significance:** Recognizing and reporting the AEs of COVID-19 vaccines are imperative to enhance the vaccine uptake among the public.

Keywords: Adverse Effects, AstraZeneca, CoronaVac®, COVID-19 Vaccine, Dental Health Care Worker, Pfizer-BioNTech

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204. ASSOCIATION BETWEEN CHILDREN'S PERCEPTION OF THE DENTIST AND DENTAL TREATMENT AND THEIR ORAL HEALTH RELATED QUALITY OF LIFE

Alkahtani ZM, Ganapathy S, Ibrahim M, Al-Amri MSA, Al-Nafari MA, Abdulla AM

Introduction: Attitude towards dental treatment has been one of the major factors associated with oral health of children in the present era. Identifying children's approaches toward their dentists and dental treatment would allow us to improve the quality of dental appointments in future. The study was conducted to identify children's perceptions of dentists and dental treatment and their association with oral health-related quality of life using questionnaire. **Materials & Methods:** A cross-sectional study of eight to ten years old, of both genders, sixty children who regularly enrolled in primary schools, at second to fifth grade reading level and in need of both curative and preventive procedures coming for dental treatment in Pediatric dental clinic, King Khalid University were included in the study. Ethical approval and Informed consent was obtained prior to the study. Child Perceptions' questionnaire included 8-items designed to assess children's perception of their dentists. Oral health-related quality of life (OHRQOL) was assessed using the ECOHIS (Early Childhood Oral Health Impact Scale). **Results:** Analysis of child's perception towards dental treatment was analyzed as a questionnaire based on children response towards dental visit and role of children's perception towards dentist. Analysis of Early Childhood Oral Health Impact Scale (ECOHIS) Questionnaire was measured using A-ECOHIS responses in the child impact and family impact study groups respectively. Present study implied that children have strong perceptions and preferences regarding dental visit and dentist. **Discussion:** Child's first dental visit is of utmost importance as it determines his/her future behavior and attitude towards dentistry. Children form an opinion of dentist based on his or her appearance, body language, speech and usage of personal protective equipment. All these factors combine and help in forming a positive attitude towards dentist and dentistry. Families' perceptions in research on health services, is also considered important to improve the quality of life as an important product of research into pediatric healthcare services. **Conclusion:** Children's perception of dentist, their attire and the dental environment should be comfortable and appropriate for the patient to deliver dental care effectively. Several factors as discussed in our study should be considered as the initial dental experience that has a major influence on the child's attitude towards dentistry. Further studies should be done on a larger sample size to cover specific regions affected by early childhood caries to improve targeted population.

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205. KNOWLEDGE, ATTITUDE, AND PRACTICE ABOUT MENTAL HEALTH CHALLENGES AMONG HEALTHCARE STUDENTS OF A PRIVATE UNIVERSITY

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Objective: The objective of this study was to evaluate the knowledge, attitude, and practice of healthcare students (Medicine, Pharmacy, and Dentistry) in a private university about mental health challenges (MHC). **Materials and methods:** A research cross-sectional observational was conducted to evaluate the knowledge, attitude, and practice of students towards MHC at a private university in Malaysia. A validated questionnaire was distributed to 284 students studying in three different selected faculties, namely the Faculty of Medicine, Pharmacy, and Dentistry. The Statistical Package for Social Science (SPSS) Version 24.0 was used to analyze the data. **Results:** Upon evaluation of knowledge, male students were having less-adequate knowledge than females ($P = 0.006$). Malay students were having adequate knowledge than other races about MHC. Faculty of Medicine was having adequate knowledge than other faculties ($P \leq 0.001$). Regarding attitude, the Faculty of Pharmacy students had the highest positive attitudes ($P = 0.001$). Final year students were having a more positive attitude than pre-final year students. For the evaluation of practice, the Faculty of Dentistry students had the lowest practice compared with other faculties. **Conclusion:** In conclusion, overall, good knowledge was seen among the students of the private medical university about MHC. The medical students had adequate knowledge when compared with other faculties in the university.

Keywords: Attitude, health care students, knowledge, mental health challenges (MHC), practice

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206. KNOWLEDGE, AWARENESS, ATTITUDE AND PRACTICE OF DENTAL PRACTITIONERS REGARDING COVID-19 PANDEMIC AND INFECTION CONTROL: A CROSS SECTIONAL STUDY IN KOLKATA METROPOLITAN REGION

Bera R, Kalia P, Hiremath S, Jaiswal D

Background: Coronavirus disease 2019 (COVID-19) is a global pandemic with more than 53,973 people affected in West Bengal state of India. Objectives: The aim of present study was to assess the Knowledge, Attitudes and Practices (KAP) of dental practitioners in Kolkata city, West Bengal, India regarding COVID-2019 pandemic. **Materials and method:** Online questionnaire was distributed among dentists across West Bengal city, using a combination of convenience and snowball sampling. The questionnaire had 17 questions: (1) Section A was 'General section' which comprised of socio-demographic and professional details of the subjects; and (2) Section B comprised of 14 questions depicting knowledge, awareness attitude and practice regarding COVID-19. The data collected was subjected to statistical analysis with level of significance at $p=0.05$. The descriptive statistical analysis was done to compute frequency and percentages. Intergroup comparison was determined by Chi-square statistical analysis to determine the level of significance for responses of each question. **Results:** Around 70.4% undergraduates participated in the study. Only 4.3% showed accurate knowledge with respect to the incubation period of coronavirus. Coughing and sneezing was considered to be the most common mode of transmission. 98.9% of dentists considered fever to be the characteristic symptom of the disease. Hand washing and alcohol rubs was advocated by 99.5% of the dentist. Emergency procedures were considered necessary by 90.8% dentists. 75.1% of dentists agree that their practice has been affected by the pandemic. **Conclusion:** A constant update regarding COVID-19 should be made available to dental health care professionals through webinars, seminars, discussions and articles. Dentists should keep themselves updated and help to fight against this pandemic.

Keywords: awareness, knowledge, attitude, practice dentist, COVID-19

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207. EVALUATION OF STRESS IN CONCURRENCE WITH LEVEL OF ORAL HYGIENE AMONG DENTAL UNDERGRADUATES IN MALAYSIA

Arunachalam R, Rajeev V, Chin SWei SHC, Shanmugavelu T, Kurra SB

Aim and objective: This study aimed to scrutinize sources and degree of stress in dental undergraduates in Asian Institute of Medicine, Science and Technology (AIMST) Dental Center during clinical years and correlating clinically with their oral hygiene. **Materials and methods:** A cross-sectional study was conducted among a total of 216 students including the third-, fourth-, and fifth-year dental students, and a modified version of the dental environment stress (DES) questionnaire was used to investigate the possible sources of stress during the clinical years. The results were evaluated using the statistical package for social sciences (SPSS) version 16. Basic descriptive statistics and Chi-square test were used to analyze and correlate the variables. A significant level was set at $p \leq 0.05$. **Results:** Total mean rank stress in terms of the academic year for the third year was 78.56, 125.6 in fourth, and 117.65 in the fifth year and was statistically higher for year 4 students. There is no statistical difference in the stress experienced by male and female undergraduate students. In response to the questionnaire pertaining to the source of stressors, an overall four-point Likert scale scoring of stress was marked as mild to moderate by the majority of the students. Pertaining to the level of oral hygiene to stress, statistical significance was noted with year 5 with a mean value higher for year 3 students. **Conclusion:** The overall findings of this investigation showed that dental students of AIMST University perceived comparatively mild-to-moderate levels of stress across the clinical study years. **Clinical significance:** Assessment of potential sources of stressors in the dental curriculum will point out the areas that need to be focused so that effective management can be instituted.

Keywords: Dentistry, Oral hygiene, Stress, Undergraduates

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208. EMOTIONAL INTELLIGENCE AMONG UNDERGRADUATE DENTAL STUDENTS AND ITS RELATIONSHIP WITH ACADEMIC AND CLINICAL PERFORMANCE

Pendyala SK, Kondreddy K, Lee LH, Lim CP, Lee PY, Lim L

Introduction: Emotional intelligence (EI) plays a significant and vital role in the success of a healthcare professional. The current study was aimed at assessing the emotional intelligence and evaluating its association with academic and clinical performance comprehensively among the dental students. **Materials and Methods:** 215 undergraduate dental students were involved in this cross-sectional questionnaire-based study. A Sterrett's EI questionnaire was used in this study. **Statistical Analysis Used:** Independent samples't-test was performed to find out the differences in mean EI scores between female and male students. Pearson's correlation coefficient test was employed to determine the relationship between EI scores and the academic and clinical performance. Simple linear regression was calculated to predict the academic and clinical performance based on the EI scores. **Results:** There was no statistically significant difference noted in the mean overall EI scores between females (168.10 ± 16.127) and the males (171.20 ± 17.222) conditions; $t(198) = -1.247$, $p = 0.214$. Moderate positive correlation was observed between EI scores and academic performance ($r = 0.393$, $p < 0.01$) and the EI scores and clinical performance ($r = 0.392$, $p < 0.01$). A significant regression equation was found ($F(1,198) = 36.142$, $p < .000$) with an R^2 of 0.154 when calculate academic performance based on the EI scores. **Conclusions:** Dental students have exhibited moderate levels of emotional intelligence scores. No statistically significant difference noted in mean overall EI scores between female and male students. The results showed a significant moderate correlation between the EI scores and the academic and clinical performance.

Keywords: Emotional Intelligence, Academic Performance, Clinical Performance, Dental Students

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209. INDONESIAN DENTISTS KNOWLEDGE, ATTITUDES AND PRACTICES IN COVID-19 PANDEMIC

Suwargiani A, Arief E, Setiawan A, Putri F, Hamdani A, Sanjaya A, Yubiliani G, Susilawati S, Aripin D, Djuastina N, Widyaputra S

Introduction: Dentists play a significant role in preventing the transmission of 2019-nCoV. Recommended infection control measures during dental practice can block the route of person-to-person transmission. Dentists and their personnel are used to assess the risk of cross-infection. This study aimed to obtain dentists' knowledge, attitudes, and practices regarding the Covid-19 pandemic in Indonesia. **Methods:** A cross-sectional study was conducted on a sample of licensed dentists using the convenience sampling technique. The minimum sample size was counted using the formula for a descriptive analysis of one group with the expected proportion of 50% and the confidence level of 95%, and obtained 407 respondents from 31 provinces. Data was collected using a questionnaire distributed via a shortened link. 99.75% of respondents knew personal protective equipment, but only 84.28% knew the proper removal procedure. 99.75% of respondents knew about dental devices that cause aerosols, and all respondents knew about social and physical distancing. **Result:** Dentists' attitudes regarding personal protective equipment were that they needed and maintained it during the pandemic. All respondents stated that social and physical distancing was critical and must be maintained while providing health services. Regarding their practices, all respondents did social and physical distancing in their daily lives and during dental procedures. **Conclusion:** Dentists' knowledge is already good in several ways, but with several matters that still need to be improved, their attitudes and practices are good criteria.

Keywords: smart Odontogram, medical record, application, usability testing, user's experience

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210. LIFESTYLE FACTORS ASSOCIATED WITH POOR SLEEP QUALITY AMONG UNDERGRADUATE DENTAL STUDENTS AT A MALAYSIAN PRIVATE UNIVERSITY

Hashim H, Ng JS, Ngo JX, Ng YZ, Aravindkumar B

Objective: The purpose of this study was to look into the associations between lifestyle factors, gender, clinical level, and sleep quality among undergraduate dental students at a private university in Malaysia. **Material and Methods:** A self-administered Pittsburg sleep quality index (PSQI) scale and the lifestyle and habits questionnaire-brief (LHQ-B) were used in this cross-sectional study. A global PSQI score of greater than 5 indicates poor sleep quality. All university dental students were invited to take part. Descriptive statistics and logistic regression analyses were used to analyze the data. **Results:** A total of 338 students took part in the study, with a response rate of 90.4%. The proportion of females was higher (68.3 %) and more than half of the respondents (56.7 %) were in their clinical years. The prevalence of poor sleep quality was 36.7%. At multivariable level, poor sleep quality was associated with being male (OR=1.72 [95% confidence interval (1.05, 2.83)]) and engaging in an unhealthy lifestyle for psychological health (OR=2.64 [95% confidence interval (1.34, 5.21)]) and nutrition (OR=2.48 [95% confidence interval (1.028, 4.82)]). **Conclusion:** The prevalence of poor sleep quality among undergraduate dental students in our study was comparable to that found in other studies. Male students were more likely to have poor sleep quality than female students. Our findings indicate that poor sleep quality (PSQI score >5) may be linked to unhealthy lifestyle habits related to psychological health and nutrition. Health education that emphasizes these domains is essential for improving their lifestyle habits and sleep quality.

Keywords: Dental, Lifestyle, Malaysia, Sleep, Students

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211. MONKEYPOX AWARENESS, KNOWLEDGE AND ATTITUDE AMONG UNDERGRADUATE PRECLINICAL AND CLINICAL STUDENTS AT A MALAYSIAN DENTAL SCHOOL: AN EMERGING OUTBREAK DURING THE COVID-19 ERA

Lin SSG, Tan WW, Chan KZD, Ooi SK, Hashim H

Objective: To evaluate the awareness, knowledge, and attitude on monkeypox viral infection among preclinical and clinical dental students in Malaysia. **Methods:** A cross-sectional study was conducted among 229 preclinical and clinical dental students via an online self-reported questionnaire. The questionnaire included 3 items on awareness, 15 items on knowledge, 9 items on attitude and 2 open-ended questions. Data were presented as frequencies and percentages. Chi-square test was used to compare knowledge and awareness scores between preclinical and clinical dental students and content analysis was performed for open-ended responses. **Results:** Preclinical and clinical dental students were aware of the existence of monkeypox (89.5% and 94.4%, respectively), that the disease emerged in non-endemic countries (81.0% and 87.1%, respectively) and that it was declared a public health emergency of international concern by the World Health Organization (73.3% and 79.0%, respectively). Clinical dental students' overall knowledge level was significantly higher than preclinical dental students ($P=0.014$). Both preclinical (95.2%) and clinical (96.8%) dental students demonstrated positive attitudes toward monkeypox with no significant difference ($P=0.736$) noted between them. Three themes emerged from the open-ended questions: (1) reimplementation of nationwide lockdown, (2) impact on the economy and health, and (3) disruption to the educational system. Students also anticipated their face-to-face learning to be reduced should there be a new outbreak. **Conclusions:** Both preclinical and clinical dental students showed comparable awareness and attitudes, while the latter demonstrated greater satisfactory knowledge toward the re-emergence of monkeypox during the COVID-19 pandemic. Nonetheless, efforts to improve dental students' understanding of this alarming outbreak are required, to safeguard their health and minimise transmission.

Keywords: Communicable disease, Monkeypox virus, Public health, Tropical disease, Zoonoses

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212. KNOWLEDGE AND PERCEPTION OF NEW GRADUATES ON TREATING PATIENTS WITH SPECIAL NEEDS IN DENTISTRY: AN ORIGINAL RESEARCH

Poojary D, Ishaq A, Bharath K, Shekhar S, Maddula CD, Anand P, Tiwari DT

Aim: The purpose of the present research was to assess the knowledge, perception of new dental graduates about treating specially abled patients. **Methodology:** A cross sectional study was conducted among a conveniently sampled 45 new dental professionals from the same institution who were both private dental practitioners. Participants were interviewed through a validated questionnaire, which consisted of 14 items. The questionnaire comprised demographic details of the participants, their years of dental experience, disabled patients they had encountered so far in their practice, and questions related to their attitude, perception, and practice to provide oral health care for patients with special needs. Informed consent was obtained from the participants prior to the study. The data obtained were entered into Microsoft Excel 2010 and descriptive statistics was computed using the SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. **Results:** A response of 71% was obtained. Majority of the dentists (65%) were unaware of the Right to Disability Act. Half of the dentists (50%) felt teledentistry would do more good to people with special needs. About (31.8%) of them felt inadequate training to handle patients with special needs as major barrier faced while treating them. **Conclusion:** Majority of the study participants felt inadequate training among the dental practitioners as barrier to treat special needs patients and hence suggested incorporation of special care dentistry into the dental curriculum.

Keywords: Awareness, disability, oral health care

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213. PREVALENCE OF SYMPTOMS OF DEPRESSION, ANXIETY, AND STRESS AMONG UNDERGRADUATE DENTAL STUDENTS IN MALAYSIA

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Aim: The aim of this study was to assess the prevalence of depression, anxiety, and stress among dental students and its association with factors such as gender, year of study, phase of the course, and ethnicity. **Materials and methods:** A questionnaire-based cross-sectional study was conducted among medical students in a medical institute in Malaysia. Prevalence of depression, anxiety, and stress was assessed by Depression, Anxiety, and Stress Scale-21 (DASS-21). **Results:** A total of 351 students took part in the study with a mean age of 22.38 (+1.69) years. The overall prevalence of depression, anxiety, and stress with varying severity among the study population was 60.4, 75.2, and 50.4%, respectively. The prevalence of symptoms of depression among the study population appears to be independent of gender, ethnicity, and academic year of study. Our results show that stress and anxiety may be influenced by gender with more prevalence in females. **Conclusion:** Early detection of symptoms of depression, anxiety and stress is of great importance to take timely remedial action to keep the mental well-being of individuals. Maintaining the mental health of young medical professionals is a need of society in the present world. Further studies are suggested to recognize other factors associated with depression, anxiety, and stress among dental students. **Clinical significance:** Considering the students who experience depression, anxiety, or stress during undergraduate schooling, appropriate measures shall be taken to ensure effective learning. Students who have shown higher scores shall be advised for further follow-up and treatment strategies or appropriate counseling programs.

Keywords: Anxiety, Dentistry, Depression, Stress Students

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214. PREPROCEDURAL MOUTH RINSES FOR PREVENTING TRANSMISSION OF INFECTIOUS DISEASES THROUGH AEROSOLS IN DENTAL HEALTHCARE PROVIDERS

Kumbargere Nagraj S, Eachempati P, Paisi M, Nasser M, Sivaramakrishnan G, Francis T, Verbeek JH

Background: Aerosols and spatter are generated in a dental clinic during aerosol-generating procedures (AGPs) that use high-speed hand pieces. Dental healthcare providers can be at increased risk of transmission of diseases such as tuberculosis, measles and severe acute respiratory syndrome (SARS) through droplets on mucosae, inhalation of aerosols or through fomites on mucosae, which harbour micro-organisms. There are ways to mitigate and contain spatter and aerosols that may, in turn, reduce any risk of disease transmission. In addition to personal protective equipment (PPE) and aerosol-reducing devices such as high-volume suction, it has been hypothesised that the use of mouth rinse by patients before dental procedures could reduce the microbial load of aerosols that are generated during dental AGPs. **Objectives:** To assess the effects of preprocedural mouth rinses used in dental clinics to minimise incidence of infection in dental healthcare providers and reduce or neutralise contamination in aerosols. **Search methods:** We used standard, extensive Cochrane search methods. The latest search date was 4 February 2022. **Selection criteria:** We included randomised controlled trials and excluded laboratory-based studies. Study participants were dental patients undergoing AGPs. Studies compared any preprocedural mouth rinse used to reduce contaminated aerosols versus placebo, no mouth rinse or another mouth rinse. Our primary outcome was incidence of infection of dental healthcare providers and secondary outcomes were reduction in the level of contamination of the dental operatory environment, cost, change in mouth microbiota, adverse events, and acceptability and feasibility of the intervention. **Data collection and analysis:** Two review authors screened search results, extracted data from included studies, assessed the risk of bias in the studies and judged the certainty of the available evidence. We used mean differences (MDs) and 95% confidence intervals (CIs) as the effect estimate for continuous outcomes, and random-effects meta-analysis to combine data. **Main Results:** We included 17 studies with 830 participants aged 18 to 70 years. We judged three trials at high risk of bias, two at low risk and 12 at unclear risk of bias. None of the studies measured our primary outcome of the incidence of infection in dental healthcare providers. The primary outcome in the studies was reduction in the level of bacterial contamination measured in colony-forming units (CFUs) at distances of less than 2 m (intended to capture larger droplets) and 2 m or more (to capture droplet nuclei from aerosols arising from the participant's oral cavity). It is unclear what size of CFU reduction represents a clinically significant amount. There is low-to very low-certainty evidence that chlorhexidine (CHX) may reduce bacterial contamination, as measured by CFUs, compared with no rinsing or rinsing with water. There were similar results when comparing cetylpyridinium chloride (CPC) with no rinsing and when comparing CPC, essential oils/herbal mouthwashes or boric acid with water. There is very low-certainty evidence that tempered mouth rinses may provide a greater reduction in CFUs than cold mouth rinses. There is low-certainty evidence that CHX may reduce CFUs more than essential oils/herbal mouthwashes. The evidence for other head-to-head comparisons was limited and inconsistent. The studies did not provide any information on costs, change in micro-organisms in the patient's mouth or adverse events such as temporary discolouration, altered taste, allergic reaction or hypersensitivity. The studies did not assess acceptability of the intervention to patients or feasibility of implementation for dentists. **Authors' Conclusions:** None of the included studies measured the incidence of infection among dental healthcare providers. The studies measured only reduction in level of bacterial contamination in aerosols. None of the studies evaluated viral or fungal contamination. We have only low to very low certainty for all findings. We are unable to draw conclusions regarding whether there is a role for preprocedural mouth rinses in reducing infection risk or the possible superiority of one preprocedural rinse over another. Studies are needed that measure the effect of rinses on infectious disease risk among dental healthcare providers and on contaminated aerosols at larger distances with standardised outcome measurement.

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215. PERCEPTION OF RISK FACTORS AT WORK ASSOCIATED WITH MUSCULOSKELETAL SYMPTOMS IN DENTAL STUDENTS OF MELAKA, MALAYSIA: A CROSS-SECTIONAL STUDY

Singh VP, Nettem S, Kyaw Soe HH, Babji NAB, Sahari AIB, Yusof LSBM, Mathew M

Background: Dental professionals have been reported to be constantly exposed to work-related musculoskeletal disorders with symptoms often started as early as the student phase. Risk perception may play an important role in modifying risk at work. **Objective:** To assess the influence of gender, academic level, and the presence of painful symptoms on the perception of risk factors at work contributing to musculoskeletal symptoms among dental students of Melaka, Malaysia. **Methods:** A cross-sectional survey of 183 clinical year dental students based on a convenience sample. The data were collected using the Nordic Musculoskeletal Questionnaire and Job Factor Questionnaire for assessment of musculoskeletal symptoms and risk factors at work respectively. Study data were evaluated using percentage, median, Cochran's Q test, Bonferroni correction, multiple linear regression analysis and Mann-Whitney U Test. The analysis was interpreted considering a 95 % confidence interval and significant level at $P < 0.05$. **Results:** Dental students reported a high prevalence (86.9 %) of musculoskeletal symptoms mostly affected the neck, shoulder, lower and upper back body regions. No significant difference in perception was found with the gender. A significant ($P < 0.05$) higher perception was observed in fourth-year students. The presence of painful symptoms was significantly ($P < 0.05$) associated with working in the same position, prolonged duration of work and use of tools. **Conclusions:** Priority in implementing ergonomic education throughout the training in the dental schools should be considered to improve perception and reduce musculoskeletal disorders associated with the dental profession.

Keywords: Dental education, ergonomics, musculoskeletal discomfort, risk factors awareness

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216. KNOWLEDGE AND AWARENESS REGARDING DENTAL MANAGEMENT OF HEMOPHILIC PATIENTS AMONG STUDENTS OF A MALAYSIAN UNIVERSITY: A CROSS-SECTIONAL STUDY

George A, Mayya A, Mayya A, Iszham A, Rafi N, Marius R, Mayya S

Background: Improper management of bleeding disorders in the dental setting can lead to complications that can endanger the lives of such patients. **Objective:** This study aimed to assess the knowledge and awareness of dental management of hemophilia among undergraduate students of a Malaysian university. **Methodology:** A cross-sectional survey was conducted in the year 2018-2019 to collect the data. A 23-item questionnaire developed and validated by the authors was used to collect data on the knowledge and awareness regarding dental management of hemophilia patients. A total of 216 dental students participated in this research. Unpaired t-test and one-way ANOVA were used to compare the knowledge score between gender and academic year. **Results:** Only 21% of the participants were confident in treating a hemophilia patient. About 97% of the participants believed that the dental curriculum must be modified to emphasize the dental management of bleeding disorders. The overall mean of the knowledge score was 47.38% and awareness was 73.7% regarding the management of patients with hemophilia. **Conclusion:** The study revealed significant scope for improvement in the dental students' knowledge, which can be achieved by modifying the dental curriculum suitably to provide more emphasis on the management of bleeding disorders.

Keywords: Bleeding disorders, Dental management, Hemophilia, Inherited disorders, Knowledge, Awareness

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217. KNOWLEDGE AND ATTITUDE TOWARDS BASIC LIFE SUPPORT (BLS) AMONG DENTAL STUDENTS OF DENTAL COLLEGES IN SOUTH INDIA

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Aim: To assess the knowledge and attitude of students of dental schools in Southern India towards Basic Life Support (BLS), as well as to study the retention of BLS knowledge over time. **Subjects and methods:** A prevalidated questionnaire was employed, which contains 12 knowledge Questions and five questions designed to assess the students perspective towards BLS. It was hosted on Google Forms, and the URL was distributed to the Students. **Results:** A total of 267 responses were received, of which 66 were males and 201 were female students. Out of a maximum possible score of 12, the mean knowledge score of the group was 4.54. It was found that those who attended a BLS workshop within the last 2 years scored significantly better than those who either took it more than 2 years ago or had never undergone BLS training. Almost all participants (96%) agreed that there is a need for BLS to be learned by all dental students and hence BLS training should be part of the dental curriculum. 76.8% of respondents expressed reluctance to perform CPR on strangers. **Conclusion:** The findings show that the dental students who participated in the study had inadequate knowledge in BLS, but had a positive attitude towards the adoption of BLS into the dental curriculum.

Keywords: Basic life support (BLS), Awareness, Curriculum, Knowledge

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218. DEVELOPING AN INTEGRATED MULTILEVEL MODEL OF UNCERTAINTY IN HEALTH CARE: A QUALITATIVE SYSTEMATIC REVIEW AND THEMATIC SYNTHESIS

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Introduction: Uncertainty is an inevitable part of healthcare and a source of confusion and challenge to decision-making. Several taxonomies of uncertainty have been developed, but mainly focus on decisions in clinical settings. Our goal was to develop a holistic model of uncertainty that can be applied to both clinical as well as public and global health scenarios. **Methods:** We searched Medline, Embase, CINAHL, Scopus and Google scholar in March 2021 for literature reviews, qualitative studies and case studies related to classifications or models of uncertainty in healthcare. Empirical articles were assessed for study limitations using the Critical Appraisal Skills Programme (CASP) checklist. We synthesised the literature using a thematic analysis and developed a dynamic multilevel model of uncertainty. We sought patient input to assess relatability of the model and applied it to two case examples. **Results:** We screened 4125 studies and included 15 empirical studies, 13 literature reviews and 5 case studies. We identified 77 codes and organised these into 26 descriptive and 11 analytical themes of uncertainty. The themes identified are global, public health, healthcare system, clinical, ethical, relational, personal, knowledge exchange, epistemic, aleatoric and parameter uncertainty. The themes were included in a model, which captures the macro, meso and microlevels and the inter-relatedness of uncertainty. We successfully piloted the model on one public health example and an environmental topic. The main limitations are that the research input into our model predominantly came from North America and Europe, and that we have not yet tested the model in a real-life setting. **Conclusion:** We developed a model that can comprehensively capture uncertainty in public and global health scenarios. It builds on models that focus solely on clinical settings by including social and political contexts and emphasising the dynamic interplay between different areas of uncertainty.

Keywords: Systematic review

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219. DEVELOPMENT AND VALIDATION OF QUESTIONNAIRE FOR ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE OF ERGONOMIC IN DENTISTRY AMONG CLINICAL YEARS DENTAL STUDENTS (ERGODENT)

Ali N, Abd Rahman N, Mohd Adnan M

Objectives: Work-related musculoskeletal disorder is common among dental personnel worldwide. It is caused by poor application of ergonomic principles into dental practice. It is important to tackle the problem earlier, starting from their study period. Thus, a tool is needed in order to assess their knowledge regarding ergonomic practice, attitude towards ergonomic practice and practice of ergonomic in dentistry. This study aimed to develop a new questionnaire to assess the three said components among dental students in clinical years. **Methods:** Information were gathered, and three steps were applied where the domains were identified, items were generated, and responses were selected. Content validation and face validation were followed after its construction. Results: The newly developed ErgoDent Questionnaire showed item-level content validity index (I-CVI) of 1.00 and item-level face validity index (I-FVI) of 1.00 was also obtained from 10 respondents, showing that the items were clear, understandable and comprehensible. **Conclusion:** This study showed good level of I-CVI and I-FVI for the newly developed questionnaire. This tool is considered valid and to be used for assessment of knowledge of ergonomic practice, attitude towards ergonomic practice and practice of ergonomic in dentistry. However, further validation needed in order to verify its psychometric credentials in other settings. It also can be applied to subjects other than dental students (dental personnel or professional) with minimal modifications.

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220. CONTENT VALIDATION AND RESPONSE PROCESS VALIDATION OF QUESTIONNAIRE ON ACCESSIBILITY OF CHILDREN WITH CEREBRAL PALSY TO ORAL HEALTH CARE SERVICES

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Introduction: In development of new questionnaire; Accessibility of children with cerebral palsy to oral health care services, a systematic production as well as objective evaluation of the developed contents is required through expert review and response process validation. **Objective:** To determine the content validity and response process validation of a new questionnaire on accessibility of children with cerebral palsy to oral health care service. **Methods:** A form for content validation was disseminated via email to seven expert panels of different dental specialties. They were critically reviewed the relevance of each item to the underlying construct. Then, the individual items were rated using a rating scale of four points. They were also encouraged to give written feedback. The calculation of content validity index was then performed and items reach the satisfactory level will be included in the form for response process validation. **Results:** Thirty caregivers of children with cerebral palsy in Kelantan engaged by telephone survey in response process validation phase. They assessed the clarity and comprehensibility of the items and gave a score using a four points scale. Comments which emerge from the survey will be documented. Then, the face validity index was performed and should be used to improve the items and the questionnaire overall. Of the initial 42 items, 36 items have reached the satisfactory level content validation index of at least 0.83. More refinement following response process validation and resulting to 33 items matched the satisfactory level of the face validity index of at least 0.80. **Conclusion:** In order to support the validity of the newly develop questionnaires it is important to determine content validity and response process validity.

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221. PATIENTS' EXPERIENCES AND CLINICIANS' PRACTISES IN BREAKING BAD NEWS OF ORAL CANCER DIAGNOSIS IN MALAYSIA

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Background: Communication is an integral component of effective healthcare delivery to patients, and this includes breaking bad news (BBN). Effective doctor-patient communication can enhance patients' engagement in decision-making and subsequently influence the patients' outcomes. However, clinicians in dentistry are rarely exposed to diseases that can negatively and seriously affect an individual's view of his or her future and pose a risk of mortality, except for oral cancer. **Objectives:** This study aimed to explore patients' experiences and clinicians' practises in BBN of oral cancer diagnosis in Malaysia. This study also looked into aspects of consensus and differences between patients' and clinicians' perspectives in BBN of oral cancer diagnosis. **Methodology:** A descriptive-interpretive approach to a qualitative study was conducted to gather relevant information regarding patients' experiences and clinicians' practises in BBN of oral cancer diagnosis in Malaysia. A total of 21 patients and 12 clinicians were recruited and participated in this study. The data were collected according to participants' preferences via face-to-face or online semi-structured interviews. The audio recordings were transcribed, and a thematic analysis approach was used for data management for thematic emergence. **Results:** Themes that emerged for patients' experiences and clinicians' practises were setting, communication, emotional aspect, and summarising the session for BBN. In addition, the other theme emerging from clinicians' practises was preparation for BBN. **Conclusion:** Overall, patients' experiences were in consensus with clinicians' practises in BBN of oral cancer diagnosis.

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222. PATIENT SATISFACTION TOWARDS DENTIST-PATIENT INTERACTION AMONG PATIENTS ATTENDING OUTPATIENT DENTAL CLINIC HOSPITAL UNIVERSITI SAINS MALAYSIA

USM/JEPeM/17040205

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Objective: To determine the satisfaction with the dentist-patient interaction and factors associated with patient satisfaction among patients attending the outpatient dental clinic Hospital Universiti Sains Malaysia (HUSM). **Material and Methods:** This cross-sectional study involved 229 patients who attended outpatient dental clinic Hospital USM that located in the East Coast region of Malaysia. A self-administered Skala Kepuasan Interaksi Perubatan – 11 (SKIP-11) questionnaire was used to assess the satisfaction towards dentist-patient interaction. Systematic random sampling was applied in this study. The data were analyzed using simple logistic regression analysis to determine the factors associated with patient satisfaction with dentist-patient interaction. **Results:** The mean age of patients was 32.6 ± 13.9 years, 71.6% of them study up to tertiary level, 31.5% came to for dental check-up and 23.6% of them had tooth decay. More than half (64.6%) of the patients were satisfactory with dentist-patient interaction. The satisfaction percentage in the distress relief domain was 60.7%, 56.8% in the rapport domain, and 53.7% in the interaction outcome domain. Satisfaction with dentist-patient interaction was significantly associated with the dentists' characteristics such as age (OR = 0.583, 95%CI 0.44-0.76, $p=0.001$), gender (OR = 0.386, 95% CI 0.22-0.69, $p=0.001$) and years of service (OR = 0.294, 95% CI 0.15-0.57, $p=0.001$). **Conclusion:** The result showed that slightly more than half of the patients who attended the outpatient dental clinic HUSM were satisfied with the dentist-patient interaction, which was found to be influenced by the characteristics of the dentists. Efforts to improve patient-dentist interaction are recommended to ensure delivery of good quality oral health care.

Keywords: Attitude to Health, Patient Satisfaction, Professional-Patient Relations

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223. PERCEPTION OF RISK GETTING INFECTED COVID-19 AND ASSOCIATED FACTORS AMONG ORAL HEALTH CARE WORKERS IN ATTENDING PATIENT DURING COVID-19 PANDEMIC IN MALAYSIA

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Background: An outbreak of COVID-19 has been huge disruption to all facets of life and work, with a wide range of global responses. The first case of COVID-19 was detected in Malaysia on 20th January 2020. During the pandemic, dentistry is considered as one of the most high-risk jobs in COVID-19 transmission. The Oral Health Care Workers (OHCWs) face higher risk of disease transmission by the nature of dental treatment. **Objective:** The Aim is to study perception of risk getting infected COVID-19 among OHCWs in attending patient during COVID-19 pandemic in Malaysia. **Materials & Methods:** An online cross-sectional survey was administered among OHCWs in Malaysia using multistages sampling. A questionnaire adapted from another pandemic in Japan. Content validity and pre-test were done. Multiple linear regression was used to identified associated factors with perception of risk getting infected COVID-19 among OHCWs. **Result:** A total of 199 participants were included in the analysis. The majority of respondents were female (82.4%) and aged below 36 years old (49.7%). The range mean score of perception of risk getting infected COVID-19 among OHCWs in attending patients is between 2.25 and 3.63 (0.28). There are associated between factors and perception of risk getting infected COVID-19 among OHCWs, p -value = 0.088. **Conclusion:** Demographic factors and knowledge were found not to be associated with perception of risk getting infected by COVID-19 in attending patients during COVID-19 pandemic, it is necessary to improve the risk perception OHCWs through health education in various ways.

Oral presentation at the International Postgraduate e-Symposium 2021 on 1-2 August 2021. Corresponding e-mail: zulkarnain@usm.my

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224. KNOWLEDGE AND ATTITUDE TOWARDS DENTAL UNIT WATERLINE SYSTEM DECONTAMINATION AMONG UNDERGRADUATE AND POSTGRADUATE DENTAL STUDENTS IN SCHOOL OF DENTAL SCIENCES, UNIVERSITI SAINS MALAYSIA

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Background: Dental unit waterline system (DUWLS) decontamination is an important infection control in dentistry. **Objective:** To determine knowledge and attitude towards DUWLS decontamination and its associated factors among dental students in Universiti Sains Malaysia. **Materials & Methods:** A cross-sectional study was conducted in April 2020 among 211 eligible undergraduate and postgraduate dental students. A validated questionnaire adapted from Kengadaran et al. (2017) was administered using Google Form to assess the knowledge and attitude towards DUWLS decontamination. SPSS version 24 was used to analyse the data. The association between age, sex, study level, clinical experience, received information, guidance, and personal experience with the knowledge and attitude scores were assessed using Pearson's correlation and independent t-test. **Result:** There were 169 students participated in the study (80.1% response rate). The majority were female (71.6%) and Malays (59.2%). The mean (SD) knowledge and attitude scores for the undergraduates were 11.6 (4.23) and 51.3 (7.86), respectively, whereas for the postgraduates were 18.0 (2.82) and 54.6 (4.74), respectively. The postgraduates had significantly higher mean knowledge and attitude scores than undergraduates ($p < 0.001$). Factors that significantly associated with the knowledge score of the undergraduates were the received information, guidance, and personal experience ($p < 0.05$). However, only the received information was significantly associated with knowledge score among postgraduates ($p = 0.011$). Age was significantly associated with attitude score among postgraduates ($p = 0.014$). **Conclusion:** The knowledge and attitude scores were relatively moderate. Significantly higher knowledge and attitude scores were presented among the postgraduates than the undergraduates.

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225. DENTAL STUDENTS' PERCEPTION, ATTITUDE AND WILLINGNESS TO INTERACT WITH MENTAL ILLNESS PATIENTS: A MULTICENTRE CROSS-SECTIONAL STUDY

USM/JEPeM/19120917

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Background: Mental illness is a psychological impairment involving emotions, cognitions, and behaviors, and its prevalence is increasing worldwide. Dental students may encounter patients with underlying psychological problems during their training. **Objective:** To evaluate dental students' perception, attitude, and willingness to interact with patients with mental illness. **Methods:** A multi-center cross-sectional study was conducted involving undergraduates at three dental institutions in Malaysia using an online self-administered questionnaire. Descriptive data analysis was conducted and statistical analysis using chi-square test was done for associations ($p < 0.05$). **Results:** The response rate was 63% (225); the majority of respondents were female (77.8%) and of Malay ethnicity (88.4%). Our study found that positive attitudes are independent of respondents' sociodemographic profiles. No significant differences in attitudes were portrayed by gender, race, or history of mental illness. Our findings suggest that respondents' place of study, gender, and previous encounter with mental illness are associated with willingness to interact with patients ($p < 0.05$). **Conclusions:** Dental students displayed positive attitudes and willingness to interact with patients with mental illness. However, to further improve students' attitudes and enhance their readiness to interact with patients with mental illness, more mental health-related educational programs should be introduced in the dental curricula.

Keywords: attitude, dental students, mental illness, perception, willingness

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226. KNOWLEDGE AND ATTITUDE TOWARDS DENTAL UNIT WATERLINE SYSTEM DECONTAMINATION AMONG UNDERGRADUATE AND POSTGRADUATE DENTAL STUDENTS IN UNIVERSITI SAINS MALAYSIA

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Background: Dental unit waterline system (DUWLS) decontamination is an important infection control in dental practice. This study aimed to determine knowledge and attitude towards DUWLS decontamination and its associated factors among undergraduate and postgraduate dental students in Universiti Sains Malaysia. **Methods:** A cross-sectional study was conducted using a validated questionnaire administered online using Google Forms to assess the knowledge and attitude of dental students towards DUWLS decontamination. Descriptive and inferential statistics using independent t-test, Pearson, and Spearman correlation were carried out using SPSS version 24.0. **Results:** A total of 169 dental students participated in the study, and the majority were female (71.6%) and Malay (59.2%). The mean (SD) age was 23.2 (0.93) and 34.4 (2.65), for the undergraduates and postgraduates, respectively. The mean (SD) knowledge scores for the undergraduates and postgraduates were 11.6 (4.23) and 18.0 (2.82), respectively, whereas the mean attitude scores were 51.3 (7.86) and 54.6 (4.74), respectively. The postgraduates had significantly higher mean knowledge and attitude scores than the undergraduates ($p < 0.001$). The significant factors associated with the undergraduates' knowledge were received information and guidance and their personal experience in managing DUWLS ($p < 0.05$). However, only received information on DUWLS was significantly associated with the postgraduate's knowledge score ($p = 0.011$). Age factor had a significant association with the attitude score among the postgraduates ($p = 0.014$). **Conclusion:** The knowledge regarding DUWLS decontamination was relatively moderate in both groups. However, both groups showed a favourable attitude towards DUWLS decontamination. Significantly higher knowledge and attitude scores were presented among the postgraduates than the undergraduates.

Keywords: Knowledge, Attitude, Infection control, Decontamination, Dental student

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227. CAREGIVERS' PERCEPTIONS TOWARDS ORAL HEALTHCARE SERVICES FOR ELDERLY LIVING IN MALAYSIAN NURSING HOMES—A QUALITATIVE STUDY

Letchumanan D, Mohamad Norpi N, Yusof ZYM, Razak IA, Abu Kasim NH, Abdullah NA, Ramalingam SR, Yacob H, Abduludin DMA, Azmi LL, Abas NA, Lian YS, Shamdol Z, Ishak FA, Ismail NA, Abd Muttalib K

Objective: To assess the perceptions of caregivers towards oral healthcare services received by elders in Malaysian nursing homes and to identify challenges and suggestions for improvement. **Background:** Caregivers play an important role in the oral health care of elders in nursing homes. **Methods:** This study employed a qualitative approach using the nominal group technique (NGT) to obtain caregivers' feedback in nursing homes in Malaysia. Data were manually transcribed, summarised into keywords/key phrases, and ranked using weighted scores. **Results:** In total, 36 caregivers (21 from government and 15 from private nursing homes) participated in the NGT sessions. Overall, caregivers were satisfied with the low treatment cost, the quality of treatment, and the availability of dental visits to nursing homes. Caregivers were dissatisfied with the frequency of dental visits, long waiting times at government dental clinics, and inadequate denture hygiene education for elders in nursing homes. The challenges faced by caregivers were elders' poor oral health knowledge and attitude and lack of elders' trust of caregivers to look after their oral health. Suggestions for improvement were to increase the frequency of dental visits to nursing homes, provide oral health education to elders and caregivers, and give treatment priority to elders at dental clinics. **Conclusion:** Despite being satisfied with the basic oral healthcare services received by elders in Malaysian nursing homes, caregivers raised some issues that required further attention. Suggestions for improvement include policy changes in nursing home dental visits and treatment priority for elders at government dental clinics.

Keywords: Malaysia, caregiver, institutionalised elders, nursing home, oral healthcare service

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228. ASSESSMENT OF ANXIETY ASSOCIATED WITH THE DENTAL TREATMENTS ON THE QUALITY OF LIFE: AN ORIGINAL RESEARCH

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Background: Patients around the world when attending the dental clinic are prone to undergo the feelings of fear and anxiety. This may impact the dental follow-up and prognosis. **Aim:** The aim of the study is to evaluate the dental anxiety in the patients attending for the dental treatment in a college, in India. **Materials and Methods:** A sample of 500 adults with ages 15–60 years was considered for the study. Modified dental anxiety questionnaire was used in the present study to assess the anxiety faced by the patients attending for the dental treatment. ANOVA and Chi-square test were used to test for the significance between the variables, and the correlation between these variables was assessed using the Spearman's correlation. Likert scale was used to know the cutoff for the severity of the dental anxiety. **Results:** Only in the 4% of the participants in the present study had dental anxiety. Gender, age, financial status, education impacted the dental anxiety and the regularity toward the appointments. **Conclusion:** It can be concluded from our study that there was a low anxiety in the dental patients toward the dental treatment and also anxiety decreased with the age. However, regular dental visits are advised to prevent the overall impact of the oral health on the general health.

Keywords: Dental anxiety and fear, modified dental anxiety scale, socioeconomic status

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229. SCHOOL DENTAL SCREENING PROGRAMMES FOR ORAL HEALTH

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Background: School dental screening refers to visual inspection of children's oral cavity in a school setting followed by making parents aware of their child's current oral health status and treatment needs. Screening at school intends to identify children at an earlier stage than symptomatic disease presentation, hence prompting preventive and therapeutic oral health care for the children. This review evaluates the effectiveness of school dental screening in improving oral health status. It is an update of the original review, which was first published in December 2017. **Objectives:** To assess the effectiveness of school dental screening programmes on overall oral health status and use of dental services. **Search Methods:** Cochrane Oral Health's Information Specialist searched the following databases: Cochrane Oral Health's Trials Register (to 4 March 2019), the Cochrane Central Register of Controlled Trials (CENTRAL, the Cochrane Register of Studies, to 4 March 2019), MEDLINE Ovid (1946 to 4 March 2019), and Embase Ovid (15 September 2016 to 4 March 2019). The US National Institutes of Health Trials Registry (ClinicalTrials.gov) and the World Health Organization International Clinical Trials Registry Platform were searched for ongoing trials. No restrictions were placed on language or publication status when searching the electronic databases; however, the search of Embase was restricted to the last six months due to the Cochrane Centralised Search Project to identify all clinical trials and add them to CENTRAL. **Selection Criteria:** We included randomised controlled trials (RCTs) (cluster or parallel) that evaluated school dental screening compared with no intervention or with one type of screening compared with another. **Data Collection and Analysis:** We used standard methodological procedures expected by Cochrane. **Main Results:** We included seven trials (five were cluster-RCTs) with 20,192 children who were 4 to 15 years of age. Trials assessed follow-up periods of three to eight months. Four trials were conducted in the UK, two were based in India and one in the USA. We assessed two trials to be at low risk of bias, two trials to be at high risk of bias and three trials to be at unclear risk of bias. None of the trials had long-term follow-up to ascertain the lasting effects of school dental screening. None of the trials reported the proportion of children with untreated caries or other oral diseases, cost effectiveness or adverse events. Four trials evaluated traditional screening versus no screening. We performed a meta-analysis for the outcome 'dental attendance' and found an inconclusive result with high heterogeneity. The heterogeneity was found to be, in part, due to study design (three cluster-RCTs and one individual-level RCT). Due to the inconsistency, we downgraded the evidence to 'very low certainty' and are unable to draw conclusions about this comparison. Two cluster-RCTs (both four-arm trials) evaluated criteria-based screening versus no screening and showed a pooled effect estimate of RR 1.07 (95% CI 0.99 to 1.16), suggesting a possible benefit for screening (low-certainty evidence). There was no evidence of a difference when criteria-based screening was compared to traditional screening (RR 1.01, 95% CI 0.94 to 1.08) (very low-certainty evidence). In one trial, a specific (personalised) referral letter was compared to a non-specific one. Results favoured the specific referral letter with an effect estimate of RR 1.39 (95% CI 1.09 to 1.77) for attendance at general dentist services and effect estimate of RR 1.90 (95% CI 1.18 to 3.06) for attendance at specialist orthodontist services (low-certainty evidence). One trial compared screening supplemented with motivation to screening alone. Dental attendance was more likely after screening supplemented with motivation, with an effect estimate of RR 3.08 (95% CI 2.57 to 3.71) (low-certainty evidence). Only one trial reported the proportion of children with treated dental caries. This trial evaluated a post screening referral letter based on the common-sense model of self-regulation (a theoretical framework that explains how people understand and respond to threats to their health), with or without a dental information guide, compared to a standard referral letter. The findings were inconclusive. Due to high risk of bias, indirectness and imprecision, we assessed the evidence as very low certainty. **Authors' Conclusions:** The trials included in this review evaluated short-term effects of screening. We found very low-certainty evidence that is insufficient to allow us to draw conclusions about whether there is a role for traditional school dental screening in improving dental attendance. For criteria-based screening, we found low-certainty evidence that it may improve dental attendance when compared to

no screening. However, when compared to traditional screening, there is no evidence of a difference in dental attendance (very low-certainty evidence). We found low-certainty evidence to conclude that personalised or specific referral letters may improve dental attendance when compared to non-specific counterparts. We also found low-certainty evidence that screening supplemented with motivation (oral health education and offer of free treatment) may improve dental attendance in comparison to screening alone. For children requiring treatment, we found very-low certainty evidence that was inconclusive regarding whether or not a referral letter based on the 'common-sense model of self-regulation' was better than a standard referral letter. We did not find any trials addressing possible adverse effects of school dental screening or evaluating its effectiveness for improving oral health.

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230. INTERVENTIONS TO REDUCE CONTAMINATED AEROSOLS PRODUCED DURING DENTAL PROCEDURES FOR PREVENTING INFECTIOUS DISEASES

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Background: Many dental procedures produce aerosols (droplets, droplet nuclei and splatter) that harbour various pathogenic micro-organisms and may pose a risk for the spread of infections between dentist and patient. The COVID-19 pandemic has led to greater concern about this risk. **Objectives:** To assess the effectiveness of methods used during dental treatment procedures to minimize aerosol production and reduce or neutralize contamination in aerosols. **Search Methods:** Cochrane Oral Health's Information Specialist searched the following databases on 17 September 2020: Cochrane Oral Health's Trials Register, the Cochrane Central Register of Controlled Trials (CENTRAL) (in the Cochrane Library, 2020, Issue 8), MEDLINE Ovid (from 1946); Embase Ovid (from 1980); the WHO COVID-19 Global literature on coronavirus disease; the US National Institutes of Health Trials Registry (ClinicalTrials.gov); and the Cochrane COVID-19 Study Register. We placed no restrictions on the language or date of publication. **Selection Criteria:** We included randomized controlled trials (RCTs) and controlled clinical trials (CCTs) on aerosol-generating procedures (AGPs) performed by dental healthcare providers that evaluated methods to reduce contaminated aerosols in dental clinics (excluding preprocedural mouthrinses). The primary outcomes were incidence of infection in dental staff or patients, and reduction in volume and level of contaminated aerosols in the operative environment. The secondary outcomes were cost, accessibility and feasibility. **Data Collection And Analysis:** Two review authors screened search results, extracted data from the included studies, assessed the risk of bias in the studies, and judged the certainty of the available evidence. We used mean differences (MDs) and 95% confidence intervals (CIs) as the effect estimate for continuous outcomes, and random-effects meta-analysis to combine data. We assessed heterogeneity. **Main Results:** We included 16 studies with 425 participants aged 5 to 69 years. Eight studies had high risk of bias; eight had unclear risk of bias. No studies measured infection. All studies measured bacterial contamination using the surrogate outcome of colony-forming units (CFU). Two studies measured contamination per volume of air sampled at different distances from the patient's mouth, and 14 studies sampled particles on agar plates at specific distances from the patient's mouth. The results presented below should be interpreted with caution as the evidence is very low certainty due to heterogeneity, risk of bias, small sample sizes and wide confidence intervals. Moreover, we do not know the 'minimal clinically important difference' in CFU. High-volume evacuator Use of a high-volume evacuator (HVE) may reduce bacterial contamination in aerosols less than one foot (~ 30 cm) from a patient's mouth (MD -47.41, 95% CI -92.76 to -2.06; 3 RCTs, 122 participants (two studies had split-mouth design); very high heterogeneity $I(2) = 95\%$), but not at longer distances (MD -1.00, -2.56 to 0.56; 1 RCT, 80 participants). One split-mouth RCT (six participants) found that HVE may not be more effective than conventional dental suction (saliva ejector or low-volume evacuator) at 40 cm (MD CFU -2.30, 95% CI -5.32 to 0.72) or 150 cm (MD -2.20, 95% CI -14.01 to 9.61). Dental isolation combination system One RCT (50 participants) found that there may be no difference in CFU between a combination system (Isolite) and a saliva ejector (low-volume evacuator) during AGPs (MD -0.31, 95% CI -0.82 to 0.20) or after AGPs (MD -0.35, -0.99 to 0.29). However, an 'n of 1' design study showed that the combination system may reduce CFU compared with rubber dam plus HVE (MD -125.20, 95% CI -174.02 to -76.38) or HVE (MD -109.30, 95% CI -153.01 to -65.59). Rubber dam One split-mouth RCT (10 participants) receiving dental treatment, found that there may be a reduction in CFU with rubber dam at one-metre (MD -16.20, 95% CI -19.36 to -13.04) and two-metre distance (MD -11.70, 95% CI -15.82 to -7.58). One RCT of 47 dental students found use of rubber dam may make no difference in CFU at the forehead (MD 0.98, 95% CI -0.73 to 2.70) and occipital region of the operator (MD 0.77, 95% CI -0.46 to 2.00). One split-mouth RCT (21 participants) found that rubber dam plus HVE may reduce CFU more than cotton roll plus HVE on the patient's chest (MD -251.00, 95% CI -267.95 to -234.05) and dental unit light (MD -12.70, 95% CI -12.85 to -12.55). Air cleaning systems One split-mouth CCT (two participants) used a local stand-alone air cleaning system (ACS), which may reduce

aerosol contamination during cavity preparation (MD -66.70 CFU, 95% CI -120.15 to -13.25 per cubic metre) or ultrasonic scaling (MD -32.40, 95% CI - 51.55 to -13.25). Another CCT (50 participants) found that laminar flow in the dental clinic combined with a HEPA filter may reduce contamination approximately 76 cm from the floor (MD -483.56 CFU, 95% CI -550.02 to -417.10 per cubic feet per minute per patient) and 20 cm to 30 cm from the patient's mouth (MD -319.14 CFU, 95% CI - 385.60 to -252.68). Disinfectants – antimicrobial coolants Two RCTs evaluated use of antimicrobial coolants during ultrasonic scaling. Compared with distilled water, coolant containing chlorhexidine (CHX), cinnamon extract coolant or povidone iodine may reduce CFU: CHX (MD -124.00, 95% CI -135.78 to -112.22; 20 participants), povidone iodine (MD -656.45, 95% CI -672.74 to -640.16; 40 participants), cinnamon (MD -644.55, 95% CI -668.70 to -620.40; 40 participants). CHX coolant may reduce CFU more than povidone iodine (MD -59.30, 95% CI -64.16 to -54.44; 20 participants), but not more than cinnamon extract (MD -11.90, 95% CI -35.88 to 12.08; 40 participants). **Authors' Conclusions:** We found no studies that evaluated disease transmission via aerosols in a dental setting; and no evidence about viral contamination in aerosols. All of the included studies measured bacterial contamination using colony-forming units. There appeared to be some benefit from the interventions evaluated but the available evidence is very low certainty so we are unable to draw reliable conclusions. We did not find any studies on methods such as ventilation, ionization, ozonisation, UV light and fogging. Studies are needed that measure contamination in aerosols, size distribution of aerosols and infection transmission risk for respiratory diseases such as COVID-19 in dental patients and staff.

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231. COMPARATIVE EVALUATION OF EFFICACY OF CHLORHEXIDINE AND HERBAL MOUTHWASH AS A PREPROCEDURAL RINSE IN REDUCING DENTAL AEROSOLS: A MICROBIOLOGICAL STUDY

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Objective: The risk to dentists, assistants, and patients of infectious diseases through aerosols has long been recognized. The aim of this study was to evaluate and compare the efficacy of commercially available preprocedural mouth rinses containing 0.2% chlorhexidine (CHX) gluconate, Befresh™ herbal mouthwash, and water in reducing the levels of viable bacteria in aerosols. **Materials & Methods:** This was a single-center, double-masked, placebo-controlled, randomized, three-group parallel design study. 30 patients (10 patients in each group) were recruited in the study. Patient rinsed mouth with 10 ml of CHX, 10 ml Befresh™, or 10 ml water. All the patients underwent supragingival ultrasonic scaling for a minimum of 30 min. The aerosol collection was done using a blood agar plate. The blood agar plates were kept approximately 12 inches from the patient's mouth. The microbial culture was analyzed. The colony-forming unit (CFU) counting in all three groups was assessed using one-way ANOVA test to compare among the groups (value <0.001). The intergroup comparison was done using the post hoc Tukey test. **Result:** There was a marked reduction in the CFU in the CHX group in all three areas. This was followed by Befresh™ (Sagar Pharmaceuticals) mouthwash. There was no reduction in the CFU of the water group. **Conclusion:** This study proves that a regular preprocedural mouth rinse could significantly reduce the majority bacteria present in aerosols generated by the use of an ultrasonic unit, and Befresh™ mouth rinse was found to be equally effective in reducing the aerosol contamination to 0.2% CHX gluconate.

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232. SOCIAL MEDIA USAGE AMONG DENTAL UNDERGRADUATE STUDENTS-A COMPARATIVE STUDY

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Social media use among students has infiltrated into dental education and offers benefits but may also cause problems. The aim of this study was to explore and compare current social media usage among dental undergraduate students from two countries-Malaysia and Finland. A self-administered structured online questionnaire was used. WhatsApp, YouTube, Instagram, Facebook and Snapchat were the services that were most familiar to the respondents from both countries. There were differences between the students from the two countries among the most preferred platforms. The most frequently used applications were WhatsApp (91.1% of students in Malaysia and 96.1% in Finland used it very frequently) and Instagram (74.3% of students in Malaysia and 70.0% in Finland used it very frequently). Students in Malaysia spent significantly more hours per week using the platforms as study tools than students in Finland. Over 80% of the Finnish dental students reported that lack of knowledge was not an issue in social media usage, while 85% of Malaysian students felt that lack of knowledge prevented them from using social media platforms frequently. The findings offer evidence that dental students used social media extensively.

Keywords: Finland, Malaysia, dental students, dental training, social media platforms, social media use

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233. THE EFFECT OF LIVE DEMONSTRATION AND FLIPPED CLASSROOM WITH CONTINUOUS FORMATIVE ASSESSMENT ON DENTAL STUDENTS' ORTHODONTIC WIRE-BENDING PERFORMANCE

DR CD1918/0106 (L)

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Background: Wire-bending skills is commonly taught through live demonstrations (LD) though flipped classroom (FC) method has gained popularity. Continuous formative assessment promotes personalised learning via closely monitored progress, with the identification of students' strengths and weaknesses. This study aims to evaluate the effects of LD and FC teaching methods, supplemented with continuous formative assessment, on dental students' learning of wire-bending skills for six types of removable orthodontic appliance components. A deeper understanding of the relative effectiveness between LD and FC teaching methods can help identify the most appropriate method to achieve student learning objectives, which is especially important given the current Covid- 19 pandemic. **Methods:** Forty third-year undergraduate dental students were randomly assigned into FC (n = 20) or LD (n = 20) cohort. Each student attended six teaching sessions, each to teach students' competency in fabricating one type of wire component, for a total competency in fabricating six wire components over the course of six teaching sessions. Either LD or FC teaching methods were used. After each session, wire assignments had to be submitted. Wire assignments were then evaluated using a blinded wire-bending assessment protocol. As part of their formative assessment, the assessment results were distributed to students, lecturers, and technicians before the next session. After the first session (T0) and at the end of all six sessions (T1), students completed a self-reported questionnaire. **Results:** The mean wire-bending scores for FC were significantly higher than LD for two of the six assignments, namely the Adams clasp ($p < 0.01$) and Z-spring ($p = 0.03$). Scores for both LD and FC increased significantly over time, which may be attributed to formative assessment. There was no statistically significant correlation between wire-bending scores and video usage. Students were satisfied with both teaching methods, according to T0 and T1 questionnaires. **Conclusions:** Both LD and FC are equally effective in transferring practical orthodontic wire-bending skills and well- received by students. Continuous formative assessment may have enhanced students' learning of orthodontic wire- bending skills. Further studies with control group are recommended to investigate the effect of formative assessment on teaching practical dental skills.

Keywords: dental education, flipped classroom, formative assessment, live demonstration, orthodontic wire- bending, teaching method

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234. STUDENTS' PERCEPTION ON FLIPPED CLASSROOM IN CONTRAST TO LIVE DEMONSTRATION FOR TEACHING ORTHODONTIC WIRE-BENDING SKILLS: A FOCUS GROUP STUDY

DR CD1918/0106 (L)

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Objective: This study aimed to explore students' perceptions of flipped classroom (FC) compared to live demonstration (LD) in transferring skills of fabricating orthodontic wire components for orthodontic removable appliances. **Methods:** Forty third-year undergraduate dental students were randomly assigned to two groups: FC ($n = 20$) and LD ($n = 20$). Students in group FC attended FC, while students in group LD attended LD. Both groups underwent a series of standardized teaching sessions to acquire skills in fabricating six types of orthodontic wire components. Eight students (four high achievers and four low achievers) from each group were randomly selected to attend separate focus group discussion (FGD) sessions. Students' perceptions on the strengths, weaknesses, and suggestions for improvement on each teaching method were explored. Audio and video recordings of FGD were transcribed and thematically analyzed using NVivo version 12 software. **Results:** Promoting personalized learning, improvement in teaching efficacy, inaccuracy of three-dimensional demonstration from online video, and lack of standardization among instructors and video demonstration were among the themes identified. Similarly, lack of standardization among instructors was one of the themes identified for LD, in addition to other themes such as enabling immediate clarification and vantage point affected by seating arrangement and class size. **Conclusions:** In conclusion, FC outperformed LD in fostering personalized learning and improving the efficacy of physical class time. LD was more advantageous than FC in allowing immediate question and answer. However, seating arrangement and class size affected LD in contrast to FC.

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235. KNOWLEDGE, PERCEIVED RISK, AND PREVENTIVE BEHAVIORS AMIDST COVID-19 PANDEMIC AMONG DENTAL STUDENTS IN MALAYSIA

IREC 2021-013

Ismail A, Ismail NH, Abu Kassim NYM, Lestari W, Ismail AF, Sukotjo C

Purpose: Coronavirus disease 19 (COVID-19) has affected dental education in Malaysia. However, studies on dental students' knowledge, perception, and behaviors with regards to COVID-19 are very limited. Thus, this study aims to determine the knowledge status, perceived risk, and preventive behaviors of dental students in Malaysia regarding COVID-19. **Methods:** A cross-sectional study was conducted among students from 13 dental schools across Malaysia using online questionnaires. **Results:** From 355 respondents, 93.5% obtained a high score of knowledge of COVID-19. Female respondents scored higher than males in perceived risks and preventive behaviors. Chinese respondents scored highest in knowledge, while Malay respondents had the highest perceived risk score. The mean preventive behavior score did not vary across ethnicity. On-campus students scored higher in knowledge and perceived risk whereas off-campus students practiced more preventive behaviors. Clinical students' knowledge score was higher than preclinical students. Final year students scored higher in knowledge and perceived risk compared to their juniors. **Conclusion:** The majority of dental students have good knowledge and a high perceived risk of COVID-19, and they practiced most of the preventive behaviors. However, the latest information on this disease should be incorporated into dental schools' curriculums and updated periodically.

Keywords: COVID-19; Malaysia; dental education; dental student; knowledge; perceived risk; preventive behavior

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236. THE DENTAL WORKFORCE IN MALAYSIA: DRIVERS FOR CHANGE FROM THE PERSPECTIVES OF KEY STAKEHOLDERS

BDM/12/13-129

Che Musa MF, Bernabé E, Gallagher JE

Introductions: The dental workforce globally is facing unprecedented change as a result of multiple influences including demographic; social; economic; politic and science and technology drivers. There is a need for research informed action in relation to understanding workforce influences, and examining their potential implications and the shape of the future Malaysian dental workforce in relation to population need. **Objective:** The dental workforce is facing unprecedented change globally as a result of multiple influences. There is a need for research informed action to map possible drivers for change at the national level and examine their potential implications in order to shape the dental workforce to serve population needs. The objective of this study was to explore key stakeholders' views on the drivers for change for the Malaysian dental workforce and their potential implications. **Method:** Stakeholders from key dental organisations/professions in Malaysia were purposively sampled and invited to participate in a semi-structured interview (n = 20) using a pre-tested topic guide. Interviews were recorded, transcribed verbatim and analysed using Framework Analysis. **Results:** Drivers for workforce were identified across four main domains: policy-politics; trends in demography; social and economic; and, technology-scientific development. The pace of change and possible interplay between drivers, most notably government policy, liberalisation of education and health services and challenges of workforce governance, followed by Malaysian demography and health trends. Implications for the future, including possible uncertainties, particularly in relation to specialisation and privatisation were identified, together in balancing and meeting public health needs/demands with professional career expectations. **Conclusion:** Stakeholders' views on the high-level drivers for change broadly mirror those of high-income countries; however, specific challenges for Malaysia relate to rapid expansion of dental education and a young workforce with significant career aspirations, together with imbalances in the health care system. The impact of these drivers was perceived as leading to greatest uncertainty around specialisation and privatisation of the future workforce.

Keywords: Dental workforce, drivers for change, key stakeholders, Malaysian, future

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237. AWARENESS OF GENERAL DENTAL PRACTITIONERS TOWARDS ORAL BIOPSY PROCEDURE

IREC 2021-112

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Introductions: Oral biopsy is defined as removal of tissue samples from a living body in order to reach a definitive diagnosis through histopathological examination. It is among the procedures that can be undertake under general dental practitioners (GDP) care, especially for the localised benign lesions. GDP are expected to have a broad knowledge in evaluating oral diseases, managing the common oral lesions and should be able to make a proper referral for cases which are for specialist care. **Objectives:** To assess the awareness of the GDP towards oral biopsy procedures, to evaluate the demographic data and educational background of the GDP and to correlate the findings of awareness and demographic data. **Materials and methods:** Validated online questionnaires using google form were spread among private GDP who were registered with Malaysian Dental Council (MDC) via email and WhatsApp. The data were analysed using SPSS version 25. **Results:** 63 out of 175 respondents answered the questionnaire. 40 were female and 23 were male participants. 79% of respondents were aware of type of lesions requiring biopsy, however only 24% GDP performed biopsy by themselves while 76% of them did not perform biopsy. The most common reasons for not performing biopsy were due to lack of clinical training, lack of experience and theoretical knowledge but no practical skill. **Conclusions:** Majority of GDP were aware regarding oral biopsy procedure, however only few who performed the biopsy by themselves. This is due to lack of training, lack of experience and theoretical knowledge but no practical skills.

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238. FINAL YEAR KULLIYAH OF DENTISTRY DENTAL STUDENTS' PERCEPTIONS AND KNOWLEDGE ON LOUPES

IREC 2021-292

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Introduction: Dental practitioners benefit greatly from the usage of magnification devices in their practices and dental loupes are one of the magnification tools available. It aids in diagnosis making and dental management by providing a clearer view of the operating field. The surgeon's visibility of the operating field is enhanced, thus improving the alignment of the neck and back muscles resulting in reduced risk of developing musculoskeletal disorders. **Aim and objectives:** To study the perceptions and knowledge of the final year dental students on the usage of dental loupes. **Material and methods:** A total of 54 final year dental students of Kulliyah of Dentistry (KOD), International Islamic University Malaysia (IIUM) session 2021/2022 were recruited to be the subjects of this study. A set of questionnaires was distributed via Google Forms after they examined the teeth that were mounted on a phantom head with and without the use of loupes. The data collected was analysed using SPSS software Ver 25. **Results:** A total of 54 students completed the survey with 100% of them agreeing that the use of dental loupes is beneficial for their clinical practices. **Conclusion:** Despite the fact that the majority of students have never used it in a clinical setting, the students know about the use and functions of dental loupes.

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239. KNOWLEDGE OF PALLIATIVE CARE AMONG FINAL YEAR UNDERGRADUATE DENTAL STUDENTS OF UNIVERSITY MALAYA AND THEIR VIEWS ON THE SUBJECT – A PILOT STUDY

DF CD2109/0021 (P)

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Introduction: Palliative care patients require specific dental needs, varying from operative and preventive care to support for emotional requirements. However, some dentists lack the knowledge in treating the patients who are on palliative care. **Aim:** This study aims to determine the knowledge of palliative care among the final year dental undergraduate students of Faculty of Dentistry, University of Malaya (UM), as well as their views on the palliative care teachings in dental undergraduate curriculum. **Materials and Methods:** This was a cross sectional study using a self-administered, online questionnaire on all final year dental undergraduate students in UM. Participants answered 'true' and 'false' questions on their knowledge of palliative care. They also responded on a 5- point Likert scale, ranging from score 1=strongly disagree to 5=strongly agree, for a questionnaire on their views regarding the subject of palliative care. Descriptive statistical analysis was used to analyze the data. **Results:** The questionnaire was sent out to the whole sample of 49 students, which all participated, giving an overall response rate of 100%. The students' knowledge on the definition, aim and common oral conditions in palliative care was satisfactory. However, 65.3% of them failed to understand that palliative care does not postpone death. There were 75.5% of the students who were unable to understand the concept of patient centered communication in palliative care. Also, some of them (30.6%) did not know the correct position when providing oral hygiene care and 36.7% of them did not know that morphine is a common pain control medication in palliative care. Most of the students agreed to have palliative care included as part of their undergraduate syllabus and dentists should be included as part of the palliative care team. **Conclusion:** The study revealed there was inadequate knowledge in certain aspects of palliative care among the students. There is a need to introduce palliative care in dental undergraduate syllabus.

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240. EFFECTIVENESS OF E-LEARNING AND GUIDED CASE-BASED LEARNING AS PERSONALISED LEARNING TOOLS

DF PD1917/0052

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Introduction: Personalised learning is broadly introduced in many institutions as a key strategy to improve student curricular engagement and academic attainment. **Aims:** The purpose of this study is to assess the effectiveness of electronic case-based learning (e-learning) and guided case-based learning (GCBL) as personalised learning methods to facilitate students in achieving the course learning outcomes (CLO). **Material and method:** Forty-nine fourth-year undergraduate dental students were given three lecture series on removable appliances. They were assessed on the subject (T0) by short answer question (SAQ) and modified essay question (MEQ) format. They were given personalised feedback and divided based on their performances to attend similar case-based learning (CBL) classes through personalised teaching methods. The performing group, who achieved the CLO by scoring at least 50%, underwent electronic case-based learning (CBL) tutorial (ET). The non-performing group, who failed to achieve the CLO with less than 50% scores, attended conventional classroom GCBL tutorial (CT). All participants were assessed two weeks after their personalised CBL (T1) and completed a validated self-administered questionnaire. The scores were analysed by paired t-tests. **Results:** The SAQ and MEQ scores improved, which were statistically significant for the overall and MEQ component scores. ET (n=34) performed well at T1 but was not significantly different from T0. However, for CT (n=15), the mean overall score and MEQ component score showed statistically significant improvement ($p<0.05$). The questionnaire had 100% response rate. Students perceived e-learning as flexible, attractive and promoted active learning while GCBL was more personalised, interactive and promoted critical thinking. **Conclusion:** Personalised guided case-based learning may facilitate non-performing students to achieve the CLO. Both teaching methods were well received and catered for the level of performers.

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241. HOW DID THE COVID-19 PANDEMIC AFFECT CLINICAL TRAINING OF MALAYSIAN DENTAL STUDENTS: FINAL YEAR STUDENTS' PERSPECTIVES

Yew H, Dom T, Rani H, Chanthirasekar N, Yin L, Bukhari M, Xin L, Sabri B, Rosdy N, Esa R, Kacharaju KR, Andiesta NS, Parolia A

Background: The national lockdown due to the COVID-19 pandemic implemented by the Government has significantly affected the teaching and learning in dental schools. The reopening of dental school clinics with strict adherence to the standard operating procedures required major adaptations from all parties including students. This study aimed to assess the perspective of dental students on the challenges faced while undergoing clinical training during the COVID-19 pandemic. **Methods:** Ethical approval was obtained from the National University of Malaysia Ethics Committee (JEP-2020-690). Data were collected from fifth-year dental students pursuing undergraduate programs in 13 dental schools in Malaysia using an online questionnaire. The questionnaire was pilot tested prior to distribution. **Results:** The study yielded a response rate of 42.4% (n=313). Female students dominated the total survey (n=237, 75.7%), while 63.2% (n= 198) of responses were received from public universities. Almost all dental students (n=312, 99.7%) believed that the COVID-19 poses risks to dental practitioners. Majority of the students reported they have sufficient knowledge (n=291, 93.0%) and confidence (n=249, 79.6%) in performing their clinical duties. Moreover, most students have opined that they are prepared (n=227, 72.5%) and know (n=275, 87.8%) how to manage infected patients. Positive responses (n=275, 87.9%) were received with regards to their schools' facilities in handling COVID-19. Both clinical supervisors and auxiliary staff were perceived to be able to support their training (n=301, 96.1%). Although a high number of students (n=296, 94.5%) were aware of the COVID-19 guidelines in dental practice, they (n=276, 88.2%) were overwhelmed by the available information regarding the pandemic. A significant proportion of students indicated that the pandemic has affected their ability to complete their clinical requirement (n=277, 88.5%) and their preparedness to be a dentist (n=229, 73.1%). Most respondents (n=268, 85.6%) expressed fear of getting infected from their patients and co-workers. They were also concerned of transmitting the infection to their families (n=300, 95.9%). Likewise, around 92% (n=248) of participants were afraid of getting quarantined from the infection. When in proximity with patients, 66.7% (n=209) students were nervous. Most students (n=302, 95.6%) reported seeing fewer patients in each clinical session and were anxious (n=292, 90%) if they were to provide treatment to patients suspected of being infected. Slightly more than half (n=166, 53.0%) of the students reported having financial impact due to COVID-19 but only 8.9% (n=36) of them would consider a career change. **Conclusion:** Despite the challenges faced by the profession, the graduating dental students appear to be highly self-assured in carrying out their clinical practice. Nevertheless, significant impact was felt on their readiness to become full-fledged dentists. Therefore, a supportive and holistic framework is pertinent to address students' overall well-being while getting through clinical training during an infectious disease outbreak, in preparation for their post-graduation independent practice.

Keywords: Dental Education

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242. IMPACT OF THE SPECIAL CARE DENTISTRY EDUCATION ON MALAYSIAN STUDENTS' ATTITUDES, SELF-EFFICACY AND INTENTION TO TREAT PEOPLE WITH LEARNING DISABILITY

Mohamed Rohani M, Ahmad Fuad N, Ahmad MS, Esa R

Introduction: Special Care Dentistry (SCD) education has been introduced in Malaysia, but there are limited number of studies about its impact to students. Thus, this study aimed to explore the level of students' readiness to treat people with learning disability (PWLD) based on their attitudes, self-efficacy and intention to treat. **Methods:** A questionnaire was developed based on the Dental Student Attitude to the Handicapped Scale, Scale of Attitudes to the Disabled Persons and Health Action Process Approach. The self-administered, validated questionnaire was tested for reliability (Cronbach's alpha = .71-.81), before being distributed to clinical dental students of both genders from two universities (University A, n = 176 and University B, n = 175). Quantitative data were analysed via t test and ANOVA ($p < .05$) using the SPSS software. **Results:** There was no significant difference in mean total attitude score between the universities, although dental students from University A, who mostly reported having received hands-on clinical experience in SCD and exposure to Disability Equality Training (DET), showed significantly higher individual mean attitude score for 5 (out of 24) attitudinal items. The mean total self-efficacy score and individual mean self-efficacy score for 1 (out of 5) self-efficacy items were also significantly higher amongst University A dental students. The intention to treat PWLD was not significantly influenced by university, gender or year of study. **Conclusion:** Incorporation of SCD education in the undergraduate curriculum, with hands-on clinical experience and exposure to DET, is recommended to equip students to be efficient oral healthcare providers for PWLD.

Keywords: attitude, dental education, learning disability, special care dentistry, special needs

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243. DENTAL STUDENTS' PERCEPTION TOWARDS FEEDBACK DURING CLINICAL TRAINING

Nerali J, Chakravarthy Pishipati V, Telang L, Telang A

Background and Aim: Feedback is an essential element in the clinical training of dental students which paves way for the achievement of learning outcomes and also to improve their future performance. The aim of this study was to analyze dental students' perceptions of importance, process, and content of feedback received during their clinical training. **Materials and Methods:** A cross-sectional, questionnaire was developed and validated and distributed to dental students (n = 178) of years 3, 4, and 5. Descriptive analysis and one-way ANOVA were used to compare the mean scores between the three groups. Open-ended responses were analyzed qualitatively. **Results:** The majority of students agreed that feedback on clinical performance is needed to improve learning and identify areas for improvements. Most of the students prefer one-to-one feedback, in a timely and regular manner and immediately after the clinical session. Eighty-six percent believed that feedback should be given with mutual respect. Most of the students disagree (80%) that marks/grades are an important part of the feedback. Students preferred feedback with positive and negative comments about their clinical work (93%), which would help them to engage in the process of learning and to make an action plan for future learning process. **Conclusions:** Students are aware of the purpose and importance of feedback and preferred timely, structured, and constructive feedback on their clinical performance. The dental clinical environment is stimulating and dynamic and the role of faculty feedback is crucial for students to reflect on their learning and improve future performance.

Keywords: Clinical training, constructive, dental students, feedback

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244. PROBLEM-BASED LEARNING IN DENTISTRY, IMPLEMENTATION, AND STUDENT PERCEPTIONS

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Introduction: Problem-based learning (PBL) is one of the most comprehensive and widely accepted student-centered tool for teaching and learning health professions education, wherein students define the problem, establish learning objectives, undergo self-directed learning and facilitate understanding of the problems. This study has been carried out with an aim of assessing 3rd year dental student's perception of PBL as a teaching and learning method over a 5-year period based on problem-solving and self-directed learning, cooperative learning, role of facilitator and product discussion.

Methodology: The perception of 3rd year students from year 2014 to 2018 was assessed at the end of PBL sessions using a self-administered, structured questionnaire. Their responses were recorded using a five point Likert scale and data collected retrospectively was analyzed. Students' open feedback regarding the PBL process was also recorded and analyzed. **Results:** A total of 376 participants responded to the questionnaire (female = 250 [65%], male = 126 [35%]). Majority of students agreed that PBL improved problem-solving skill, self-directed learning and perceived that it had a positive impact on cooperative learning. Students also felt that PBL product discussion prepared them for future presentation and helped to clarify concepts. **Conclusion:** The results suggested that students had a positive attitude toward PBL and it improved their problem-solving skills as well as motivated them to learn and participate actively. Some students felt that PBL was time consuming, yet it was a fun and interesting way to learn.

Keywords: Dental students, health professions, perception, problem-based learning

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245. RELATIONSHIP BETWEEN THE SENSE OF COHERENCE, SELF-DIRECTED LEARNING READINESS, AND ACADEMIC PERFORMANCE IN MALAYSIAN UNDERGRADUATE DENTAL STUDENTS

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Background: Stress and low psychological well-being among students in higher education impact their academic performance. The purpose of this study was to determine the relationship between SOC, SDLR, and academic performance in year 3, 4, and 5 undergraduate dental students. **Materials and methods:** Two hundred and ten students completed a validated questionnaire on SOC and SDLR. The percentage of marks obtained by these students in their year-end examination was used as their academic performance. The SOC scores were further divided into three hierarchical clusters using cluster analysis. The data were analyzed to determine the difference in the SDLR scores and academic performance among the three clusters. Furthermore, the relationship between SOC scores, SDLR scores, and academic performance was assessed. **Results:** The SDLR scores significantly increased from the low SOC cluster to the high SOC cluster ($P = 0.026$). However, there was no significant change in academic performance. A positive relationship was found between the SOC and the academic performance ($R = +0.025$; $P > 0.05$). The SDLR had a significant positive relationship with both SOC and academic performance ($R = +0.27$; $P < 0.001$). **Conclusion:** Although SOC may not have a direct influence on academic performance, SDLR can play an intermediary role. Early identification and timely intervention in students with a weak SOC and low SDLR can have a beneficial influence on their academic life.

Keywords: Academic performance, Malaysia, dental students, self-directed learning, sense of coherence

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246. FIELD POSTING – WORK BASED LEARNING IN DENTAL EDUCATION

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Workplace-based learning (WBL) is a vital component of the training and education of healthcare professionals and learning in the workplace enables students to learn knowledge, skills, and aptitudes required in their professional practice. This study aimed to evaluate final year dental students' field posting visit to The Ministry of Health (MOH) facilities to observe and learn how the principles of primary health care are being applied. A cross-sectional survey was carried out for final year students who completed their field posting visit to MOH centers in Malaysia. A pretested and validated questionnaire based on the Likert scale range from 1 - 5 (Scale 1 -highly disagree and scale 5 - highly agree) was distributed to the students. Data collected were analyzed using SPSS software. The mean value range was from (3.38 - 4.26) for all 8 items questions. Overall students agreed that field posting was well organized (70%), enhanced knowledge in health care services provided in MOH (95%), helped to understand future clinical practice in MOH (89.5%), and less than fifty percent agreed that health care services were accessible, available, acceptable and affordable to public (48.8%). The overall students' experience with field posting visit to MOH centers showed a positive attitude and had able to understand the health care facilities provided in MOH, Malaysia.

Keywords: Work Based Learning, Field Posting, Health Care Services

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247. EVALUATING THE PERFORMANCE OF DENTAL STUDENTS WITH DIFFERENT LEVELS OF CLINICAL EXPERIENCE IN LEARNING ICDAS

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Aim: This study aimed to evaluate the dental students' performance in ICDAS (International Caries Detection and Assessment System) coding with different levels of clinical experience. **Materials and methods:** Dental students (n = 122) in their clinical years, year 3 (n = 37), year 4 (n = 44), and year 5 (n = 41) received training (two-hour introductory lecture on ICDAS, followed by a 90 min e-learning video, and practice sessions using extracted teeth and photographs) from a calibrated expert. After training, the students examined a prevalidated set of extracted teeth and assigned scores in two sessions. The intra- and inter-examiner agreement between students was analyzed using weighted kappa statistics and a focus group discussion was conducted for qualitative feedback. **Results:** The range of kappa values for intra-examiner agreement among the year 3, 4, and 5 students for ICDAS caries code (0.611-0.879, 0.633-0.848, and 0.645-1.000) and restoration code (0.615-0.942, 0.612-0.923, 0.653-1.000), respectively. The range of kappa values for inter-examiner agreement for year 3, 4, and 5 students with a trained expert for ICDAS caries code (0.526-0.713, 0.467-0.810, and 0.525-0.842) and restoration code (0.531-0.816, 0.682-0.842, and 0.645-0.928), respectively. **Conclusion:** The ICDAS system is a promising tool for caries detection and its implementation in the curriculum was perceived by dental students as an effective method. In general, there was moderate to substantial agreement for ICDAS caries and restoration code between students of different academic year groups and with a trained ICDAS expert. **Clinical significance:** ICDAS is a simple, logical, and evidence-based system for the detection and classification of caries. Introducing ICDAS to dental students enables them to detect caries in a reliable and reproducible manner irrespective of their past clinical experience and also significantly improves their caries detection skills.

Keywords: Caries detection, Dental students, ICDAS Training

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248. ANTIMICROBIAL STEWARDSHIP – IMPLEMENTATION AND IMPROVEMENTS IN ANTIBIOTIC-PRESCRIBING PRACTICES IN A DENTAL SCHOOL

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Background and Aim: Antimicrobial stewardship (AMS) is a coordinated systematic approach aimed at educating prescribers to follow evidence-based prescription practice to reduce misuse of antimicrobials and thus antimicrobial resistance (AMR). We aimed to improve the standards of antimicrobial prescribing in a dental school by implementing AMS. **Materials and Methods:** A retrospective (first) clinical audit of antibiotic prescriptions (n = 200) over a 6 months' period was analyzed for the following parameters: type of antibiotic, clinical condition, compliance to national guidelines, and errors in prescriptions. In response to the results of this audit, an educational intervention workshop was conducted for clinical faculty. A validated self-administered questionnaire on perception and practice of antimicrobial prescribing was given to participants (n = 31) before and after the workshop and t-test was used to compare the mean scores of responses. Prospective clinical audits were conducted 6 months (second) and 1 year (third) after the workshop assessing the same parameters. A Strengths, Weaknesses, Opportunities, and Threats analysis of the AMS program was also done. **Results:** The total number of prescriptions issued was 943 in the first audit, which reduced to 552 in the second audit and further to 435 in the third audit. The most commonly prescribed antibiotic was a combination of amoxicillin and metronidazole. The percentage of prescriptions in accordance with national guidelines improved from 19% during the first audit to 54% and 79% in the subsequent audits. The percentage of erroneous prescriptions was 23% in the first audit, which reduced to 12% in the second audit and 9% in the third audit. The pre- and posttest mean values of the questionnaire when compared suggested that there is a need for uniformity in prescribing antimicrobials. **Conclusions:** Clinical audits with educational workshops on appropriate use of antibiotics have a positive impact on conforming with prescription guidelines. This will encourage the rational prescription of antibiotics based on clinical needs of patients, thus contributing to the fight against AMR.

Keywords: Antibiotics, antimicrobial resistance, antimicrobial stewardship, clinical audit, dentistry

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249. PROBLEM-BASED LEARNING IN DENTISTRY, IMPLEMENTATION, AND STUDENT PERCEPTIONS

Nerali JT, Telang LA, Telang A, Chakravarthy PV

Introduction: Problem-based learning (PBL) is one of the most comprehensive and widely accepted student-centered tool for teaching and learning health professions education, wherein students define the problem, establish learning objectives, undergo self-directed learning and facilitate understanding of the problems. This study has been carried out with an aim of assessing 3rd year dental student's perception of PBL as a teaching and learning method over a 5-year period based on problem-solving and self-directed learning, cooperative learning, role of facilitator and product discussion. **Methodology:** The perception of 3rd year students from year 2014 to 2018 was assessed at the end of PBL sessions using a self-administered, structured questionnaire. Their responses were recorded using a five point Likert scale and data collected retrospectively was analyzed. Students' open feedback regarding the PBL process was also recorded and analyzed. **Results:** A total of 376 participants responded to the questionnaire (female = 250 [65%], male = 126 [35%]). Majority of students agreed that PBL improved problem-solving skill, self-directed learning and perceived that it had a positive impact on cooperative learning. Students also felt that PBL product discussion prepared them for future presentation and helped to clarify concepts. **Conclusion:** The results suggested that students had a positive attitude toward PBL and it improved their problem-solving skills as well as motivated them to learn and participate actively. Some students felt that PBL was time consuming, yet it was a fun and interesting way to learn.

Keywords: Dental students, health professions, perception, problem-based learning

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250. BALANCING ASSESSMENT OF DEPTH AND BREADTH IN THE DENTAL CURRICULUM: A BI-DIMENSIONAL ASSESSMENT STRATEGY

Ramachandra SS, Western JS, Muttalib KA

Introduction: Integrated curricula are being increasingly adopted in health professions, owing to their advantages including patient-centred training and development of critical thinking. Similarly, the majority of dental Universities have either moved away from discipline-specific towards integrated curricula or have incorporated elements of integration. Despite several advantages offered by the integrated curriculum, one disadvantage is failure to assess depth of knowledge. Assessing the depth of knowledge is a characteristic of discipline-specific curriculum. This commentary describes the inclusion of both discipline-based and integrated assessments at Faculty of Dentistry, SEGi University, Malaysia. **Material And Methods:** Module tests (discipline-based assessments) comprising of discipline specific questions are conducted at the end of every term, mimicking the traditional discipline-specific assessment. Questions in the module tests are intended to assess the depth of knowledge of students. Mid semester examinations are conducted at the end of the semester, mimicking the integrated assessment. Integrated questions are intended to test the breadth of knowledge of students. **Results:** Lecturers and students felt introduction of module tests, helped them to prepare for topics in a phased manner and better answer questions posed by lecturers during case discussions and clinical presentations. The 'borderline distinction' students felt that studying for module tests provided them with the depth of knowledge essential to answer questions during viva voce. **Discussion:** Including both the traditional and integrated methods of assessments would engage students in a learning experience developing their breadth and depth of knowledge. Further prospective research is essential to assess the impact of this assessment strategy.

Keywords: Breadth, Dental curriculum, Depth, Integrated, Traditional

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251. PERCEPTION AND ATTITUDE REGARDING THE RELEVANCE OF TOOTH MORPHOLOGY CARVING EXERCISES: A MALAYSIAN UNDERGRADUATE DENTAL STUDENTS PERSPECTIVE

Pandarathodiyi AKI, Priyadarshini H, Daud S, Islam MN, Monerasinghe E

There is a growing consensus among experts that tooth carving exercises have become obsolete with ostensibly no place for them in the modern dental curriculum. Although many reasons have been cited in support of this argument, a sizable majority approve the idea of tooth carving being an integral part of the dental curriculum. In grappling with this conundrum, it was ascertained that there is a lack of studies on the students' perspective about the relevance of tooth carving exercises in Malaysia. To assess the perception and attitude of Malaysian dental undergraduates towards tooth carving exercises and its relevance in the practical and clinical setting. A cross-sectional study was undertaken among years 3 to 5 dental undergraduate (UG) students from 13 dental schools in Malaysia. A questionnaire was adopted from previous studies with permission. The survey was disseminated electronically via google forms and data was analyzed using SPSS 22 and presented as percentage. About 75% of the students agreed that tooth carving exercises helped them identify and reproduce the morphology of teeth in lab and clinical settings and differentiate normal from anomalous teeth. However more than 90% of the students believed that computer aided 3D software would help them learn tooth carving more effectively. Overall, 71% of them felt that tooth carving exercises were useful. Tooth carving exercises are perceived as useful and add value to dental anatomy learning. However, to make the exercises more appealing to the students, implementation of alternate teaching methods, is recommended.

Keywords: Attitude, dental anatomy, perception, tooth carving, undergraduates

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252. CASE SHARING—AN APPROACH FOR IMPROVING CLINICAL EXPERIENCE TO CASES OF ADVANCED COMPLEXITY AMONG UNDERGRADUATE DENTAL STUDENTS

Ramachandra SS, Gupta VV, Abd Muttalib K

Introduction/Problem: Clinical experience in cases of advanced complexity/rare cases is limited among undergraduate dental students. This commentary narrates a module termed “case sharing”, wherein a small group of undergraduate dental students treat/assist, document and present advanced or rare cases to their entire cohort in eight weeks. **Approach:** Undergraduate students perform procedures of straightforward and moderate complexity, and later assisted the clinical specialists during procedures of advanced complexity. Students document these cases with clinical photographs and case notes to make presentations that were uploaded in the faculty’s online management system to be reviewed by the entire cohort. Student groups presented their cases with their entire cohort. An independent assessor assessed the groups for their organization of the case, information collected on the topic, critical analysis of the case, defending the diagnosis and treatment plan, teamwork and presentation skills. **Evaluation:** Students reported improvement in the depth of knowledge on particular diseases/procedures, a better understanding of holistic management of advanced cases, improved rapport, team spirit and communication among group members. They also reported difficulties in recruiting and completing the procedures within eight weeks. **Discussion:** Apart from improving the clinical experience of undergraduate students, the module provides an opportunity for the development of teamwork, communication skills, and ethical presentations among students, which are invaluable to the faculty to meet its programme learning outcomes. Case sharing provides a platform for holistic learning and serves as an alternative learning method aside from didactic lectures and routine clinical supervision.

Keywords: Advanced complexity, Case sharing, Clinical experience, Teamwork

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253. EFFECTIVENESS OF ONLINE PEER ASSISTED LEARNING AS A TEACHING METHODOLOGY FOR DENTAL UNDERGRADUATE STUDENTS

Veerabhadrapa SK, Ramalu DS, Jin EYS, Lyn FS, Valautham D, Ramamurthy PH, Zamzuri ATB, Yadav S

Introduction: Peer-assisted learning (PAL) has been extensively used in professional courses. However, its effectiveness as an adjunct to teacher-assisted learning (TAL) has not been evaluated. The objective of this study was to evaluate the effectiveness of Online PAL as an independent teaching methodology and as an adjunct to TAL, for dental students. **Methods:** Forty BDS year 3 students were divided into 2 groups of 20 each. Four year 5 students were chosen as tutors to teach 4 different topics using the Microsoft teams platform. The study was conducted in two parts. At first, two topics were taught to one group by the tutor (peer-led group) and the other group, by a teacher (teacher-led group). Next, the remaining two topics were taught to both groups by the teacher initially. This was followed by repeated teaching of the topics to peer-led group by tutors, while other group did self-study. Students' perception and performance scores were compared using an independent sample t-test for all the topics. **Results:** The mean performance scores in the teacher-led group for topics 1 and 2 were 86.15 and 90.22, whereas scores in the peer-led group were 75.38 and 79.21 which was statistically significant ($p < 0.05$). The mean scores in the teacher-led group for topics 3 and 4 were 71.82 and 65.42, whereas in the peer-led group as an adjunct to TAL were 84.55 and 82.50. This was statistically significant ($p < 0.01$). **Discussion:** Online PAL as an adjunct to teacher-assisted learning can be useful for teaching dental undergraduate students.

Keywords: Dental, Peer-assisted learning, Learning, Teaching

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254. IMPACT OF COVID-19 ON PERCEPTION AND PREPAREDNESS AMONG CLINICAL YEAR MALAYSIAN UNDERGRADUATE DENTAL STUDENTS – A CROSS-SECTIONAL STUDY

Rath A, Zheng MWL, Pannuti CM

This study aimed to evaluate how quarantine affected final-year dental students' self-perceptions of preparation and assess how online training affected clinical students' education at SEGi University. Year 3 to 5 students (n=140) were asked to fill up an online questionnaire. The first part included the effects of online education experience between the academic years. The second section assessed the graduating class's self-perceived readiness in cognitive, communication and professional abilities. The Chi-square test was used to analyse the association between the groups regarding academic years, gender, and family income. Year 3 students missed educational experiences during lockdown significantly more than years 4 and 5 ($p < 0.001$). In addition, 86% of year 5 students ($p < 0.001$) felt that online assessment was not a suitable evaluation method compared to the other clinical years. About two-thirds of the 5th year dental students were unsure of their confidence in their skills before graduation. Around half of the final-year students said they were unsure about starting their practice following graduation. After graduation, 80% of respondents preferred to spend a year in residence with sufficient training. Although students' self-perceived preparation was generally positive, they expressed reservations about the independent practice after graduation.

Keywords: dental education, COVID-19, undergraduate, online, Malaysia, Educational Technology

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255. TEN MAXIMS FOR CREATING A SAFE LEARNING ENVIRONMENT

Prashanti E, Ramnarayan K

To foster a milieu in which student learning can be optimum, teachers need to be aware of the attributes of a safe learning environment. This is the space created in the students' minds to seamlessly promote learning. The 10 maxims, presented in this paper, are the cornerstones, nay, the capstones, for making this happen.

Keywords: maxims, medical education, safe learning environment, student-teacher relationship

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256. INSIGHTS INTO DISASTER MANAGEMENT SCENARIO AMONG VARIOUS HEALTH-CARE STUDENTS IN INDIA: A MULTI-INSTITUTIONAL, MULTI-PROFESSIONAL STUDY

Rajesh G, Binnal A, H Pai MB, Nayak SV, Shenoy R, Rao A

Background: The frequency of occurrence of disasters is on the rise all over the world. Workforce shortage can be a major impediment toward efficient disaster management. Incorporation of other health-care workers along with conventional medical personnel might be critical for efficient and effective management of disasters. **OBJECTIVE:** The objective of this study was to assess various aspects pertaining to disaster management among various health-care students in India. **Methods:** Final-year students pursuing medicine, dentistry, nursing, physiotherapy, pharmacy, Ayurveda, and homeopathy at various institutions in Mangalore, India, were the study participants. Participants' willingness to partake in disaster management and knowledge, attitude, behavior, and perceived effectiveness pertaining to disaster management was ascertained by a questionnaire method. Their previous history of training and familiarity with standard operating procedures was assessed. **Results:** A total of 437 students belonging to seven health-care institutions participated in the study. Overall, 98.40% of the participants were willing to partake in disaster management. The mean knowledge, attitude, behavior, and perceived effectiveness scores were 49.19%, 81.75%, 47.28%, and 66.20%, respectively. Step-wise multiple linear regression analysis revealed that course ($\beta = 0.247$, $P < 0.001$), attitude ($\beta = 0.154$, $P = 0.001$), and behavior ($\beta = 0.284$, $P < 0.001$) were significant predictors of perceived effectiveness. **Conclusions:** Participants in the present study revealed that they were willing to partake in disaster management. The participants also reported poor behavior and knowledge scores but appropriate attitude scores. The present study highlights the need for curriculum changes and policy implications for effective integration of various sectors for disaster management, particularly in developing nations such as India, which have a definite scarcity of resources.

Keywords: Curriculum changes, health-care professionals, public health emergencies, willingness to participate

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257. INFORMATION RETRIEVAL AND AWARENESS ABOUT EVIDENCE-BASED DENTISTRY AMONG DENTAL UNDERGRADUATE STUDENTS—A COMPARATIVE STUDY BETWEEN STUDENTS FROM MALAYSIA AND FINLAND

Nieminen P, Uma E, Pal S, Laitala ML, Lappalainen OP, Varghese E

Background: A fundamental skill in education includes the ability to search for, evaluate, and synthesize information, and this cannot be underestimated in dental education. The aim of this study was to assess how dental students from Malaysia and Finland acquire scientific information and to compare their information retrieval skills. **Methods:** Fourth and fifth-year dental students from Malaysia and Finland were invited to participate. A self-administered structured questionnaire including items about the use of information sources, subjective assessment of literature retrieval skills and knowledge was used. **Results:** A total of 226 dental students participated in the survey: 131 from Malaysia and 95 from Finland. In both countries, the highest interest for data retrieval among students was found in the oral surgery specialty. The three most used sources of information among Malaysian students were personal lecture notes, dental textbooks, and colleagues; while Finnish students used colleagues, lecture notes, and current clinical guidelines. Students' knowledge of evidence-based practice was inadequate in both student groups. Though the majority of participants reported that they had good or passable skills in literature retrieval, more students from Finland judged themselves to have at least good skills compared to those from Malaysia. **Conclusion:** Dental education in both countries includes information retrieval studies and mandatory research projects. However, students did not often use those sources that are considered essential in evidence-based dentistry. Universities should further develop educational and training interventions that guide students to use knowledge resources more effectively for critically appraising scientific evidence.

Keywords: Finland, Malaysia, clinical appraisal, dental students, evidence-based dentistry, literature retrieval

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258. APPLICATION OF A NEW SYSTEM FOR CLASSIFYING ROOT CANAL MORPHOLOGY IN UNDERGRADUATE TEACHING AND CLINICAL PRACTICE: A NATIONAL SURVEY IN MALAYSIA

Ahmed HMA, Che Ab Aziz ZA, Azami NH, Farook MS, Khan AA, Mohd Noor NS, Ayoub AA, Imran ZA, Halim MS, Pai ARV, Kacharaju KR, Mohammad N, Nagendrababu V, Nabhan MS, Dummer PMH

Aim: To evaluate and compare the feedback of final year undergraduate dental students in eight Malaysian dental schools on the application of a new system for classifying root canal morphology in teaching and clinical practice. **Methods:** One PowerPoint presentation describing two classification systems for root canal morphology (Oral Surgery Oral Medicine Oral Pathology, 1974 38, 456 and its supplemental configurations, International Endodontic Journal 2017, 50, 761) was delivered to final year undergraduate dental students in eight dental schools in Malaysia by two presenters (each presented to four schools). To examine students' feedback on the utility of each system, printed questionnaires consisting of six questions (five multiple choice questions and one open-ended question) were distributed and collected after the lecture. The questionnaire was designed to compare the classification systems in terms of accuracy, practicability, understanding of root canal morphology and recommendation for use in pre-clinical and clinical courses. The exact test was used for statistical analysis, with the level of significance set at 0.05 ($P = 0.05$). **Results:** A total of 382 (out of 447) students participated giving a response rate of 86%. More than 90% of students reported that the new system was more accurate and more practical compared with the Vertucci system ($P < 0.001$). Overall, 97% of students reported the new system helped their understanding of root and canal morphology compared with the Vertucci classification ($P < 0.001$). Over 97% of students recommended the use of the new system in teaching, pre-clinical courses and clinical practice ($P < 0.001$). Except for two schools, no significant difference was detected between the responses of students for all questions at the different schools ($P > 0.05$). The students' responses for all questions were almost similar for both presenters ($P > 0.05$). **Conclusions:** The new system of International Endodontic Journal 2017, 50, 761 for classifying root and canal morphology was favoured by final year undergraduate dental students in Malaysia. The new system has the potential to be included in the undergraduate endodontic curriculum for teaching courses related to root and canal morphology.

Keywords: classification, education, root canal morphology, students, survey, teaching

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259. ACADEMIC PROCRASTINATION AND SELF-EFFICACY AMONG A GROUP OF DENTAL UNDERGRADUATE STUDENTS IN MALAYSIA

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Background: Undergraduate dental students have to do multiple tasks as part of their extensive curriculum in order to achieve the proficiencies expected of them. During the course of their study, a tendency to procrastinate and question their self-efficacy is detrimental for the students. The aim of this study was to evaluate the level of procrastination and self-efficacy and its related factors among dental undergraduate students. **Subjects And Methods:** This cross-sectional study was conducted among all (n = 361) consented dental undergraduate students of our dental school. A twenty-item Lay's Procrastination Scale for student population and a ten-item General Self-Efficacy Scale were used for the study after getting institutional ethical approval. The quantitative data were explained using descriptive statistics. Independent sample t-test and ANOVA were used to determine the association between self-efficacy, academic procrastination, and genders and academic years. Pearson correlation coefficient was used to determine the association between self-efficacy and procrastination. Multiple linear regression analysis was performed to determine the related factors to academic procrastination. **Results:** High procrastination (score ≥ 62) was seen among 28.5% of students. The mean self-efficacy score was 29.5. There was no significant difference between genders for procrastination scores ($P = 0.835$) and between academic years ($P = 0.226$). Males showed significantly more self-efficacy ($P < 0.001$), and self-efficacy did not show any significant difference ($P = 0.204$) between academic years though a tendency for year 5 students to have lower self-efficacy scores was observed. Academic procrastination was negatively correlated with self-efficacy ($r = -0.238$ and $P < 0.001$). **Conclusions:** For dental undergraduates who have cognitive load as well as work associated with patients, procrastination and self-efficacy are negatively correlated.

Keywords: Dental students, procrastination, self-efficacy, undergraduates

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260. TEN MAXIMS FOR OUT OF CLASS LEARNING TO OUTCLASS THE ACADEMIC CHALLENGES OF COVID-19

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Responding to the COVID-19 pandemic, universities world over are aggressively moving their learning, teaching and assessment to online platforms. Educators suddenly feel unsettled, unprepared and unsupported. This inevitable segue from a traditional to online environment will need faculty to grapple quickly and efficiently with the technological imperatives. The purpose of this article is to present ten maxims to navigate the academic challenges posed by out of class learning. The article includes a user-friendly checklist to facilitate the blooming of online teachers.

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DOMAIN 4

Traditional and Complementary Medicine (TCM) in Oral Healthcare



261. MANGROVE ETHANOL EXTRACT (*AEGICERAS CORNICULATUM*) FAILED TO INHIBIT *CANDIDA ALBICANS* GROWTH ISOLATED FROM ORAL CANDIDIASIS HIV/AIDS PATIENT *IN VITRO*

Saputra G, Nugraha AP, Rosari FS, Budhy TI, Ernawati DS, Sibero MT et al.

Introduction: *Candida albicans* species can cause severe morbidity and mortality in Human Immunodeficiency Virus (HIV) patients when they become systemically involved, known as candidemia. Mangrove (*Aegiceras corniculatum*) is a plant that is commonly distributed and has been shown to have several advantages to be used as phytotherapy. **Objective:** To investigate the anti-fungal ability of Mangrove Ethanol Extract (MEE) (*A. corniculatum*) to *Candida albicans* isolated from Oral Candidiasis HIV/AIDS patient *in vitro*. **Materials and Methods:** The fresh mangrove leaf (*A. corniculatum*) was extracted by means of maceration methods. There were 5 groups, each with 4 samples: (1) control negative group (2) control doxycycline group, (3) MEE (*A. corniculatum*) concentration 25%, (3) 50% concentration group, (4) 75% concentration group, and (5) 100% concentration group. *C. albicans* isolated from stadium HIV/AIDS patients who were assessed clinically but did not seek fungal infection therapy. Sabouraud dextrose agar (SDA) containing the tested *C. albicans* suspension was poured into a petri dish around the paper disk. Observation of the inhibition zone around the well and then measuring the diameter of the inhibition zone horizontally and vertically using a digital scale ruler. **Results:** It was discovered that 100%, 75%, 50%, and 25% MEE (*A. corniculatum*) had no antifungal efficacy against *C. albicans* isolated from HIV/AIDS with no significant difference in inhibitory zone ($p>0.05$). **Conclusion:** MEE (*A. corniculatum*) did not have an inhibitory zone against *C. albicans* isolated from HIV/AIDS patients *in vitro*.

Keywords: Dentistry, infectious disease, medicine, communicable disease, HIV/AIDS

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262. ANTI-PERIODONTOGENIC ABILITY OF MANGROVE LEAVES (*AEGICERAS CORNICULATUM*) ETHANOL EXTRACT: *IN SILICO* AND *IN VITRO* STUDY

Nugraha AP, Sibero MT, Nugraha AP, Puspitaningrum MS, Rizqianti Y, Rahmadhani D, Kharisma VD, Ramadhani NF, Ridwan RD, Noor TNEBTA, Ernawati DS

Objective: Mangrove (*Aegiceras corniculatum*) is an abundant natural marine resource of Indonesia, which can be explored for treating periodontal disease due to its potential as immunoregulatory, antibacterial, and antioxidant properties. The objective of this study was to investigate the active compound from Indonesian mangrove leaf extract (*A. corniculatum*) (MLE) for developing a herbal-based mouthwash through *in silico* and *in vitro* studies. **Materials and methods:** Phytochemistry and liquid chromatography-high resolution mass spectrometry (LC-HRMS) were done to explore the active compounds in MLE. Chemistry screening and interaction, absorption, distribution, metabolism, and excretion (ADME), molecular docking simulation, and visualization of MLE active compounds as anti-inflammatory, antioxidant, and antibacterial were investigated *in silico*. The inhibition zone of MLE against *Aggregatibacter actinomycetemcomitans* (Aa), *Porphyromonas gingivalis* (Pg), and *Fusobacterium nucleatum* (Fn) as periodontopathogenic bacteria was performed by diffusion method. Doxycycline 100 mg was used as a positive control, as a treatment group, there were five groups, namely 0%, 25%, 50%, 75%, and 100% MLE. **Results:** Alkaloid, saponin, flavonoid, triterpenoid, steroid, tannin, and quinone were detected in MLE. A high concentration of (-)-epicatechin and coumaric acid (CA) were found in MLE. MLE in 100% concentration has the most effective ability to inhibit Fn, Pg, Aa growth *in vitro*. (-)-Epicatechin has a higher negative binding affinity than CA that can enhance heat shock protein (HSP)-30, HSP-70, HSP-90, interleukin-10, and FOXP3 and also inhibit interleukin-6, peptidoglycan, flagellin, and dectin *in silico*. **Conclusion:** MLE of *A. corniculatum* has antioxidant, anti-inflammatory, and antibacterial activities that can be a potential raw material for developing a herbal-based mouthwash.

Keywords: mangrove leaf extract, human health, good health and well-being, medicine, dentistry

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263. POTENTIAL OF CURCUMIN-QUERCETIN LOADED NANOSTRUCTURED LIPID CARRIERS AS ORAL SQUAMOUS CELL CARCINOMA ADJUVANT THERAPY BY DOWNREGULATING AKT/PI3K SIGNALING PATHWAY

Nugraha AP, Yudianto DO, Anwar AA, Purnamasari AE, Mappananrang RA, Faradilla N, Luthfi M, Noor TN, Nugraha AP, Nugraha AP

Introduction: Oral squamous cell carcinoma (OSCC) is an oral epithelial neoplasm with worldwide prevalence of 95% among all oral malignancies. Therapy of OSCC include radiation, chemotherapy, and surgery but causes subsequent cell death, ineffective long-term therapy, and infection risk at surgical site. Curcumin-quercetin is flavonoid derived from *Curcuma longa* and *Allium cepa* that can induce apoptosis and inhibit cells metastasis. Combination of curcumin-quercetin has low solubility hence encapsulated by nanoparticle is necessary. Nanostructured lipid carriers (NLCs) can enhance loading capacity and improve stability of curcumin-quercetin, biocompatible, and enhance site-specific targeting efficiency. Administration of combination of curcumin-quercetin loaded nanostructured lipid carrier by injection targeting OSCC cell. **Objectives:** To analyze the potency of curcumin-quercetin loaded NLCs as OSCC therapy by downregulating AKT/PI3K signaling pathway. **Discussion:** Curcumin-quercetin loaded NLCs are injected into the body then reach the target cells. This combination later would be encapsulated releasing curcumin-quercetin. Curcumin-quercetin suppresses the AKT/PI3K signaling pathway which is considered as strong cell cycle inductor, inhibitor of pro-apoptotic proteins expression, and has a pivotal role in OSCC metastasis. Inhibition of the pathway decreases the expression of cyclin A/D/E and manifests in the G1/G2/M phase arrest. This condition accompanied by p53 and FOXO-1 expression leads to apoptosis. Downregulating of this pathway decreases NF- κ B expression then the expression of MMP-2/9 is lowered and manifests in inhibition of extracellular matrix degradation. This condition leads to migration and metastasis inhibition. **Conclusion:** Curcumin-quercetin loaded NLCs is potential for OSCC therapy by downregulating AKT/PI3K signalling pathway.

Keywords: Herbal, Medicine, Cancer, non-communicable disease, dentistry

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264. ANTI-CANCER EFFECTS OF *EURYCOMA LONGIFOLIA* JACK DICHLOROMETHANE ROOT EXTRACT ON NASOPHARYNGEAL CARCINOMA CELL LINE

Kajahmohideen NH, Razi SN, Faisal GG, Ashour AE, Kusumawardani A, Makky EA, et al.

Background: *Eurycoma longifolia* (*E. longifolia*) or Tongkat Ali is a tree that grows in southeast Asia, the roots of which contain bioactive components that exhibit cytotoxic properties against various cancer cell lines. However, no study has been conducted to relate the cytotoxic properties against nasopharyngeal carcinoma (NPC), a type of cancer that shows poor prognosis for metastatic disease. The purpose of this study was to determine whether the *E. longifolia* root extract exerts cytotoxic activity against nasopharyngeal carcinoma (ORL-115) cell lines. **Materials and method:** *E. longifolia* root extracts were obtained through Soxhlet extraction method and by using two different solvents; ethanol and dichloromethane. MTS assay was used to evaluate the cytotoxic effect of the root extracts against ORL-115 cell line for three different incubation time which were 24-hour, 48-hour and 72-hour. **Results:** Ethanol extract was significantly more potent compared to DCM extract. Ethanol extract exhibited lower IC₅₀ value compared to DCM extract. The IC₅₀ of ethanol extract were 232.1 µg/ml, 66.86 µg/ml and 42.6 µg/ml. Meanwhile the IC₅₀ of DCM extract were 678.87 µg/ml, 136.71 µg/ml, 73.72 µg/ml for 24-hour, 48-hour and 72-hour incubation period respectively. The cytotoxic activity of both extracts increased as the incubation time prolonged. The cytotoxic activity of ethanol extract at each incubation time was significantly different from DCM extract except at 72 hours. **Conclusion:** *E. longifolia* root extracts exerted cytotoxic activity against the nasopharyngeal carcinoma (ORL-115) cell line. Ethanol extract exhibited lower IC₅₀ value compared to DCM extract. The cytotoxic activity of both extracts were dose dependent and time dependent.

Keywords: *E. longifolia*, Cytotoxic activity, Nasopharyngeal carcinoma

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265. SYNBIOTIC *MUSA ACUMINATA* SKIN EXTRACT AND *STREPTOCOCCUS SALIVARIUS* K12 INHIBIT *CANDIDA* SPECIES BIOFILM FORMATION

Rismayuddin NAR, Badri PEAM, Ismail AF, Othman N, Bandara HMHN, Arzmi MH

This study aimed to determine the effect of synbiotic *Musa acuminata* skin extract (MASE) and *Streptococcus salivarius* K12 (K12) on *Candida* species biofilm formation. Liquid chromatography quadrupole time-of-flight (LC-Q-TOF-MS) was conducted to characterize MASE. To determine the effect of synbiotic on *Candida* biofilm, 200 µL of RPMI-1640 containing *Candida*, K12, and MASE were pipetted into the same well and incubated at 37 °C for 72 h. A similar protocol was repeated with K12 or MASE to determine the probiotic and prebiotic effects, respectively. Dimorphism, biofilm biomass, and *Candida* total cell count (TCC) were determined. A total of 60 compounds were detected in MASE. *C. albicans* (ALT5) and *Candida lusitanae* exhibited the highest reduction in biofilm biomass when co-cultured with prebiotic ($77.70 \pm 7.67\%$) and synbiotic ($97.73 \pm 0.28\%$), respectively. All *Candida* spp. had decreased TCC and hyphae when co-cultured with synbiotic. In conclusion, MASE and K12 inhibit *Candida* biofilm formation.

Keywords: *Candida* species, *Musa acuminata*, *Streptococcus salivarius*, biofilm, prebiotic, symbiotic

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266. EVALUATION OF ANTIMICROBIAL EFFECT OF MALAYSIA GEOPROPOLIS WITH *ALOE VERA* AGAINST *ENTEROCOCCUS FAECALIS* TO BE USED AS AN INTRACANAL MEDICAMENT IN ENDODONTICS

Ismail IH, Al-Bayaty FH, Yusof EM, Khan BSG, Hamka FA, Azmi NA

Introduction: *Enterococcus faecalis* can be found in failed endodontic treatment (FET) even after performing primary endodontic treatment (PET). Calcium hydroxide [Ca(OH)] cannot fully eliminate this microorganism during PET. Brazilian green propolis (bee glue) was found to be more effective against *E. faecalis* when compared to Ca(OH)₂. A much less studied Malaysian geopropolis (MP) as well as *Aloe vera* (AV) is antibacterial but is unknown against *E. faecalis*. **Objectives:** The objective of this study is to determine the antimicrobial effects of MP, AV, and MP + AV in comparison with Ca(OH)₂ against *E. faecalis*, as an intracanal medicament. **Materials and Methods:** Antimicrobial activity of MP, AV, MP + AV, Ca(OH)₂, and dimethyl sulfoxide was tested against *E. faecalis* using antimicrobial sensitivity testing, minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC). The results were analyzed by Kruskal–Wallis test with Mann–Whitney *post hoc* test and repeated measures analysis of variance with Bonferroni *post hoc* test ($P < 0.05$). **Results:** For agar well-diffusion method, MP + AV gave maximum inhibition zone diameter (mean: 8.11 ± 0.015 mm), MP (mean: 6.21 ± 0.046 mm), Ca(OH)₂ (mean: 5.5 ± 0.006), and AV (mean: 5.05 ± 0.012) with $P < 0.05$. MIC for MP + AV was 2 mg/ml, MP at 8 mg/ml, Ca(OH)₂ at 8 mg/ml, and AV at 16 mg/ml. The MBC for MP + AV is at 4 mg/ml, MP at 16 mg/ml, Ca(OH)₂ at 16 mg/ml, and AV at 32 mg/ml. **Conclusion:** The combination of MP and AV consistently showed better antimicrobial activity compared to MP and AV alone against *E. faecalis*. The findings suggest that MP and AV used in combination may be an ideal intracanal medicament in FET and PET.

Keywords: *Aloe vera*, antimicrobial, *Enterococcus faecalis*, intracanal medicament, Malaysian geopropolis

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267. *IN VITRO* STUDY OF THE CYTOTOXICITY OF STINGLESS BEE PROPOLIS TOWARDS ORAL CANCER CELL CARCINOMA ORL-48 AND HUMAN GINGIVAL FIBROBLAST; AI-POWERED CONCEPTUAL BEEHIVE MODEL

Sahruzaman S, Naqiyuddin FAA, Ismail IH, Khor GH, Yunus MAM

Introduction: Artificial Intelligence (AI) is a technology implemented into machines to mimic human intelligence performing everyday tasks. It may be used in beekeeping promoting healthy, thriving and productive bees producing high quality bee products thus enhancing their pollination activities. Propolis furthermore, possessed anti-bacterial, anti-inflammatory, and anti-proliferative properties. AI may play an important role in ensuring sustained supply of this raw material. **Objectives:** Our aim is to evaluate the cell proliferation after comparative treatment with Malaysian *Heterotrigona itama* (HI) propolis on oral squamous cell carcinoma, ORL-48 and Human Gingival Fibroblasts (HGF). Additionally, we aim to provide a modified beehive model with the implementation of AI for beekeeping optimisation. **Methods:** Cytotoxic effects of HI propolis, Cisplatin and DMEM were investigated using 3-(4,5- dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The proposed modified bee hive were assembled from a conceptual plan blueprint, until functioning prototype simulated model. **Results:** Data were analyzed by one-way ANOVA, followed by Tukey's test with level of significance set to $p < 0.05$. A dose dependent anti-proliferative response of HI propolis on ORL-48 cell growth was observed, with 50% growth inhibition (IC₅₀) at concentration 4.58 mg/ml at 48h, and 6.24mg/ml at 72h ($p < 0.05$). HI propolis treatment to HGF cells indicated a corresponding increase in their cell proliferation percentage, was observed, but for Cisplatin, the IC₅₀ concentration on ORL-48 is 0.0036mg/ml at 72h ($p < 0.05$) while its treatment to HGF cells showed no markedly reduced cell viability. A blueprint of beehive model was designed incorporating AI. **Conclusions:** Propolis was found to reduce ORL-48 proliferation by being less cytotoxic towards normal cells and on an encouraging note, these fibroblasts propagation was additionally evident. It may indicate its usefulness as chemotherapeutic and chemo-preventive adjunct agents in managing oral squamous cell carcinoma. The impact of AI holds to sustain the beehive environment is significant for the optimized bee products.

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268. *IN-VITRO* COMPARISON OF ANTIBACTERIAL ACTIVITIES ON STINGLESS BEE PROPOLIS USING SELECTED EXTRACTION METHODS

Al-Masoodi OHH, Khan HBSG, Baharuddin IH, Ismail IH

Objectives: This study aimed to compare the different selected extraction methods of propolis extracts against *Enterococcus faecalis* (*E. faecalis*). **Materials and Methods:** Extraction of Malaysian Propolis (MP) from *Heterotrigona itama*, was carried out using 70% ethanol. For the selected extraction processes, such as, centrifugation-assisted extraction (CAE), vacuum-assisted extraction (VAE), and shaking-assisted extraction (SAE) methods were used. Antimicrobial activity against *E. faecalis* was assessed using the antibacterial susceptibility test (AST). **Results:** The results showed that SAE, followed by CAE, had better antimicrobial properties as compared to those obtained by VAE. The inhibition zones for SAE, CAE, and VAE were 5.3mm, 4.67mm, and 4.16mm, respectively. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) for extracted MP by SAE were 12.5 and 25 mg/mL, respectively. Furthermore, non-setting calcium hydroxide's [Ca(OH)₂] MIC and MBC were determined to be 50 and 100 mg/mL, respectively. **Conclusion:** As a result, we believe that extraction of raw MP from *Heterotrigona itama* using the SAE method was more effective than Ca(OH)₂ against *E. faecalis*.

Keywords: Malaysian propolis, *Enterococcus faecalis*, Ca(OH)₂, Antimicrobial activity, *Heterotrigona itama*

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269. IMMUNOMODULATORY EFFECT AND AN INTERVENTION OF TNF SIGNALLING LEADING TO APOPTOTIC AND CELL CYCLE ARREST ON ORL-204 ORAL CANCER CELLS BY TIGER MILK MUSHROOM, *LIGNOSUS RHINOCERUS*

Yap HYY, Kong BH, Yap CSA, Ong KC, Zain RB, Tan SH, Zaini ZM, Ng ST, Tan CS, Fung SY

Research Background: Tiger milk mushroom (*Lignosus rhinocerus*) is a medicinal mushroom that is geographically distributed in the region of South China, Thailand, Malaysia, Indonesia, Philippines and Papua New Guinea. Consumption of its sclerotium has been reported to treat various ailments. However, its anticancer potential towards oral cancer cell lines is yet to be determined considering the traditional method of its consumption by biting/chewing of the sclerotium. **Experimental Approach:** Mushroom sclerotial powder of cultivar TM02® was extracted and fractionated in a chromatographic column prior to cytotoxicity testing against a panel of human oral cancer cell lines. The capability of the identified bioactive fraction in regulating several molecules associated with its tumour necrosis factor (TNF) pathway was investigated. **Results and Conclusions:** 2,5-Diphenyl-2H-tetrazolium bromide (MTT) proliferation assay indicated that cell lines ORL-48 (derived from gingiva), ORL-188 (derived from the tongue) and ORL-204 (derived from buccal mucosa) were inhibited by cold water extract of *L. rhinocerus* sclerotia and its high-molecular-mass fraction (HMM) in varying degrees with ORL-204 being most affected. Hence, the treatment of ORL-204 with HMM mushroom extract was further investigated. HMM mushroom extract induced apoptosis and G₀/G₁ phase cell cycle arrest through caspase-3/7 cleavage. Activities of MIP2 and COX-2 were downregulated by 0.2- and 4.6-fold respectively in the HMM mushroom extract-treated ORL-204 cells. **Novelty and Scientific Contribution:** Using ORL-204, we showed that HMM mushroom extract may act *via* the TNF pathway at various network sites as a potential dietary compound for cancer prevention and natural adjunct therapeutic to conventional cancer treatment.

Keywords: COX-2, Lignosus rhinocerus, MIP2, apoptosis, cell cycle, oral cancer

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270. ANTIMICROBIAL EFFICIENCY OF *TINOSPORA CORDIFOLIA* AND *OCIMUM TENUIFLORUM* AGAINST *STREPTOCOCCUS MUTANS* AND *CANDIDA ALBICANS*

Shivakumar VH, Tegginamani AS, Zain NM

Background: The application of traditional medicinal plants and their products for treatment has been an integral part of our culture and continues to play a key role as many infectious microorganisms are resistant to synthetic drugs. *Tinospora cordifolia* and *Ocimum tenuiflorum* herbs have shown medicinal properties and have gained importance in modern research. **Aims:** This study assessed the antimicrobial activities of *Tinospora cordifolia* and *Ocimum tenuifloru* against *Streptococcus mutans* and *Candida albicans* to conventional medications such as chlorhexidine and nystatin. **Methodology:** The *S. mutans* and *C. albicans* were grown and maintained on Columbia agar plates and yeast malt extract agar respectively. An ethanolic extract was made and subjected to rotary evaporation to remove the ethanol. The antimicrobial activity of plant extracts was determined using the Kirby-Bauer disc diffusion method. The standard drugs, 10 µg/disc nystatin and 0.12% chlorhexidine, were used as a positive control. The zone of inhibition was measured after 24 hours. **Results:** At a concentration of 3 mgs., the zone of inhibition of 25.6 mm was found with *T. cordifolia*, followed by 15.8 mm with *O. tenuiflorum* against *S. mutans*, and 0.12% chlorhexidine, at 21.7 ± 0.43 mm. A zone of inhibition of 23 mm and 22.9 mm was observed in both *T. cordifolia* and *O. tenuiflorum* against *C. albicans*, respectively. Positive control of nystatin showed 26.1 ± 0.46 mm. **Conclusion:** *Tinospora cordifolia* has better antimicrobial activity against *S. mutans* compared to *Ocimum tenuiflorum*. Whereas at higher concentrations, both extracts were effective against *C. albicans*.

Keywords: Antimicrobial activity, *Candida albicans*, *Ocimum tenuiflorum*, *Streptococcus mutans*, *Tinospora cordifolia*

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271. CAN HERBAL EXTRACTS SERVE AS ANTIBACTERIAL ROOT CANAL IRRIGATING SOLUTIONS? ANTIMICROBIAL EFFICACY OF *TYLOPHORA INDICA*, *CURCUMIN LONGA*, *PHYLLANTHUS AMARUS*, AND SODIUM HYPOCHLORITE ON *ENTEROCOCCUS FAECALIS* BIOFILMS FORMED ON TOOTH SUBSTRATE: IN VITRO STUDY

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Aim: The purpose of this study was to evaluate the antimicrobial efficacy of *Tylophora indica*, *Curcumin longa*, and *Phyllanthus amarus* on *Enterococcus faecalis* biofilms formed on the tooth substrate. Sodium hypochlorite was used as a positive control. DMSO (dimethyl sulfoxide), the vehicle for the herbal extracts, was used as the negative control. **Materials and methods:** Extracted human teeth were biomechanically prepared, vertically sectioned, placed in the tissue culture wells exposing the root canal surface to *E. faecalis* to form a biofilm. At the end of the third week, all groups were treated for 15 min with the test solutions and the control. The results were analyzed both quantitatively and qualitatively. **Results:** Statistical analysis was performed by using one-way analysis of variance and compared by the Mann-Whitney test using the Statistical Package for the Social Sciences (SPSS) software, version 20.0. The qualitative assay with the 3-week biofilm on the canal portion showed complete inhibition of bacterial growth for NaOCl, whereas samples treated with herbal solutions showed significant reduction of bacterial growth compared to control group, which showed 139.9×10^9 CFU/mL among the experimental herbal solutions groups. *P. amarus* has shown maximum bacterial count followed by *C. longa* and *T. indica*. **Conclusion:** NaOCl 5% showed maximum antibacterial activity against 3-week biofilm on tooth substrate. *T. indica*, *P. amarus*, and *C. longa* showed statistically significant antibacterial activity against 3-week biofilm. The use of herbal alternatives might prove to be advantageous considering the several undesirable characteristics of NaOCl.

Keywords: Antibacterial, *Enterococcus faecalis*, biofilm, herbal irrigants

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272. GREEN SYNTHESIS AND EVALUATION OF DIMOCARPUS LONGAN LEAVES EXTRACT BASED CHITOSAN NANOPARTICLES AGAINST PERIODONTITIS TRIGGERING BACTERIA

Fuloria NK, Ko MY, Rui CS, Hang CZ, Karupiah S, Paliwal N, Kumari U, Gupta K, Sathasivam K, Fuloria S

Present study was intended to synthesize and evaluate the *Dimocarpus longan* leaves aqueous extract (DLLAE) based chitosan nanoparticles (CSNPs) against periodontitis triggering bacteria. In present study the DLLAE was prepared by extracting *D. Longan* leaves in distilled water using decoction method. The prepared DLLAE was subjected to phytochemical investigations, total phenolic content, total flavonoid content study and CSNPs synthesis. The CSNPs were characterized (using UV-visible, FT-IR, SEM, FESEM, XRD and EDX) and evaluated for their potential against periodontitis triggering bacteria (using agar well diffusion method). The phytochemical investigations over DLLAE exhibited presence of monosaccharides, reducing sugars, proteins, steroids, anthraquinones and coumarins glycosides, flavonoids, alkaloids, organic acid, tannic and phenolic compounds. The CSNPs were formed using DLLAE when the colour changed from white to pale brown. Absorbance of the CSNPs was in the desired range (201-310 nm). The optimization study revealed 1% acetic acid, 1% sodium alginate, 2 mg/mL chitosan, pH 5.8 and 1 mL DLLAE as the standard requirement for CSNPs synthesis using DLLAE. The CSNPs characterization data of FT-IR exhibited shifted bands. The FESEM revealed that the synthesized CSNPs were spherical in shape and their size ranged from 74.66 to 94.07 nm. The XRD data showed peaks at 2θ values of 22.28° , 25.19° , 34.72° , 40.0° , 71.16° and 73.0° . The average size for CSNPs was between 30.11-62.98 nm. The EDX spectrum revealed signal for carbon (76.17%), oxygen (22.14%) and sodium (1.53%) which confirmed formation of CSNPs. The antibacterial activity revealed high inhibitory potential of green CSNPs against *S. aureus*. Present studies establish that CSNPs biosynthesis using *D. longan* leaves aqueous extract is an efficient method and the biosynthesized CSNPs possess high antibacterial potential against *S. aureus* (bacteria that triggers periodontitis).

Keywords: Chitosan nanoparticles, *Dimocarpus longan* leaves, Antibacterial activity, Periodontitis

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273. ANTHOCYANIN, TARTARIC ACID, ASCORBIC ACID OF ROSELLE FLOWER (*HIBISCUS SABDARIFFA* L.) FOR IMMUNOMODULATORY ADJUVANT THERAPY IN ORAL MANIFESTATION CORONAVIRUS DISEASE-19: AN IMMUNOINFORMATIC APPROACH

Ramadhani NF, Nugraha AP, Rahmadani D, Puspitaningrum MS, Rizqianti Y, Kharisma VD, Noor TNEBTA, Ridwan RD, Ernawati DS, Nugraha AP

Introduction: Oral manifestations that arose from COVID-19 infection often causes morbidity and systemic drug administration is less effective. Roselle flower (*Hibiscus sabdariffa*) is one of the plants that is often used in infusion as it gives health benefits. Hence, *H. sabdariffa* may benefit from adjuvant therapy to treat oral manifestation due to COVID-19. **Objectives:** To investigate the potential of *H. sabdariffa* anthocyanins, tartaric acid, and ascorbic acid chemical compounds as antiviral, anti-inflammatory, antioxidant, and increasing tissue regeneration in oral manifestation due to COVID-19 infection *in silico*. **Materials and Methods:** Chemical compounds consisted of anthocyanins, (+)-tartaric acid, and ascorbic acid beside target proteins consisted of ACE2-spike, Foxp3, IL-10, IL6, IL1 β , VEGF, FGF-2, HSP70, TNFR and MDA-ovalbumin were obtained from the database, ligand samples were selected through absorption, distribution, metabolism, excretion and toxicology analysis, then molecular docking simulations, identification of protein-ligand interactions, and 3D visualization were performed. **Results:** Anthocyanins, tartaric acid, and ascorbic acid are the active compounds in *H. sabdariffa*, which act as antioxidants. The activity of anthocyanin compounds is higher than other compounds through value binding affinity, which is more negative and binds to specific domains of target proteins by forming weak binding interactions that play a role in biological responses. Anthocyanins have the most negative binding energy compared to tartaric-acid and ascorbic acid. **Conclusions:** Anthocyanins act as antioxidants; this mechanism increases heat shock protein-70 (HSP70), which may play an important role in increasing wound regeneration of oral manifestation in severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as documented *in silico*.

Keywords: COVID-19, dentistry, *Hibiscus sabdariffa*, infectious disease, medicine

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274. EFFICACY IN REDUCING BACTERIAL CONTENT IN ORAL CAVITY BY CANNABINOIDS IN ORAL CARE PRODUCTS-A COMPARATIVE STUDY

Manikrao LN, Bhalthim S, Tiwari H, Pendyala SK, Kondreddy K, Chandra J, Tiwari RVC

Aim: Purpose of our research was to assess the efficacy of cannabinoids in oral care products in reducing bacterial content inside the mouth. **Methodology:** Dental plaques of 30 healthy adults were collected using paro-toothpick sticks and spread on three Petri dishes (A, B and C) containing cannabinoids containing toothpaste, oral B and Colgate respectively. The Petri dishes were sealed and incubated at 37°C for twenty-four hours, followed by counting the amount of colonies using colony counter. **Results:** By evaluating the colony count of the dental bacteria isolated from six groups, it absolutely was found that cannabinoids were simpler in reducing the bacterial colony count in dental plaques as compared to the well-established synthetic oral care products like Oral B and Colgate.

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275. *DRACAENA CINNABARI* METHANOLIC EXTRACT IMPAIRING MIGRATION AND INHIBITING GROWTH OF NASOPHARYNGEAL CARCINOMA CELLS THROUGH INDUCTION OF INTRINSIC APOPTOTIC PATHWAY *IN VITRO*

Rola AS, Gohar S, Aied MA

The resin of *Dracaena cinnabari* Balf. F. has demonstrated antiviral, antibacterial, antioxidative, analgesic and anti-inflammatory properties, which presents some proof for its effectiveness in traditional use. Despite the broad health benefits of *Dracaena cinnabari*, few research has been conducted on its anti-tumour effect. We have previously shown that *Dracaena cinnabari* Balf. F. methanolic extract (DCBME) induces apoptotic cell death in human tongue squamous cell carcinoma cell line and significantly reduces its migration capacity. The anti-tumour potential and mechanism of action of DCBME in Nasopharyngeal Carcinoma (NPC) have not yet been elucidated. In our recent paper, we showed the disruption of mitochondrial membrane potential and the induction of the intrinsic apoptotic pathway through caspase 3/7 activation.

In the present study, we aim to investigate the effect of DCBME on proliferation, morphological changes, cell death, cell cycle arrest and cell migration of NPC cells. NPC cells (C666-1 and HK-1) were treated with DCBME and the mechanism underlying its anti-tumour effect was explored by examining cell proliferation, induction of apoptosis and cell migration using MTT assay, phase-contrast and fluorescence microscopy, propidium iodide staining, DNA fragmentation and wound healing assays. DCBME significantly inhibited NPC cell proliferation in a time and dose-dependent manner. It induced marked apoptotic morphological changes, apoptotic DNA laddering and S and/or G2/M-phase cell cycle arrest. DCBME also inhibited the migration of NPC cells. Together with our previously reported anti-tumour effect of DCBME, the findings suggest that DCBME deserves further investigation as a promising anti-tumour agent for human Nasopharyngeal Carcinoma cells therapy.

Keywords: *Dracaena cinnabari* Balf, Nasopharyngeal carcinoma, anti-tumour agent, cell cycle arrest, apoptosis, migration

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276. FLAXSEED (LINUM USITATISSIMUM) ETHANOLIC EXTRACT AFFECTS WNT SIGNALLING PATHWAY-ASSOCIATED MOLECULES; B-CATENIN AND DKK1 EXPRESSIONS, DURING OSTEOBLAST DIFFERENTIATION OF STEM CELLS FROM HUMAN EXFOLIATED DECIDUOUS TEETH (SHED)

Mokhtar KI, Nordin NS, Mustafa BE, Lestari W, Darnis DS, Kannan TP, Ahmad A, Ichwan SJA

Introduction: WNT signalling is important in regulating developmental process including bone development. Additionally, WNT signalling also involves in lineage differentiation of mesenchymal stem cells (MSC), including osteogenic differentiation, through canonical WNT pathway. Flaxseed (linum usitatissimum) is a plant with many health benefits including promoting bone health. Our previous study demonstrated that Flaxseed ethanolic extract (FEE) reduced the osteoblast differentiation potential of stem cells from human exfoliated deciduous teeth (SHED), a type of MSC.

Aim: Hence, we aimed to analyse the effect of FEE on WNT signalling pathway-associated molecules; β -catenin, and DKK1 expressions, during the osteoblast differentiation of SHED.

Materials and Methods: SHED cultured in osteoblast induction media (OIM) was treated with FEE at 4 mg/ml. RNA extracted from cells cultured at day 7, 14 and 21 was subjected to reverse-transcriptase PCR for β -catenin, and DKK1 gene expression analysis. **Results:** FEE at 4 mg/ml significantly reduced β -catenin and DKK1 expression of SHED at day 7 (0.5293 ± 0.01 , 1.0792 ± 0.02 respectively, $p < 0.01$) but induced their expression at day 14 (0.7675 ± 0.05 , 1.7176 ± 0.07 respectively, $p < 0.01$). The expression was later reduced at day 21 (0.2592 ± 0.01 , 1.0653 ± 0.04 respectively, $p < 0.01$). **Conclusions:** Changes in the β -catenin, and DKK1 expressions levels at different time frame might explain how FEE reduced the osteoblast differentiation potential of SHED. Overall, FEE modulates the expressions of WNT signalling pathway-associated molecules: β -catenin, and DKK1, during the process of osteoblast differentiation of SHED which could possibly interrupt the process of osteogenesis in the current environment.

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277. ANTI-INFLAMMATORY EFFECT OF CAFFEIC ACID PHENETHYL ESTER SUPPLEMENTATION ON TNF- α AND NF- κ B EXPRESSIONS THROUGHOUT EXPERIMENTAL TOOTH MOVEMENT IN VIVO

Salikha K, Narmada IB, Alida, Nugraha AP, Sari AF, Riawan W, Noor TNEBTA

Introduction: Orthodontic tooth movement (OTM) changes the periodontal tissue and increases the incidence of root resorption (OIRR). Caffeic acid phenethyl ester (CAPE), an antioxidant and anti-inflammatory chemical generated from honey propolis, might be useful in controlling inflammation during OTM and so reducing the risk of OIRR. **Objectives:** To evaluate if CAPE supplementation has an anti-inflammatory impact on tumor necrosis factor- α (TNF- α) and nuclear transcription factor κ B (NF- κ B) during experimental OTM in male Wistar rats (*Rattus norvegicus*). **Materials and Methods:** Forty-eight healthy male Wistar rats were divided into positive control group (OTM 10 g/mm² force application) and experimental group (OTM application and CAPE administration). Each group were observed for 3, 7, 14 days. A nickel-titanium closed coil spring that was 8.0 mm long, thick was inserted between the upper left first molar and upper central incisor in order to move the molar mesially. A 20 mg/kg body weight dose of CAPE was taken orally. Using immunohistochemistry, the expression of TNF- α and NF- κ B was examined on the compression side of the OTM. Both the Tukey's honest significant difference test and the one-way analysis of variance test were applied ($p < 0.05$). **Results:** TNF- α and NF- κ B expression in the compression side differed considerably across groups ($p < 0.05$). Daily administration of CAPE significantly down-regulates TNF- α and NF- κ B expression on the compression side. **Conclusions:** Administration of CAPE throughout OTM can successfully reduce the number of TNF- α and NF- κ B expressions in the compression side in vivo.

Keywords: caffeic acid phenethyl ester, experimental tooth movement, medicine, nuclear transcription factor- κ B, tumor necrosis factor- α

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278. SPECTROPHOTOMETRIC EVALUATION OF THE EFFICACY OF NATURAL VERSUS COMMERCIAL BLEACHING AGENTS

Kohli S, Al-Haddad A, Siew AY, Nam WL, Hamdan HD, Roslan QA

Purpose: To compare the bleaching efficacy of in-office (Opalescence), professional home (LumiBrite), over the counter (WhiteLight) and natural (strawberry extract) bleaching agents. **Methods:** 80 teeth were selected and divided into two groups which were stained with black coffee and red wine respectively. The stained specimens were subdivided into four subgroups to be bleached with Opalescence, LumiBrite, WhiteLight and strawberry extract. Color measurements were made using spectrophotometer at baseline level, after staining, after bleaching and 1 week after bleaching. The ΔE_{00} was calculated post bleaching (ΔE_{001}), after 1-week follow up (ΔE_{002}) and color changes between 1-week follow up and baseline (ΔE_{003}). Data were analyzed by paired t-test and ANOVA with a significant difference of $P < 0.05$. **Results:** Paired t-test showed significant differences in ΔE_{001} and ΔE_{002} for both stained specimens ($P < 0.001$). For black coffee-stained specimens, Whitelight had significantly higher ΔE_{002} compared to the other bleaching agents ($P < 0.05$). For red wine stain, Whitelight also showed the significantly lowest ΔE_{001} ($P < 0.001$) and the highest ΔE_{002} ($P < 0.001$) compared to other groups. LumiBrite showed the significantly lowest ΔE_{003} for red wine-stained specimens ($P < 0.05$). Whitelight had the poorest bleaching efficacy with deterioration effect after 1-week follow up. Opalescence, LumiBrite and strawberry extract had clinically perceptible and comparable bleaching efficacy. Strawberry extract appeared to be a potential natural bleaching agent with a desirable effect. **Clinical significance:** Commercial tooth bleaching agents can cause several undesirable side effects such as damage to enamel, hypersensitivity and even affecting the pulp. Strawberry extract is a natural, effective bleaching agent that may have reduced side effects.

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279. *IN VITRO* CYTOTOXICITY STUDY OF STINGLESS BEE PROPOLIS TOWARDS ORL-48 AND HGF; AI-CONCEPTUAL DEEP LEARNING AND SMART BEEHIVE MODEL

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Introduction: Artificial Intelligence (AI) is a technology implemented into machines to mimic human intelligence performing everyday tasks. It may be used in beekeeping promoting healthy, thriving and productive bees producing high quality bee products thus enhancing their pollination activities. Propolis furthermore, possessed anti-bacterial, anti-inflammatory, and anti-proliferative properties. AI may play an important role in ensuring sustained supply of this raw material. **Objectives:** Our aim is to evaluate the cell proliferation after comparative treatment with Malaysian *Heterotrigona itama* (HI) propolis on oral squamous cell carcinoma, ORL-48 and Human Gingival Fibroblasts (HGF). Additionally, we aim to provide a modified beehive model with the implementation of AI for beekeeping optimisation. **Methods:** Cytotoxic effects of HI propolis, Cisplatin and DMEM were investigated using 3-(4,5- dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The proposed modified bee hive were assembled from a conceptual plan blueprint, until functioning prototype simulated model. **Results:** Data were analyzed by one-way ANOVA, followed by Tukey's test with level of significance set to $p < 0.05$. A dose dependent anti-proliferative response of HI propolis on ORL-48 cell growth was observed, with 50% growth inhibition (IC₅₀) at concentration 4.58 mg/ml at 48h, and 6.24mg/ml at 72h ($p < 0.05$). HI propolis treatment to HGF cells indicated a corresponding increase in their cell proliferation percentage, was observed, but for Cisplatin, the IC₅₀ concentration on ORL-48 is 0.0036mg/ml at 72h ($p < 0.05$) while its treatment to HGF cells showed no markedly reduced cell viability. A blueprint of beehive model was designed incorporating AI. **Conclusions:** Propolis was found to reduce ORL-48 proliferation by being less cytotoxic towards normal cells and on an encouraging note, these fibroblasts propagation was additionally evident. It may indicate its usefulness as chemotherapeutic and chemo-preventive adjunct agents in managing oral squamous cell carcinoma. The impact of AI holds to sustain the beehive environment is significant for the optimized bee products.

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280. EFFECTIVENESS OF TENS AND HOME EXERCISES AS AN ADJUNCT TO DRUG THERAPY IN THE MANAGEMENT OF MYOGENOUS MASTICATORY PAIN: A COMPARATIVE STUDY

Veerabhadrapa SK, Anbananthan TD, Ying CX, Ramamurthy PH, Yadav S, Zamzuri ATB

Introduction: Pain relief is the primary goal of treatment in patients with myogenous temporomandibular disorder. This study evaluated the effectiveness of TENS and Home exercises as an adjunct to drugs in relieving myogenous masticatory pain. **Materials and methods:** This prospective clinical study was conducted on 60 patients with myogenous masticatory pain. Patients were randomly allocated into three groups of 20 patients each. Patients in Group A received TENS and drugs, while patients in Group B received home exercises and drugs and Group C received drugs only. The drugs prescribed were Diclofenac 50 mg and Orphenadrine 100 mg, to be taken twice daily for 5 days. All patients were followed up for three weeks. The severity of pain was recorded using the Visual Analog Scale. Inter and intragroup differences in the pain scores were analyzed using one-way ANOVA along with post hoc Tukey's test, and Paired t-test, respectively. $p < 0.05$ was considered as statistically significant. **Results:** There was a significant reduction in the mean pain scores in all the three groups at 1st, 2nd, and 3rd post-treatment weeks as compared to the baseline scores with $p < 0.001$. However, when the pain scores were compared across groups, maximum pain reduction was observed in group A (0.2 ± 0.04), followed by group B (0.5 ± 0.06), and the least reduction was noticed in group C (2.1 ± 0.8). This result was significant with $p < 0.001$. **Conclusion:** Both TENS and Home exercises program were effective as adjuncts to drugs, in controlling myogenous masticatory pain, as compared to drugs alone.

Keywords: TENS, masticatory muscle pain, myofascial pain, muscle relaxants, home exercises, drugs

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DOMAIN 5

Oral Tissue Engineering (OTE) and Regenerative Dentistry



281. THE NUMBER OF OSTEOBLAST AND OSTEOCLAST DURING ORTHODONTIC TOOTH MOVEMENT AFTER PRECONDITIONED GINGIVA MESENCHYMAL STEM CELL ALLOGENEIC TRANSPLANTATION IN VIVO

Ernawati DS, Nugraha AP, Narmada IB, Ardani IGAW, Hamid T, Triwardhani A, Winoto ER, Alida A, Susanto H, Ramadhani NF, Brahmanta A, Nugraha AP, Ihsan IS, Riawan W, Saskianti T, Noor TNEBTA

Introduction: Malocclusion can affect the quality of life related to oral health. A novel technique to expedite orthodontic tooth movement (OTM) in order to minimize treatment length and the side effects. Under orthodontic force, MSCs transplantation might hypothetically accelerate the bone remodeling process, resulting in OTM acceleration. **Objective:** To investigate the number of osteoclasts and osteoblasts in the tension side during OTM after transplantation of normoxic or hypoxic preconditioned allogeneic gingival mesenchymal stem cells in vivo. **Materials and Methods:** The OTM animal model was 48 male rabbits (*Oryctolagus cuniculus*) aged 6 months with body weight about 3-4 kg. There were 4 experimental groups in this study: control negative group (C-): injected with PBS without OTM, positive control group (C+): 50g OTM with 20µL PBS injection, treatment group 1 (T1): 50g OTM with 20µL GMSCs normoxia in PBS, treatment group 2 (T2): 50g OTM with 20µL GMSCs hypoxia in PBS. The injection was done in afflicted mandibular gingiva using µL small needle syringe with local infiltration technique. Every sample then was sacrificed after day 7, 14, and 28 respectively. The number of osteoblasts and osteoclasts in the alveolar bone during OTM was determined by hematoxylin and eosin staining. **Result:** In T2 group, osteoblast was significantly enhanced on day 14 and 28 but not osteoclast number during OTM. There was significant difference in osteoclast and osteoblast number between groups ($p < 0.05$). **Conclusion:** GMSCs hypoxia preconditioned escalate osteoblast number but not decrease the osteoclast number in the tension side during orthodontic tooth movement in vivo.

Keywords: Dentistry, tooth movement technique, orthodontics appliance, medicine, bone remodeling

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282. MOLECULAR DOCKING OF POLYETHER ETHER KETONE AND NANO-HYDROXYAPATITE AS BIOMATERIAL CANDIDATES FOR ORTHODONTIC MINI- IMPLANT FABRICATION

Ardani IGAW, Nugraha AP, Suryani NM, Pamungkas RH, Vitamamy DG, Susanto RA, Sarno R, Fajar A, Kharisma VD, Nugraha AP, Noor TNEBTA

Context: Modified polyether ether ketone (PEEK) by adding nano-hydroxyapatite (HA) material on its fixture for mini-implant fabrication may increase resistance force through osseointegration. **Aims:** To analyze the binding molecular docking of PEEK incorporated with HA as a biomaterial candidate for orthodontic mini-implant fabrication through a bioinformatic approach, an *in silico* study. **Methods:** 3D ligand structure consisting of HA, PEEK and target proteins consisting of osteopontin, osteocalcin, osteonectin, bone morphogenetic protein 4 (BMP4), bone morphogenetic protein 2 (BMP2), bone morphogenetic protein 7 (BMP7), alkaline phosphatase (ALP), runt-related transcription factor 2 (RUNX2), Insulin growth factor-1 (IGF-1), osterix, tartrate-resistant acid phosphatase (TRAP), collagen alpha-1 (COL1A1) obtained from RCSB-PDB. It was analyzed the binding affinity of a single HA, PEEK, and HA + PEEK complex to twelve target proteins related to osseointegration. The types of chemical interactions produced by the ligands in the target protein domain consisted of Van der Waals, hydrogen, hydrophobic, pi, and alkyl. **Results:** The blind docking simulation succeeded in identifying the most negative binding affinity; it was found in the HA + PEEK molecular complex compared to HA and PEEK in the single condition. The type of chemical interaction formed consisted of hydrogen, van der Waals, pi, and alkyl. HA+PEEK showed the most negative binding affinity with ALP and IGF-1, as much as -8.7 binding affinity. **Conclusions:** The molecular docking of PEEK with HA exhibited a prominent binding affinity with osteogenic markers like ALP and IGF-1 *in silico*, allowing it to have a higher potential than nano-HA or PEEK as a single biomaterial for osseointegration as the fabrication of mini-implants that may support orthodontic treatment.

Keywords: dentistry, good health and well-being, in silico, medicine, temporary anchorage device

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283. A BIOINFORMATIC APPROACH OF HYDROXYAPATITE AND POLYMETHYLMETHACRYLATE COMPOSITE EXPLORATION AS DENTAL IMPLANT BIOMATERIAL

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Introduction: The most common biomaterial used for dental implants is titanium. However, the release of metal ions and the risk of allergic reactions to metals that may occur in some patients cannot be avoided. Hydroxyapatite-polymethylmethacrylate (HA-PMMA) composite biomaterials are proposed to have potential as dental implant biomaterials due to their mechanical, chemical, and biological properties. HA-PMMA may induce osseointegration, biocompatible, less allergic reactions, and no metal ions released. In addition, HA-PMMA can be obtained from Indonesia's abundant natural resources. **Objectives:** To explore HA-PMMA composites through molecular docking as a biomaterial candidate for dental implants in silico. **Materials and Methods:** Structure data format (sdf), molecular weight, and identity number (CID) of HA-PMMA ligand samples were obtained from PubChem database and minimized through OpenBabel. 3D structure, selection method, resolution, atom count, weight, sequence length, and ID protein BMP2, BMP4, BMP7, alkaline phosphatase (AP), osteonectin, osteopontin, and osteocalcin on RCSB-PDB native ligand and water sterilization on PyMol were carried out with the aim of to maximize the formation of binding affinity during molecular docking simulations. **Results:** HA-PMMA composites can enhance the activity of proteins associated with osseointegration such as BMP-2/4/7, AP, osteocalcin, osteonectin, and osteopontin in silico. HA-PMMA composites have the strongest binding to osteonectin and are predicted to enhance the AP activity in silico. **Conclusions:** HA-PMMA composites are potential candidates for dental implant biomaterials with the osteointegration ability through binding with BMP-2/4/7, AP, osteocalcin, osteonectin, and osteopontin in silico.

Keywords: biomaterials, composite, human well-being, hydroxyapatite- polymethylmethacrylate, in silico, osseointegration

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284. IDENTIFICATION OF COPY NUMBER VARIATION AMONG NONSYNDROMIC CLEFT LIP AND OR WITHOUT CLEFT PALATE WITH HYPODONTIA: A GENOME-WIDE ASSOCIATION STUDY

USM/JPEPeM/140357

Ghazali N, Abd Rahman N, Ahmad A, Sulong S, Kannan TP

Introduction: Nonsyndromic cleft lip and or without cleft palate (NSCL/P) with the hypodontia is a common developmental abnormality in humans and animals. This study identified the genetic aberration involved in both NSCL/P and hypodontia pathogenesis. **Methods:** A cross-sectional study using genome-wide study copy number variation-targeted CytoScan 750K array carried out on salivary samples from 61 NSCL/P and 20 noncleft with and without hypodontia Malay subjects aged 7–13 years old. Copy number variations (CNVs) of *SKI* and fragile histidine triad (*FHIT*) were identified in NSCL/P and noncleft children using quantitative polymerase chain reaction (qPCR) as a validation analysis. Copy number calculated (CNC) for each gene determined with Applied Biosystems CopyCaller Software v2.0. **Results:** The six significant CNVs included gains (12q14.3, 15q26.3, 1p36.32, and 1p36.33) and losses (3p14.2 and 4q13.2) in NSCL/P with hypodontia patients compared with the NSCL/P only. The genes located in these regions encoded *LEMD3*, *IGF1R*, *TP73*, *SKI*, *FHIT*, and *UGT2B15*. There were a significant gain and loss of both *SKI* and *FHIT* copy number in NSCL/P with hypodontia compared with the noncleft group ($p < 0.05$). **Conclusion:** The results supported that CNVs significantly furnish to the development of NSCL/P with hypodontia.

Keywords: cleft lip, cleft palate, hypodontia, DNA copy number variations, genome-wide association study

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285. REGENERATIVE ENDODONTIC TREATMENT IN MATURE TEETH: A SYSTEMATIC REVIEW AND META-ANALYSIS

Al-Haddad AY, Al-Namnam NM

Regenerative endodontic treatment (RET) is an alternative treatment for immature teeth, however, its efficacy on mature teeth is still controversial. This review was aimed to assess the level of evidences of clinical and radiographical outcomes of RET in mature teeth and run a meta-analysis to compare its success rate to conventional root canal treatment (CRCT). The electronic databases PubMed, Science Direct and Web of Science were used to search based on inclusion and exclusion criteria. The Randomized controlled clinical trials (RCTs), case series, and case reports studies of the RET in mature teeth published in the English language from January 2010 till February 2021 were selected. A meta-analysis was performed using the random-effects model on the randomized clinical trials that compare the success rate based on clinical and radiographic outcomes of RET and CRCT. From sixteen articles included in the narrative analysis, two studies were subjected to meta-analysis. Different protocol aspects of RET including disinfection, size of apical preparation, intracanal medications, types of scaffolds, barriers and follow-up periods were described. The meta-analysis showed no significant differences in success rate between CRCT (89.47%) and RET (95.45%) at 12 months ($P>0.05$), while it showed a significant increase in positive response to the electrical pulp test of RET ($P=0.010$). With the limitations, the adopted protocols of RET are comparable to CRCT and could be a potential approach to treat mature teeth with pulp necrosis and/or apical periodontitis. However, providing more evidences are essential to ascertain these findings.

Keywords: mature permanent teeth, meta-analysis, regenerative endodontic, treatment protocol

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286. EVALUATION OF PLATELET-RICH FIBRIN AND PLATELET-RICH PLASMA IN IMPACTED MANDIBULAR THIRD MOLAR EXTRACTION SOCKET HEALING AND BONE REGENERATION: A SPLIT-MOUTH COMPARATIVE STUDY

Bhujbal R, Veerabhadrapa SK, Yadav S, Chappi M, Patil V

Objective: To compare the efficacy of platelet-rich fibrin (PRF) and platelet-rich plasma (PRP) in postoperative extraction socket healing, pain, swelling, and bone regeneration after surgical removal of impacted mandibular third molars. **Materials and Methods:** The present split-mouth comparative study was conducted on 20 patients undergoing bilateral identical mandibular third molar extraction. PRF was placed on the right side of the third molar extraction socket, and PRP was placed on the contralateral side. Evaluation of soft tissue healing, pain, and swelling was carried out on immediate postoperative and on the 1st day, 3rd day, and 7th day. Radiological bone density was assessed on the 3rd and 6th months postoperatively. **Results:** Soft tissue healing was better in PRF site. The postoperative pain scores in PRF site were less compared with PRP site; however, there was no significant difference between immediate postoperative period ($P < 0.15$), 1st day ($P < 0.96$), 3rd day ($P < 0.58$), and 7th day ($P < 0.78$). Measurement of swelling on the 1st day ($P < 0.0020$) and 3rd day ($P < 0.0010$) showed significant difference on PRF site, but it ceases to nonsignificant on the 7th day ($P < 1.00$). Postoperative mean bone density at the 3rd and 6th months was higher in PRF site, which was statistically significant ($P < 0.00001$). **Conclusion:** Our results showed a significant improvement in the soft tissue wound healing and increase in bone density in PRF site than PRP site. There was significant reduction of the swelling found on the 1st and 3rd day at PRF site as compared to the PRP site. Although the postoperative pain scores were less in PRF site, this was not statistically significant among the two groups.

Keywords: Pain, platelet-rich fibrin, platelet-rich plasma, soft tissue healing, swelling, third molar

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287. GENE EXPRESSION PROFILING ON EFFECT OF ASPIRIN ON OSTEOGENIC DIFFERENTIATION OF PERIODONTAL LIGAMENT STEM CELLS

Abd Rahman F

Periodontal ligament (PDL) contains a unique population of mesenchymal stem cells (MSCs), also known as PDL stem cells (PDLSCs). The regenerative properties of PDLSCs hold great potential for its use in stem cells based therapy, particularly for periodontal or bone regeneration. The present study investigated the global gene expression profile in PDLSCs during osteogenic differentiation. MSCs from PDL were isolated from normal permanent human teeth (n = 3). Microarray analysis was used to study the effects of ASA (200, 500, and 1000 μ M) on the gene expression profiles in PDLSCs during osteogenic differentiation. Microarray study revealed that ASA was able to modulate PDLSCs gene expression profile. At 200 μ M, 315 genes were dysregulated genes (DE), involving 151 upregulated and 164 downregulated genes. At 500 μ M, 794 genes were DE, involving of 364 upregulated and 430 downregulated genes. At 1000 μ M, the number of DE genes increased to 2035, of which 735 were upregulated and 1300 were downregulated. Bioinformatics analyses of the gene expression data revealed that the majority of DE genes (for 500 and 1000 μ M ASA treatment) are involved in osteogenic differentiation. The gene network analysis was carried out using Ingenuity Pathway Analysis (IPA) software, and this revealed that the number of gene groups involved in cell adhesion and extracellular matrix components were increased. This study indicated that ASA could enhance PDLSCs functions and provide evidence for the potential use of ASA with PDLSCs for regenerative dentistry applications, particularly in the areas of periodontal health and regeneration. Periodontal ligament stem cells (PDLSCs) Aspirin (ASA) Microarray Osteogenic.

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288. INFLUENCE OF GRAFTING ON POCKET DEPTH AND DENTIN HYPERSENSITIVITY AROUND THIRD MOLAR EXTRACTION SITES: A SPLIT-MOUTH RANDOMIZED CONTROLLED TRIAL

Majid H, Ramachandra SS, Kumar S, Wei M, Gundavarapu KC

This study evaluated the effect of alloplastic bone grafts in osseous defects following surgical removal of horizontally impacted third molars by comparing the periodontal measures distal to the second molar in grafted and nongrafted third molar extraction sites. **Materials and Methods:** A double-blind, randomized, controlled clinical trial was designed on subjects with bilateral horizontally impacted mandibular third molars. Grafting consisting of alloplasts at the third molar extraction sites was compared with nongrafted sites. This study assessed 54 randomized sites in 27 patients who were selected using a split-mouth design. The predictor variable included the change in pocket depth distal to the mandibular second molar and associated dentin hypersensitivity around the second molar, assessed preoperatively and at 3 and 6 months after third molar surgery. The data regarding pocket depth reduction was statistically analyzed using paired t-test. The data concerning reduction in dentin hypersensitivity was statistically analyzed using chi-square test. **Results:** Six months after third molar surgery, mean pocket depth distal to mandibular second molar decreased significantly at the grafted sites compared to the nongrafted sites. The reduction in dentin hypersensitivity of mandibular second molar was statistically significant for the grafted sites at 6 months, compared to the nongrafted sites.

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289. KNOWLEDGE, AWARENESS AND PERCEPTION OF DENTAL STEM CELL AND THEIR APPLICATIONS IN REGENERATIVE MEDICINE AMONG PROFESSIONAL GROUPS

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Introduction: Dental stem cell research has become an important field in regenerative medicine. Nevertheless, the depth of knowledge and awareness of dental stem cells remain vague among the professional groups in Malaysia. The objective of this study is to assess the level of knowledge and awareness of professional groups in Malaysia on dental stem cells and their applications in regenerative medicine. **Methods:** A descriptive cross-sectional survey was implemented using online and hard-copy questionnaires that was distributed among medical doctors, scientists, and dentists to assess the level of knowledge and awareness (n=157). The questionnaire consists of 3 sections consisting of demographics, knowledge assessment and perception among the professional groups. The data were analysed using SPSS analysis. **Results:** Results showed that professional groups in Malaysia were knowledgeable and aware of dental stem cells and their application. Majority of the respondents were dentists (41.91%), followed by medical doctors (35.29%) and scientists (22.79%). 50.74% of respondents were unsure about the similar characteristics between dental stem cells (DSCs) and bone marrow mesenchymal stem cells (BMMSCs). Most respondents were aware of the derivation of DSCs from pulp and periodontal ligament (PDL) tissues (77.21%) and that DSCs are considered an adult stem cell source (51.11%). Most respondents were familiar with the characteristics of DSCs. They were aware that DSCs have the unique ability to self-renew and differentiate into trilineage differentiation (69.12%). They agreed that DSCs are an excellent cell resource for therapeutic approaches to neural repair and regeneration (63.24%). 63.24% of the respondents demonstrated a positive outcome for dental stem cell research. 59.56% of them would be willing to donate their extracted teeth for research. About 56.62% of respondents would conserve their teeth in stem cell banks and 52.94% are interested in investing in the stem cell industry. **Conclusion:** A high level of perception and awareness about dental stem cells and its application was noted among professional groups in Malaysia. They are supportive and willing to invest for dental stem cell research.

Keywords: Dental stem cell, Knowledge, Perception, Dentist, Scientists, Medicine

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290. INTRACANAL CRYOTHERAPY WITH TWO DIFFERENT TEMPERATURE RANGES IN REDUCING POSTENDODONTIC PAIN: A DOUBLE-BLIND RANDOMIZED CLINICAL TRIAL

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Introduction: The use of intracanal cryotherapy in the reduction of postendodontic pain (PEP) has been investigated in several recent scientific publications. This study aims to compare the effect of intracanal cryotherapy at three different temperature ranges (room temperature, 2°C-4°C and 13°C-15°C) on PEP. **Materials and Methods:** A parallel, double-blind randomized clinical trial was conducted at SEGi University, Malaysia. This trial included 51 participants who were diagnosed with symptomatic irreversible pulpitis and symptomatic apical periodontitis in single-rooted teeth. The root canal therapy was completed in single visit for all the patients. Prior to the obturation step, they were randomly allocated into three groups of 17 participants each (Group 1: room temperature [control], Group 2: 2°C-4°C, and Group 3: 13°C-15°C). The intracanal cryotherapy was performed over a period of 5 min. The PEP scores were measured using Wong Baker Faces Pain Rating Scale and recorded at different time intervals (6, 24, 48, and 72 h), and the data were statistically analyzed. **Results:** Kruskal-Wallis test showed statistically significant difference in mean pain ranks between at least two out of three groups studied at 24 and 48 h ($P \leq 0.05$). At 24 and 48 h, the pairwise post hoc Dunn test with Bonferroni adjustments showed statistically significant difference in pain scores within the Groups 1 versus 3 (room temperature vs. 13°C-15°C) and Groups 1 versus 2 (room temperature vs. 2°C-4°C) ($P \leq 0.05$), while within the Groups 2 versus 3 (2°C-4°C vs. 13°C-15°C), there was no statistically significant difference. **Conclusion:** Intracanal cryotherapy with 13°C-15°C saline is as effective as 2°C-4°C saline in reducing PEP and can be easily incorporated as one of the steps of root canal therapy. © 2022 Saudi Endodontic Journal Published by Wolters Kluwer-Medknow.

Keywords: Cryotherapy, pain measurement, root canal irrigants, saline solution, temperature

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291. AN INSIGHT OF PROANTHOCYANIDIN AND POLYAMIDOAMINE-CALCIUM PHOSPHATE NANOPARTICLES AS BIOMATERIAL CANDIDATE FOR DENTIN REGENERATION IN DENTAL PULP CAPPING: A NARRATIVE REVIEW

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Dental caries is the world's biggest dental problem with an incidence of 95%, causing tooth demineralization and complications including pulp perforation and premature tooth loss. A non-toxic biomaterial is required for increasing dentine regeneration in reversible dental caries. Proanthocyanidin (PA) is grape seed-derived flavonoid as antibacterial, anti-inflammatory, and antioxidant. However, PA provides low bioavailability so that it can be combined with polyamidoamine-calcium phosphate (PAMAM-CP) nanoparticles as drug delivery system. The investigation of PA and PAMAM-CP nanoparticles paste-based as innovation biomaterial for dental pulp capping may potential to induce dentine regeneration. The aim of this narrative review is to describe the combination of PA and PAMAM-CP nanoparticles as dental pulp capping biomaterial for dentin regeneration in dental caries. PA is able to express runt related transcription factor (Runx2), bone morphogenic protein-2 (BMP2), osteocalcin (OCN), and dentine sialoposphoprotein (DSPP) which increase biomineralization and odontogenic differentiation. PAMAM is a macromolecule that provides attachment to dentine and induces remineralization. CP nanoparticles are calcium phosphate-based drug carriers that facilitate dentinal tubules penetration. PA loaded PAMAM-CP nanoparticles would be encapsulated releasing PA. PA suppresses Nuclear Factor-kB signaling pathway activation and decrease tumor necrosis factor- α so that inhibit dentinal matrix degradation. PA increases Runx2 and DSPP expression that manifest in dental pulp stem cells differentiation into odontoblasts. Combination of PA and PAMAM-CP nanoparticles may potential and beneficial as pulp capping biomaterial for dentin regeneration in dental caries.

Keywords: Proanthocyanidin, polyamidoamin, calcium phosphate, good health and well-being, pulp capping, medicine

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292. COMPUTATIONAL STUDY OF Cu^{2+} , Fe^{2+} , Mn^{2+} , Mn^{3+} , Fe^{3+} , CrO_4^{2-} , Si^{4+} , AND Hg^+ BINDING SITES IDENTIFICATION ON CYTOKINES TO PREDICT DENTAL METAL ALLERGY: AN IN-SILICO STUDY

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Introduction: Metal allergy is a general term to describe allergic diseases due to the release of metal ion reactions in the body which are mediated by T cells and involve inflammatory cytokines that can cause morbidity and mortality. Molecular docking is an analysis that can be used to assess the interaction of ligand bonds with target proteins that are used to predict metal allergies caused by metal ions that stimulate cytokines. **Objectives:** To analyze the binding sites of Cu^{2+} , Fe^{2+} , Mn^{2+} , Mn^{3+} , Fe^{3+} , CrO_4^{2-} , Si^{4+} , and Hg^+ ions on cytokines to predict dental metal allergy through a bioinformatics approach, in silico. **Materials and Methods:** Metal ion particles consisting of Cu^{2+} , Fe^{2+} , Mn^{2+} , Mn^{3+} , Fe^{3+} , CrO_4^{2-} , Si^{4+} , and Hg^+ were predicted to bind tumor necrosis factor- α (TNF- α), interferon- γ (IFN- γ), interleukin (IL) IL-1 β , IL-2, IL-4, IL-10, IL-13, IL-17, IL-23, and IL-33 act as target proteins were examined. Results: The blind docking simulation succeeded in identifying the comparison of the binding activity of metal ion particles on cytokines target proteins. The docking simulation results show that the metal ion with the most negative binding affinity value binds to the IL-17 protein. **Conclusions:** Metal ion particles consisting of Cu^{2+} , Fe^{2+} , Mn^{2+} , Mn^{3+} , Fe^{3+} , CrO_4^{2-} , Si^{4+} , and Hg^+ have the most negative binding affinity values for binding to IL-17 protein, which can cause allergic reactions predicted by molecular docking, in silico.

Keywords: allergy, dentistry, good health and well-being, medicine, orthodontics

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293. GINGIVAL MEDICINAL SIGNALING CELLS CONDITIONED MEDIUM EFFECT ON THE OSTEOCLAST AND OSTEOBLAST NUMBER IN LIPOPOLYSACCHARIDE-INDUCED CALVARIA BONE RESORPTION IN WISTAR RATS' (RATTUS NOVERGICUS)

Ramadhani NF, Nugraha AP, Ihsan IS, Agung YA, Rantam FA, Ernawati DS, Ridwan RD, Narmada IB, Ansori ANM, Hayaza S, Noor TNEBTA

Introduction: The gingival medicinal signaling cells conditioned medium (GMSCs-CM) is a biocompatible material which possessed beneficial cytokine, anti-microbial peptide, growth factor that can be collected after culture. GMSCs- CM may inhibit bone resorption in order to improve the patient's quality of life. **Objective:** In this study, the potential effect of GMSCs-CM on the number of osteoclasts and osteoblasts in Lipopolysaccharide (LPS)-induced calvaria bone resorption in wistar rats (*Rattus novergicus*) has been analyzed. **Materials and Methods:** Twenty-eight male and healthy wistar rats (*R. novergicus*) at the age of 1-2 months old with 250-300grams body were divided into 4 groups, namely PBS group: 100µg PBS day 1-7; LPS group: 100µg LPS day 1-7; LPS and GMSCs group: 100µg LPS + 100µg GMSCS-CM day 1 1-7, GMSCs group: 100µg M-GMSCs day 1-7. *Escherichia Coli* LPS was used to induce the bone resorption on the calvaria with subcutaneous injection. GMSCs-CM was collected after passage 4-5 then injected subcutaneously on the calvaria. All samples were examined on the 8th day through cervical dislocation. The number of osteoblasts and osteoclasts in calvaria was then observed under 400x magnification. One Way ANOVA and Tukey HSD were conducted to analyze differences between groups ($p < 0.01$). **Results:** The number of osteoclasts in calvaria decreased significantly in the LPS + GMSCs-CM group compared to LPS group ($p < 0.01$). The number of osteoblasts in calvaria increased significantly in the LPS + GMSCs-CM group compared to LPS group ($p < 0.01$). GMSCs-CM can reduce the amount of osteoclast significantly and increases the production of osteoblast in LPS-induced calvaria bone resorption in wistar rats (*R. novergicus*).

Keywords: Gingival Mesenchymal Stem Cells Conditioned Medium, Human Well-Being, Lipopolysaccharide, Medicine, Osteoblast, Osteoclast

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294. CATHELICIDIN IN MESENCHYMAL STEM CELL CONDITIONED MEDIUM INHIBIT PRO-INFLAMMATORY CYTOKINE AND OSTEOCLASTOGENESIS: A BIOINFORMATIC APPROACH

Ramadhani NF, Kharisma VD, Leonita DV, Rahmawati D, Puteri A, Sarasati A, Rezkiti F, Joestandari F, Nugraha AP

Introduction: Mesenchymal stem cell conditioned medium (MSC-CM) possessed abundant beneficial active compounds such as Cathelicidin or LL-37. Cathelicidin is antimicrobial peptide that may inhibit the microbial pathogen, pro-inflammatory cytokine and osteoclastogenesis. Cathelicidin may potential for drug development to treat osteolysis due to excessive pro-inflammatory cytokines induced by endotoxin. **Objective:** The aim of this study is to investigate MSCs-CM active compound namely Cathelicidin (LL-37) effect binding to tumor necrosis factor alpha (TNF- α), Interleukin 1 beta (IL-1 β), Receptor activator of nuclear factor κ B (RANK), and tumor necrosis factor receptor 1 (TNFR1), interleukin-1 receptor complex type 1 (IL-1RI), receptor activator complex of nuclear factor kappa-B ligand and osteoprotegerin (RANKL / OPG) by means of bioinformatics approach, in silico study. Sample preparation of target protein from RCSB PDB database. Then, the sample went through molecular docking method (rigid-body docking). Last, the sample visualize as 3D structure using PyMol software. **Results:** The molecular docking simulation results showed that the binding condition with the cathelicidin TNFR_Cathelicidin complex at Rank 1 has the lowest binding energy with a global score of -83.94 kcal/mol, the IL1 β R_Cathelicidin complex at Rank 1 has the lowest binding energy with a global score of -8.43 kcal/mol. The RANK / TNFRSF11A_Cathelicidin complex in Rank 1 has the lowest binding energy with a global score of -21.67 kcal/mol. **Conclusion:** Ligand-receptor binding of Cathelicidin demonstrated by molecular docking inhibits various pro-inflammatory cytokines that may inhibit osteoclastogenesis in silico.

Keywords: LL-37, Cathelicidin, Stem Cells, Dentistry, Medicine

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295. MUTATIONS ON *MSX1* GENE EFFECT ON TOOTH AGENESIS

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Introduction: Tooth agenesis is one of the most common anomalies of the dentition and *MSX1* plays a significant role in early stages of tooth development by expressing in dental mesenchyme. The purpose of this research is to identify the association between tooth agenesis and mutations in *MSX1* gene. **Materials and Methods:** Mutated sequences in *MSX1* gene are collected from multiple articles and 3D protein models are constructed using SWISSMODEL, wild type 3D model is compared with mutated model using RasMol and DEEP VIEWER. All the articles are retrieved from the archives of the National Center for Biotechnology Information (NCBI). **Results:** The RMSD values in comparison using carbon alpha and backbone atoms were obtained by the superimposition of the wild type and mutated *MSX1* protein using DEEP VIEWER after obtaining their templates from NCBI. **Conclusion:** Point mutations in the *MSX1* gene cause the changes of amino acid sequence of its protein, resulting in possible structural changes of varying degree that may have biological impacts in relation to tooth agenesis.

Keywords: *MSX1* gene, mutation, 3D modelling

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296. TOOTH AGENESIS: IS THERE ANY ASSOCIATION WITH POINT MUTATIONS AT PAX9 GENE?

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Introduction: Tooth agenesis is one of the most common anomalies of the dentition and *PAX9* plays a significant role in early stages of tooth development. Studies have shown that *PAX9* gene mutations may cause the occurrence of missing teeth in humans. **Objectives:** The purpose of this research is to identify the possible association between tooth agenesis and mutations in *PAX9* gene from bioinformatics approach and proposed 3D models. **Materials and Methods:** Mutated sequences in *PAX9* gene are collected from multiple articles and 3D protein models are constructed using SWISSMODEL, wild type 3D model is compared with mutated model using RasMol and DEEP VIEWER. All the articles are retrieved from the archives of the National Center for Biotechnology Information (NCBI). **Results:** The RMSD values in comparison using carbon alpha and backbone atoms were obtained by the superimposition of the wild type and mutated *PAX9* protein using DEEP VIEWER after obtaining their templates from NCBI. **Conclusion:** Point mutations in the *PAX9* gene cause changes of amino acid residue resulting in possible structural changes of varying degree, depending on the RMSD values being compared between superimposed 3D structures. This may or may not have a relationship with the biological impacts of said point mutations in relation to tooth agenesis.

Keywords: PAX9 gene, mutation, 3D modelling

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297. ASSOCIATION OF SALIVARY STATHERIN, CALCIUM, AND PROLINE-RICH PROTEINS ON ORAL HYGIENE: A CROSS-SECTIONAL STUDY

Pateel DGS, Gunjal S, Fong LF, Hanapi NSM

Background: Saliva, as a complex biofluid, plays a pivotal role in maintaining oral health and tooth integrity. There has been inconsistent data available on the relationship between salivary parameters and oral health. This study aims to investigate the association between salivary statherin, acidic proline-rich proteins (aPRP), and calcium with oral hygiene status. **Methods:** One hundred and eighty-eight healthy subjects aged between 18 and 50 years with varying oral hygiene status who gave consent to participate were included in this cross-sectional study. The subjects were recruited from primary oral health care of MAHSA University. Oral hygiene of all the participants was measured using Oral Hygiene Index-Simplified (OHI-S). Stimulated saliva collected using paraffin wax was analyzed for salivary statherin, aPRP, and calcium. The relationship between salivary statherin, aPRP, and calcium levels with OHI-S was assessed using Spearman's Rank correlation coefficient; the strength of relationship was assessed by multiple linear regression analysis. **Results:** The study found a weak positive correlation ($r = 0.179$, $p = 0.014$) between salivary statherin and OHI-S; weak negative correlation ($r = -0.187$, $p = 0.010$) between salivary aPRP and OHI-S; and moderate negative correlation between salivary statherin and salivary aPRP levels ($r = -0.50$, $p < 0.001$) which were statistically significant. **Conclusion:** Poor oral hygiene is associated with increased statherin and reduced aPRP levels in saliva. Thus, these salivary components may have a role in predicting oral hygiene status.

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298. ANTIFUNGAL PROPERTIES OF ZINC OXIDE NANOPARTICLES ON CANDIDA ALBICANS

Djearamane S, Xiu L-J, Wong L-S, Rajamani R, Bharathi D, Kayarohanam S, De Cruz AE, Tey L-H, Janakiraman AK, Aminuzzaman M, et al.

This paper reports the antifungal properties of zinc oxide nanoparticles (ZnO NPs) on *Candida albicans* ATCC 1023 through the study of growth inhibitory effects of ZnO NPs on *C. albicans* and the effect of the nanoparticles on the surface of *C. albicans*. The growth inhibitory effects of ZnO NPs (5, 10, 20, 40, 80, and 160 µg/mL) on *C. albicans* at 24 h were determined through the reduction in suspension turbidity and colony count. Fourier transform infrared (FTIR) analysis was carried out to establish the functional groups associated with the interaction of ZnO NPs on the yeast cell wall, while scanning electron microscopy (SEM) with energy dispersive X-ray (SEM-EDX) analysis was utilised to determine the surface accumulation of ZnO NPs on the yeast cells and the consequential morphological alterations on *C. albicans*. The results exhibited a significant ($p < 0.05$) growth inhibition for all tested concentrations except for 5 µg/mL of ZnO NPs at 24 h as compared to negative control. FTIR analysis revealed the possible involvement of alcohol, amide A, methyl, alkynes, amide I and II, and phosphate groups from the cell wall of *C. albicans* in the surface interaction with ZnO NPs. Finally, SEM-EDX revealed a considerable accumulation of ZnO NPs on the yeast cells and consequential morphological alterations on *C. albicans*, including the damage of hyphae, pitting of the cell wall, invagination, and rupture of the cell membrane. The current study demonstrated that ZnO NPs possess antifungal properties against *C. albicans* in a dose-dependent manner, and the surface interaction of ZnO NPs on fungal cells caused alterations in cell membrane integrity that might have resulted in cell death.

Keywords: Zinc oxide nanoparticles, *Candida albicans*, antifungal property, growth inhibition, morphological alterations

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299. AN *IN VITRO* STUDY OF THE ANTIFUNGAL EFFICACY OF ZINC OXIDE NANOPARTICLES AGAINST *SACCHAROMYCES CEREVISIAE*

Tan EP, Djearamane S, Wong LS, Rajamani R, Tanislaus Antony AC, Subbaih SK, Janakiraman AK, Aminuzzaman M, Subramaniyan V, Sekar M, et al.

Zinc oxide nanoparticles (ZnO NPs) are widely used in biomedical applications due to their antimicrobial and antioxidant properties. The objective of the present study was to determine the antifungal activity of ZnO NPs against the yeast *Saccharomyces cerevisiae*. The turbidity test results showed a significant ($p < 0.05$) dose-dependent growth inhibitory effect of ZnO NPs on *S. cerevisiae* as the growth inhibition increased from 7.04 ± 0.64 to $70.30 \pm 3.19\%$ as the concentration of ZnO NPs increased from 5 to 150 $\mu\text{g/mL}$. The scanning microscopy images evidenced the morphological alterations such as regional invagination, pitting, cracks, wrinkles, and cell wall rupture in the yeast cells treated with ZnO NPs. In addition, the FTIR spectrum revealed the possible involvement of hydroxyl, alkene, amides, carbonyl, and phosphate groups from polysaccharides, polypeptides, phospholipids, and ergosterol of the yeast cells wall for binding of ZnO NPs on the cell surface. The present study has demonstrated the antifungal activity of ZnO NPs on *S. cerevisiae* through growth inhibition and the morphological damages resulting from the treatment of ZnO NPs.

Keywords: yeast cells, growth inhibition, morphological alterations, scanning electron microscopy, FTIR

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300. DYSREGULATION OF METALLOTHIONEIN AND ZINC AGGRAVATES PERIODONTAL DISEASES

Aziz J, Rahman MT, Vaithilingam RD

Introduction: Periodontitis (PD) is a multifaceted inflammatory disease connected to bacterial infection that results in the destruction of tooth supporting structures and eventually tooth loss. Given their involvement in infection and inflammation, both metallothionein (MT) and zinc (Zn) might play vital roles in the development and progression of PD. More specifically, both MT and Zn are heavily involved in regulating immune functions, controlling bacterial infection, balancing inflammatory responses, and reducing oxidative stress, all of which are associated with the pathogenesis of PD. **Objective:** This review paper will explore the physiological functions of MT and Zn and hypothesise how dysregulation could negatively affect periodontal health, leading to PD. **Results:** Bacterial lipopolysaccharide (LPS) derived from periodontal pathogens, namely *P. gingivalis* initiates the acute phase response, thus upregulating the expression of MT which leads to the subsequent deficiency of Zn, a hallmark of periodontal disease. This deficiency leads to ineffective NETosis, increases the permeability of the gingival epithelium, and disrupts the humoral immune response, collectively contributing to PD. In addition, the presence of LPS in Zn deficient conditions favours M1 macrophage polarisation and maturation of dendritic cells, and also inhibits the anti-inflammatory activity of regulatory T cells. Collectively, these observations could theoretically give rise to the chronic inflammation seen in PD. **Conclusion:** A disrupted MT and Zn homeostasis is expected to exert an adverse impact on periodontal health and contribute to the development and progression of PD.

Keywords: Dentistry, Immunity, Infection, Inflammation, Oral health

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301. COMPARATIVE EVALUATION OF VARIOUS SALIVARY INTERLEUKINS IN SMOKING VERSUS NON-SMOKING PERIODONTITIS PATIENTS: A SCOPING REVIEW

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Introduction: Smoking is one of the risk factors contributing to periodontitis. When comparing between non-smoking and smoking periodontitis patients, the later group have faster disease progression rate and higher chance of tooth loss due to periodontitis. The non-invasive diagnosis for periodontitis could be made by determining specific biomarkers in oral fluids such as saliva. Examples of established salivary biomarkers are matrix metalloproteinase 8 (MMP-8), C-reactive protein (CRP) and interleukins. Many studies reported increased salivary interleukin level in general periodontitis patients however whether the level is significantly differed between smoking versus non-smoking periodontitis patients has not been clearly concluded. **Objectives:** This review aimed to collate systematically studies reporting the level of various salivary interleukins in non-smoking and smoking periodontitis patients and further determine if there is a significant difference between the two groups. **Methods:** Literature search was performed using 3 databases (PUBMED, Science Direct and Wiley Online for original research articles that match the inclusion criteria. Search keywords used were saliva, biomarkers, periodontitis, smoking, cytokines and interleukins. **Results:** From the databases searched, nine studies met the criteria and are included in this review. Increased salivary IL-1B and IL-6 concentrations are found in periodontitis patients with active smoking status compared to the non-smokers. Meanwhile, level IL-8 and IL-10 are higher in non-smokers group. **Conclusions:** Findings of this review indicate higher level of specific salivary interleukins in smoking as compared to non-smoking periodontitis patients. This further suggests potential application of these interleukins as biomarkers for diagnosis and monitoring of periodontitis in patients.

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302. HISTOLOGIC ASSESSMENT OF PERI-IMPLANT TISSUES AROUND ENDOSSEOUS DENTAL IMPLANTS PLACED ALONG WITH INTENTIONALLY RETAINED ROOT FRAGMENT IN ANIMAL MODELS: A SYSTEMATIC REVIEW

Gaikwad AM, Joshi AA, Yadav S, Nadgere JB

Purpose: To evaluate whether the placement of endosseous dental implants along with intentionally retained root fragments enhances peri-implant histologic characteristics and outcomes in healthy animal models. **Materials and Methods:** Two review authors independently performed electronic literature searches across the PubMed/MEDLINE, LILACS, EBSCOhost, and Science Direct databases by using different keywords and Medical Subject Headings terms to identify relevant articles. Only preclinical animal trials evaluating the histology of peri-implant tissues around endosseous dental implants placed along with intentionally retained root fragments were included in the review. The risk of bias assessment was investigated using the Systematic Review Centre for Laboratory animal Experimentation (SYRCLE) tool, and the reporting quality of each trial was evaluated using the Animal Research: Reporting in Vivo Experiments guidelines. **Results:** Seven preclinical trials including a total of 33 animals and 155 endosseous dental implants were eligible for the analysis. One trial reported the histologic assessment of peri-implant tissues around endosseous dental implants with ankylotic root fragments, whereas the other six studies used nonankylotic root fragments. The effects of the length of retained root fragments on peri-implant tissues were reported in two trials that showed contrasting results. The effects of the width of retained root fragments were assessed in two trials reporting that a remaining thickness < 2 mm and buccal bone thickness > 3 mm favors alveolar bone preservation over a period of 12 weeks. Although the mean quality assessment score for all preclinical trials was moderately high, the summary for the risk of bias presented a high risk. **Conclusion:** Limited data and short-term preclinical evidence showed optimal peri-implant histologic findings of endosseous dental implants placed along with intentionally retained root fragments. However, further preclinical histologic evaluation with homogenous populations and long-term controlled clinical studies are needed to substantiate its applicability in clinical situations.

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303. EVALUATION OF GINGIVAL CREVICULAR FLUID AND SERUM TARTRATE RESISTANT ACID PHOSPHATASE LEVELS IN SUBJECTS WITH CLINICALLY HEALTHY PERIODONTIUM AND CHRONIC PERIODONTITIS – A CLINICO BIOCHEMICAL STUDY

Baddam H, Vivekanandan G, Kondreddy K, Peddi S, Chitnis PP, Singh YP, Tiwar RVC

Background: Periodontitis is a chronic inflammatory disease with conglomerate etiology making it difficult to diagnose at the early stages. Potential biomarkers in gingival crevicular fluid (GCF) would determine the presence of the current disease activity, predict sites vulnerable for future breakdown, and assess the response to periodontal interventions. Merely elevated levels of inflammatory soft-tissue markers do not indicate bone destruction. Since there is no single ideal biomarker established, bone-related biomarkers such as telopeptide of type I collagen, osteocalcin, calprotectin, osteopontin, and tartrate-resistant acid phosphatase (TRAP) seem to hold great promise as predictive markers to determine bone destruction and active phases in the disease progression. The present study is intended to explore the biologic plausibility of the levels of TRAP in health and chronic periodontitis. **Materials and methods:** The present cross-sectional clinico-biochemical study comprised 30 systemically healthy subjects with 15 periodontally healthy and 15 chronic periodontitis subjects who were age and gender matched. GCF and blood samples were collected from all the patients. TRAP estimation was done in both the samples using an enzyme-linked immunosorbent assay kit. The data were analyzed using independent t-test and Pearson correlation test. **Results:** Serum and GCF TRAP levels in chronic periodontitis subjects were significantly higher when compared to the periodontally healthy group. There were no significant correlations found among serum and GCF TRAP levels with increasing age and gender in both the groups. An increase in disease severity, i.e., increase in probing pocket depth and clinical attachment level, did not show correlation with the GCF and serum TRAP levels in the chronic periodontitis group. **Conclusion:** Based on the findings of the present study, increased GCF TRAP levels in chronic periodontitis seem to be a potential marker for identifying ongoing periodontal destruction.

Keywords: Gingival crevicular fluid, Periodontitis, tartrate-resistant acid phosphatase

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304. THE EFFECT OF BIOACTIVE GLASS AND SINTERING CONDITIONS ON THE PROPERTIES OF TITANIUM-HYDROXYAPATITE COMPOSITES

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Titanium-hydroxyapatite (Ti-HA) based composites have been widely investigated as viable materials to be used in dentistry. However, sintering of these composites is very challenging due to decomposition of HA and oxidation of Ti. The objective of this study was to investigate the effect of incorporating a bioactive glass in Ti-HA composites sintered in different atmospheric conditions. The bioactive glass was prepared and added to different percentages of Ti-HA mixtures and divided into two groups. Samples in Group 1 were sintered with air atmosphere, while samples in Group 2 were sintered with vacuum furnace. All samples were later subjected to XRD, SEM, density, micro-hardness, and compression strength tests. XRD results showed that in Group 1, the major phases were assigned to Ti and HA while the minor phases were assigned to oxidised Ti. Whereas, Group 2 showed that the major phases were assigned to HA and the minor phases showed decomposition of HA to $\text{Ca}_3(\text{PO}_4)_2$ (TCP) and $\text{Ca}_4(\text{PO}_4)_2\text{O}$ (TTCP). Oxidized Ti was also present in this group. In terms of density, micro-hardness and compression strength, statistical analyses showed that samples in Group 1 have a significant difference ($p = 0.000$) as compared to those in Group 2. Sintering Ti-HA composites incorporated with BG by using air atmosphere furnace could reduce the decomposition of HA and oxidation of Ti, thus improve the density, micro-hardness and compression strength of the composites.

Keywords: Bioactive glass, composites, compression strength, hydroxyapatite, sintering process, titanium

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305. AN *IN VITRO* STUDY TO EVALUATE AND COMPARE THE EFFECT OF SURFACE TREATMENT OF IMPLANT ABUTMENTS ON THE RETENTIVENESS OF THREE COMMERCIALLY AVAILABLE PROVISIONAL CEMENTS

Jubapu AS, Pinto B

There is no universal opinion regarding the cement selection for implant supported prosthesis. Retentive potential of cements on a smooth abutment head is questionable. Surface modifications of abutments by sandblasting may increase the retentive strength of cemented castings as a result of micro and macro-retention. The present study was carried out to evaluate and compare the cement failure load of an implant supported restoration when used on abutments of varying texture with various provisional cements. Ten implant analogs and thirty implant abutments were used. Copings were seated on abutment with hand pressure for 10 seconds. This was followed by placement of a 5 kg load with help of cementation jig. Universal testing machine was used to test the cement failure load of the luting cements. Abutments were sandblasted with 50 µm aluminum oxide particles. New groups of copings were checked for internal surface configuration, passivity, and marginal adaptation on implant abutment-analog assembly before cementation and all the test specimens were stored in saline for 24 hours after cementation. Subsequently, all the test specimens were subjected for testing. The results of the study showed that, the maximum cement failure load value (113.79 N) was observed in sandblasted abutments with RelyXTM Temp NE cement. The least cement failure load value (63.76 N) was observed in non-sandblasted abutments with FREEGENOL TEMPORARY PACK cement. Sandblasting with 50 µm aluminium oxide particles for 5 seconds at a distance of 10 mm increased the cement failure load value in all the cement groups.

Keywords: Surface Treatment, Implant abutment, Retention, Cement

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306. INFLUENCE OF DIETARY SOLVENTS ON OPTICAL PROPERTIES AND WEIGHT OF DENTAL COMPOSITES: AN *IN-VITRO* STUDY

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Introduction: Dental composites have evolved tremendously from being an artisanal material to a highly reliable computer-aided design/ computer-aided manufacturing (CAD/CAM) material. The physical changes that may occur when composites interact with dietary factors is an area that needs further investigation. **Objective:** The objective of this study is to identify the changes in colour, translucency, and weight, and to relate weight changes to degree of conversion (DC) of representative samples following conditioning in different dietary solvents. **Materials and Methods:** Samples for this study consists of direct composite (Filtek Z350 [FZ]), indirect composite (Ceramage [CM]) and CAD-CAM composites (Shofu HC [HC], Cerasmart [CS], Vita Enamic [VE], Lava Ultimate [LU]). Samples of a standard measurement (12 x 14 x 1.5mm) were divided into six groups (n=12) and were conditioned in the following media for 1 week at 37°C: air (control), distilled water, 0.02 N citric acid, 0.02 N lactic acid, heptane, and 50% ethanol-water solution. Weight change post conditioning was measured using an analytical balance (Sartorius BP161P, Minden, Germany). Colour change in the form of ΔE , and translucency parameter (TP) was measured using a spectrophotometer (CM-5, Konica Minolta Sensing Europe B.V) and DC was assessed using a Fourier Transform Infra-Red Spectroscopy (FT-IR) (Nicolet 6700, Thermo Scientific). Inter-medium and inter-material comparisons were performed with one-way analysis of variance and post hoc Tukey test for weight and colour change. For TP, an independent T test was done. The significance level was $p < 0.05$. **Results:** The results demonstrate that weight change was significant for all materials in all dietary solvents. Regardless of the solvent in which the samples were conditioned, LU had the highest and CM had the lowest weight change. Significant change in colour and translucency was only observed with LU samples when immersed in 50% ethanol-water solution. Post conditioning DC value was highest in LU and lowest in HC and this can be related to weight change as dental composites with lowest DC value also showed least weight change. **Conclusions:** Our findings suggest that CAD/CAM composites did undergo changes in optical property and weight post conditioning with dietary solvents despite being acclaimed for its superior physical properties.

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307. MICROTENSILE BOND STRENGTH OF TOTAL-ETCH AND SELF-ETCH UNIVERSAL ADHESIVES CONTAINING 10-MDP: A SYSTEMATIC REVIEW

Razak NAA, Ramzi NDM, Yusof MYPM, Ismail IH

Introduction: A systematic review was performed to compare the human dentin microtensile bond strength of universal adhesives with 10-MDP when used as total-etch and self-etch strategies. **Materials and Methods:** Literature search was done on October 2019 without limitations on the language of publication, in four databases: PubMed, Web of Science, Scopus, and EBSCO. Additional manual search was done for the grey literature articles: OpenGrey and OpenThesis. Studies that evaluated the dentin bond strength of universal adhesives with 10-MDP using total-etch and self-etch strategy from the year 2000 up till October 2019 were included. **Results:** The initial search resulted in 5121 references: 2234 from PubMed, 1814 from Scopus, 516 from Web of Science, 553 from EBSCO and 4 from OpenThesis. After full text analysis, 30 references were included in this systematic review. Seven different universal adhesives with 10-MDP were evaluated for dentin microtensile bond strength comparing total-etch and self-etch strategies: Single Bond Universal/Scotchbond Universal (3M ESPE), All Bond Universal (Bisco), Clearfil Universal Bond (Kuraray), G-Premio Bond (GC Corp), Tetric Bond Universal (Ivoclar Vivadent), Ambar Universal (FGM) and One Coat 7 Universal (Coltene). The total-etch strategy improved the dentine microtensile bond strength compared to self-etch strategy for all universal adhesives when stored in all three conditions: 24h, thermocycling and long-term immersion according to ISO (TS 11405:2015(E)). **Conclusion:** The evidence suggests that microtensile bond strength of universal adhesives containing 10-MDP may be improved utilizing total-etch strategy compared to self-etch strategy. This study provides valuable information on the importance of appropriate dentin adhesives strategy that affect success rate of restorations, which helps clinicians to make informed decisions on the strategy to be used during restorations in practice.

Keywords: 10-MDP, Dental bonding, Self-etch, Total-etch, Universal adhesive, Microtensile bond strength, Systematic review

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308. MICROBIAL ADHESION, PHYSICAL AND MECHANICAL PROPERTIES OF REMOVABLE RETAINER MATERIALS IN DIFFERENT STORAGE CONDITIONS: AN IN VITRO STUDY

Kairul Annuar AF, Zakaria NN, Wan Hassan WN, Abdul Razak F

Introduction: Inadequate evidence exists to recommend a way of storing removable retainers. As a result, clinicians give conflicting advices to their patients about retainer wear and care. **Objectives:** The present study aimed to compare the effects of storage conditions on the microbial affinity, surface roughness, sorption and, flexural strength/modulus of two removable retainer materials, polyethyleneterephthalate glycol modified (PETG) and polymethyl methacrylate (PMMA). **Methods:** Twenty test samples [PETG (n=10) and PMMA (n=10)] were prepared at standard dimensions (PMMA, 30 x 5 x 2 mm; PETG, 30 x 5 x 1 mm). The samples were divided into 4 groups: 1) PMMA stored in wet condition, 2) PMMA stored in dry condition, 3) PETG stored in wet condition, and 4) PETG stored in dry condition. Samples were incubated at 37°C in a mixture of artificial saliva and bacteria for 8 hours daily to mimic part-time wear of retainers, brushed with standardised strokes for 10-15 seconds and cleaned with distilled water. Wet group samples were stored in distilled water, while dry group samples were stored in a dry container (desiccator) for 14 hours. Samples underwent a series of tests at baseline after 14th day: (1) microbial adhesion by enumerating the colony forming unit per ml; (2) water sorption by measuring weight and volume; (3) surface roughness using atomic force microscope; and (4) flexural strength/modulus by three-point bending test. **Results:** Results revealed there were significant differences in the microbial adhesion ($p < 0.001$) and water sorption ($p = 0.020$) of PMMA compared to PETG in wet and dry storage conditions, but no significant differences in surface roughness ($p = 0.659$) and flexural strength/modulus ($p = 0.593$). **Conclusion:** In conclusion, dry storage condition for both materials exhibited less microbial adhesion, less surface roughness, less sorption and higher flexural strength/modulus than wet storage condition.

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309. EFFECT OF INTRACANAL MEDICAMENTS ON THE BOND STRENGTH OF BIOCERAMIC ROOT FILLING MATERIALS TO OVAL CANALS

Al-Haddad AY, Kacharaju KR, Haw LY, Yee TC, Rajantheran K, Mun CS, Ismail MF

Aim: This study aimed to evaluate the effect of the prior application of intracanal medicaments on the bond strength of OrthoMTA (mineral trioxide aggregate) and iRoot SP to the root dentin. **Materials And Methods:** Thirty single-rooted mandibular premolars were standardized and prepared using ProTaper rotary files. The specimens were divided into a control group and two experimental groups receiving Diapex and Odontopaste medicament, either filled with iRoot SP or OrthoMTA, for 1 week. Each root was sectioned transversally, and the push-out bond strength and failure modes were evaluated. The data were analyzed using Kruskal Wallis and Mann-Whitney U post hoc test. **Results:** There was no significant difference between the bond strength of iRoot SP and OrthoMTA without medicaments and with the prior placement of Diapex (p value > 0.05). However, iRoot SP showed significantly higher bond strength with the prior placement of Odontopaste (p value < 0.05). Also, there was no association between bond strength of OrthoMTA with or without intracanal medicament (p value > 0.05) and between failure mode and root filling materials (p value > 0.05). The prominent failure mode for all groups was cohesive. **Conclusion:** Prior application of Diapex has no effect on the bond strength of iRoot SP and OrthoMTA. However, Odontopaste improved the bond strength of iRoot SP. **Clinical Significance:** Dislodgment resistance of root canal filling from root dentin could be an indicator of the durability and prognosis of endodontic treated teeth.

Keywords: Bond strength, Diapex, Intracanal medicaments, iRoot SP Odontopaste

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310. A COMPARATIVE EVALUATION OF THE SHAPING ABILITY, CANAL STRAIGHTENING, AND PREPARATION TIME OF FIVE DIFFERENT NITI ROTARY FILES IN SIMULATED CANALS

Siang Lin GS, Singbal KP, Abdul Ghani NRN

Aim: The aim is to compare the shaping ability, canal straightening, and the preparation time of five different nickel-titanium rotary files in simulated J-shaped canals. **Materials and Methods:** Ninety J-shaped canals in resin blocks were filled with 2% Methylene Blue solution and pre-instrumentation images were taken using a Leica microscope at a $\times 10$. They were prepared until size 25 taper 0.04 using ($n = 18$ per group): T-Flex, HyFlex CM, Vortex Blue, S5, and iRace. After instrumentation, images were captured again, and composite images were made using Adobe Photoshop imaging software. The differences in canal width and canal curvature at each respective landmark were measured and compared. The preparation time and canal abbreviations were also recorded. Statistical analyses were performed using one-way ANOVA and *post hoc* Tukey HSD tests. The level of statistical significance was set to $P < 0.05$. **Results:** HyFlex CM demonstrated the least difference in canal width after instrumentation, but no significant difference ($P > 0.05$) as compared to T-Flex and Vortex Blue. The mean canal straightening ranged between 0.91° and 7.65°. T-Flex created the least canal straightening after instrumentation which was significantly less ($P < 0.05$) than S5, but there was no significant difference ($P > 0.05$) when compared to HyFlex CM. Instrumentation with the S5 file was significantly faster ($P < 0.05$), whereas HyFlex CM was the slowest. **Conclusion:** T-Flex, HyFlex CM, and Vortex Blue demonstrated better shaping ability, whilst T-Flex and HyFlex CM maintained the original canal curvatures well. S5 tended to straighten the canals and caused the greatest canal transportation, but it required the least amount of time to shape the canal.

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311. APICAL SEALING ABILITY OF EXPERIMENTAL APATITE CALCIUM PHOSPHATE BASED COATED GUTTA-PERCHA POINTS

Al-Haddad A, Kutty M, Ab Aziz ZAC

Aims: This study aimed to assess the apical sealing ability of experimental apatite-coated gutta-percha points compared to various coated gutta-percha root filling materials. **Study Design:** Experimental in-vitro study. **Place and Duration of Study:** Department of Restorative Dentistry, University of Malaya, June 2014 and November 2014. **Methodology:** Ninety-six extracted permanent maxillary central incisors were standardized and prepared by ProTaper universal rotary files. The specimens were allocated into six groups (n=15) and filled using matching single cone technique as follows; EndoREZ points with EndoREZ sealer, Bioceramic coated points (BCGP), Active GP (ActiV GP), Conventional gutta-percha (GP), apatite coated GP (HAGP) all in combination with Endosequence BC sealer. The sixth group was filled using cold lateral compaction of Conventional GP and Endosequence BC sealer. The specimens were subjected to a dye leakage test. The remaining six teeth were divided equally to be used as a negative and positive control. One-way analysis of variance (ANOVA) followed by the post hoc Dunnett T3 test was performed for data analysis, and the significance value was set at $P = .05$. **Results:** ActiV GP had the least leakage followed by BCGP, HAGP, cold lateral compaction, conventional GP, and EndoRez. **Conclusion:** HAGP as root canal filling showed favourable sealing ability comparable to ActiV GP, BCGP, and conventional GP and it was superior to EndoREZ.

Keywords: Apatite, coated gutta-percha, root canal filling, sealing ability

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312. COMPARATIVE EVALUATION OF RESIN DENTIN INTERFACE USING UNIVERSAL AND TOTAL-ETCH ADHESIVE SYSTEMS ON SOUND AND ERODED DENTIN: *IN VITRO* STUDY

Kanniappan G, Hari P, Jujare RH

Objective: This study aimed to compare the resin-dentin interface of sound and eroded dentin using universal and total-etch adhesive systems. **Materials And Methods:** Forty caries-free extracted human premolars were collected, and the occlusal surfaces were ground by using slow speed diamond disc with copious water supply until a flat superficial dentin was exposed. The test group underwent erosive cycle ($n = 20$), and another group ($n = 20$) was reserved for control group. Erosive protocol consisted of immersion in 1.23% citric acid for 1 minute every 12 hours and stored in artificial saliva. Both the control and eroded teeth were further subdivided ($n = 10$) for composite restoration by using either self-etch or total-etch systems. Then the tooth samples were sectioned longitudinally and observed under confocal laser scanning microscope at $\times 10$ magnification to evaluate resin tag length and hybrid layer thickness. **Statistical Analysis:** The data obtained were analyzed by using independent t-test. **Results:** The highest mean value of the resin tag length and thickness of hybrid layer was observed with total-etch system in sound dentin group compared with other groups ($p < 0.001$). **Conclusion:** The resin-dentin interface of sound dentin was found to be better than eroded dentin by using total-etch system. The resin-dentin interface of eroded dentin was superior to sound dentin by using self-etch adhesive system.

Keywords: confocal laser scanning microscope, eroded dentin, resin tag length, total-etch adhesive, universal adhesive

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313. CENTION N COMPARED TO OTHER CONTEMPORARY TOOTH-COLORED RESTORATIVE MATERIALS IN TERMS OF FLUORIDE ION RELEASING EFFICACY: VALIDATION OF A NOVEL CARIES-PREVENTION-INITIATIVE BY THE MINISTRY OF HEALTH, MALAYSIA

Singbal K, Shan MKW, Dutta S, Kacharaju KR

Background: The Dental Public Health Services of the Ministry of Health, Malaysia have introduced Cention N as a primary restorative material in the health care centers all over the country. Thus, in this scenario, a comprehensive evaluation of Cention N as compared to other restorative materials, in terms of fluoride release, assumes to be of utmost relevance. Fluoride release plays a pivotal role in the prevention of secondary dental caries, and dental restorations facilitate direct fluoride delivery to the susceptible tooth surface. **Aim:** To evaluate and compare the fluoride releasing property of Cention N with other restorative materials, EQUIA Forte, Beautifil II and Estelite Quick. **Methods and Material:** A total of 20 disk-shaped brass-mold samples (6 ± 0.1 mm in diameter and 2 ± 0.1 mm thickness) for the dental restorative materials were prepared, with five samples for each of Cention N, EQUIA Forte, Beautifil II and Estelite Quick. Following the immersion of samples in deionizing water, the released fluoride ions were measured over 28 days using ion chromatography. Data were obtained at day 1, 7 and 28 post-immersions. **Statistical analysis:** Data obtained from this investigation was analyzed using the MedCalc statistical software (v. 19.05). Kolmogorov-Smirnov test followed by Repeated Measures ANOVA and 'Comparison of multiple method' was applied to statistically compare the fluoride release efficacy of Cention N individually with each of the other three materials. Any difference found was considered significant at $P<0.05$. **Results:** Cention N showed significantly higher fluoride release than Beautifil II and Estelite Quick when observed on Day 1, 7 and 28. 'Comparison of multiple method' confirmed the results obtained via ANOVA and showed Cention N is a significantly better ($P<0.05$) material in terms of fluoride release as compared to Beautifil II and Estelite Quick on Day 1, 7 and 28. **Conclusions:** Cention N displays consistent fluoride release while weighing against other contemporary and more expensive restorative materials.

Keywords: Cention N, Composite Resin, Fluoride Ion, Glass Ionomer, Ion Chromatography

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314. A COMPARATIVE EVALUATION OF THE RETENTIVE EFFECT OF FOUR DIFFERENT FORMS OF DENTURE ADHESIVES ON MAXILLARY DENTURES AN *IN VIVO* STUDY

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Statement of the problem: Improving retention of complete dentures is of considerable interest in the field of prosthetic dentistry. With the loss of the natural dentition, edentulousness poses numerous problems associated with the complete dentures in terms of its retention and resulting efficacy. With the advent of new generation denture adhesives, the retention may well be enhanced but the effectiveness over other materials remain to be studied. The objective of the study was to compare the retentive effect offered by different forms of denture adhesives to maxillary dentures. Four types of denture adhesives - powder, paste, liquid and pads were evaluated for their retentive effect on maxillary dentures. A custom-made pulley unit was fabricated in which weights were added to test the retentive effect of all four forms of adhesives. Mean values for pair 3 in Test A&B [346.15] and Test B&C[38.46] were significantly higher than pair 1[158.46][5.38], pair 2[204.61][18.46] and pair 4[302.31][25.38] in both Test A&B and B&C. Within the limitations of this study, it has been concluded that Liquid adhesive was superior to all other forms of adhesives in their performance, which can be considered as the material of choice for more retention. Powder adhesive was least effective in improving retention.

Keywords: Denture adhesives, retention, stability, bond strength

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315. SPECTROPHOTOMETRIC EVALUATION OF CORONAL DISCOLORATION INDUCED BY BIO CERAMIC ROOT CANAL FILLING MATERIALS

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Abstract: The aim of this study is to evaluate the crown discoloration induced by bioceramic root canal filling materials (OrthoMTA and iRoot SP) compared to AH Plus. **Material and Methods:** Sixty intact mandibular single rooted premolars were sectioned 2 mm below the cemento-enamel junction, prepared, and randomly assigned into four groups according to the root filling materials: OrthoMTA, iRoot SP, AH Plus and unfilled. **Results:** Before placement of the materials in the pulp chamber and the coronal third of the root, the spectral reflectance lines of the crowns were recorded by a digital spectrophotometer at baseline, and after filling at 1 week and 1, 3 and 6 months and ΔE values were calculated. All materials used induced clinically perceptible crown discoloration ($\Delta E > 3.7$) and no significant difference was detected between these materials ($p > 0.05$). Regardless of the material, discoloration progressed significantly within the three months ($p < 0.05$) however, at 6 months, the discoloration reduced for AH Plus and no further increase for bioceramic materials was detected. **Conclusion:** Bioceramic root filling materials tested induced clinically perceptible crown discoloration and their application in the esthetic zone should be performed with caution.

Keywords: esthetics, dental, root canal filling materials, tooth discoloration, iroot sp, orthomta, spectrophotometry

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316. CLINICAL ASSESSMENT OF RETENTION IN HYDROPHOBIC AND HYDROPHILIC PIT AND FISSURE SEALANTS

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Introduction: Pit and fissure sealants are one of the most effective preventive dentistry measures. They have been demonstrated to be particularly efficient in preventing caries by blocking pits and fissures. The sealant effectiveness is mainly associated with their retention in the tooth surface.

Objective: To compare & assess the retention between hydrophobic and hydrophilic fissure sealants placed on permanent first molars. **Method:** A total of 100 newly erupted upper & lower permanent first molars from 25 children were considered for the study. Teeth were separated into two equal groups. Group A with 50 right upper and lower permanent first molar teeth were sealed with for Conseal f sealant (SDI, Australia), and Group B with 50 left upper and lower permanent first molar teeth were sealed with Embrace Wet Bond (Pulpdent, USA) sealant. Clinical evaluation was carried out for all the teeth at the different time intervals of 3, 6 & 9 months. **Results:** At the end of 9 months, out of 50 teeth in group A, 39 teeth showed complete retention compared to 45 teeth in group B. Partial loss of sealant was seen with 5 teeth in group A compared to 2 teeth in group B. Whereas only 3 teeth of group B showed missing sealant when compared to 6 teeth in group A. **Conclusion:** Embrace Wet Bond sealant exhibited superior retention than Conseal f sealant when applied on both maxillary & mandibular first permanent molars over 9 months.

Keywords: Embrace Wet Bond, permanent molars, pit & fissure sealants, retention

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317. STRUCTURAL, PHYSICAL, AND MECHANICAL ANALYSIS OF ZNO AND TiO₂ NANOPARTICLE-REINFORCED SELF-ADHESIVE COATING RESTORATIVE MATERIAL

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This study aimed to modify an EQUIA coat (EC; GC, Japan) by incorporating 1 and 2 wt.% of zinc oxide (ZnO; EC-Z1 and EC-Z2) and titanium dioxide (TiO₂; EC-T1 and EC-T2) nanoparticles, whereby structural and phase analyses were assessed using Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD), respectively. Thermogravimetric analysis/differential scanning calorimetry, micro-hardness, and water absorption analyses were conducted, and the microstructure was studied by scanning electron microscopy/energy-dispersive spectroscopy. FTIR spectra showed a reduction in peak heights of amide (1521 cm⁻¹) and carbonyl (1716 cm⁻¹) groups. XRD showed peaks of ZnO (2θ ~ 31.3°, 34.0°, 35.8°, 47.1°, 56.2°, 62.5°, 67.6°, and 68.7°) and TiO₂ (2θ ~ 25.3°, 37.8°, 47.9°, 54.5°, 62.8°, 69.5°, and 75.1°) corresponding to a hexagonal phase with a wurtzite structure and an anatase phase, respectively. Thermal stability was improved in newly modified materials in comparison to the control group. The sequence of obtained glass transitions was EC-T2 (111 °C), EC-T1 (102 °C), EC-Z2 (98 °C), EC-Z1 (92 °C), and EC-C (90 °C). EC-T2 and EC-T1 showed the highest (43.76 ± 2.78) and lowest (29.58 ± 3.2) micro-hardness values. EC showed the maximum water absorption (1.6%) at day 7 followed by EC-T1 (0.82%) and EC-Z1 (0.61%). These results suggest that EC with ZnO and TiO₂ nanoparticles has the potential to be used clinically as a coating material.

Keywords: DSC, EQUIA coat, FTIR, TGA, dental materials, glass ionomer, hardness, nanoparticles, titanium dioxide, zinc oxide

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318. AN ASSESSMENT ON PH AND CALCIUM RELEASE OF DYCAL, LIMELITE AND BIODENTINE AS CAVITY LINERS

Vanishree HS, Anand ST, Tze HAY, Mieow KC

Introduction: Indirect pulp treatment is performed on a deep carious tooth that is close to the pulp followed by the placement of a protective layer. The protective layer should promote new reparative dentin. **Aims & Objectives:** To compare and assess the pH and calcium release of Dycal, Lime lite and Biodentine. **Materials and Methods:** Standardized class 1 cavities were prepared on 36 extracted molars with the excision of pulp. The remaining dentin thickness was maintained from both the coronal and pulpal sides. Nail varnish was applied on all the external surfaces. Samples were divided into 3 equal halves with 12 teeth each. They were treated with an indirect pulp capping procedure by using Dycal, Lime lite and Biodentine. Samples were placed in reverse osmosis water and subjected for pH analysis and assessment of calcium ion release at 3 hours, 24 hours and 48 hours. **Results:** The pH analysis after 3 hours showed a significant difference among the 3 groups. There was a significant difference in pH change when compared between Biodentine and Lime lite and no differences between Biodentine and Dycal. The highest calcium ion release was observed with Biodentine at 3, 24, 48 hours. The difference in the amount of calcium released after 24 and 48 hours between the materials Biodentine and Dycal, and Biodentine and Lime lite was statistically significant. **Conclusion:** Biodentine demonstrated superior bioactivity than Dycal and Limelite in terms of calcium ion release, and there was no significant variation in pH between the three materials.

Keywords: Biodentine, Calcium Hydroxide, Dycal, Indirect Pulp Capping, Lime lite

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319. AN *IN VITRO* EVALUATION OF THE FURCATION PERFORATION REPAIR ABILITY OF SILICATE CEMENT MINERAL TRIOXIDE AGGREGATE (MTA REPAIR HP) AND BIODENTIN

Shivakumar VH, Tegginamani AS

One of the causes of endodontic failure is furcation perforation. Perforations have been repaired with a variety of materials. MTA Repair HP and Biodentin are two additional materials that need to be evaluated for perforation repair. Using a stereomicroscope, compare and evaluate the sealing ability of two different materials when used to treat furcal perforations in permanent molars. In thirty-two extracted permanent molars, a standard access opening was made and perforated at the pulp chamber's centre with the standard diameter. Thirty teeth were randomly assigned to one of two experimental groups: MTA repair HP (15 teeth) and Biodentin (15 teeth). Two samples were used as positive controls, with perforated teeth that were not repaired. Dye was administered to the teeth. All the samples were directly sectioned buccolingually by using a diamond disc & observed under a stereomicroscope for microleakage. MTA repair HP & Biodentin, a novel high plasticity cement, were compared for perforation repair with minimal laboratory procedures. Perforations restored with Biodentin had good sealing ability compared to MTA repair HP, as per statistical analysis, with a statistically significant difference between the two groups. In vitro test indicated that Biodentin has a better sealing ability than MTA Repair HP.

Keywords: Biodentin, dye penetration, furcation repair, MTA Repair HP, perforation

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320. AN EVALUATION ON SEALING ABILITY OF CALCIUM SILICATE-BASED CEMENTS AND GLASS IONOMER CEMENT AS PERFORATION REPAIR MATERIALS

Shivakumar VH, Tegginamani AS, Dicksit DD, Zamzuri ATB

Aims: The study evaluated the sealing ability of Biodentine, MTA Repair HP, and Glass ionomer cement as perforation repair materials by using a Stereomicroscopic analysis. **Study Design:** Experimental in vitro study. **Methodology:** The access cavity was prepared on 45 samples of maxillary and mandibular teeth with a perforation of the standardized diameter of a No. 2 round bur at the bottom of the pulp chamber. All 45 samples were divided into three different experimental groups of 15 samples each. Group A (n=15), Group B (n=15) and Group C (n=15). The furcation repairs of the samples in groups A, B and C were carried out using Biodentine, MTA Repair HP and glass ionomer cement respectively. All sealed furcation perforation samples were stored at room temperature for 24 hours. Two layers of nail varnish were coated on all the surfaces to avoid dye penetration except for 2 mm around the area of the perforation site. After complete drying, all specimens were separately soaked in 2% methylene blue solution for 48 hours, cleaned with water and dried for 24 hours. They were sectioned buccolingually. The perforation wall of the sectioned sample with the greatest dye penetration was selected for microleakage analysis. **Results:** The collected data from the three experimental groups were subjected to statistical analysis using one-way analysis of variance and Tukey's post hoc test for multiple comparisons of mean differences in dye penetration. The Biodentine group had the significantly lowest dye penetration length compared with the MTA Repair HP and glass ionomer cement groups ($P < 0.001$). **Conclusion:** Biodentine showed better sealing ability as a repair material for furcation perforations compared to the other two materials.

Keywords: Biodentine, dye penetration, glass ionomer cement, MTA Repair HP, perforation repair, sealing ability

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321. SEALANTS FOR PREVENTING DENTAL CARIES IN PRIMARY TEETH

Ramamurthy P, Rath A, Sidhu P, Fernandes B, Nettem S, Fee PA, Zaror C, Walsh T

Background: Pit and fissure sealants are plastic materials that are used to seal deep pits and fissures on the occlusal surfaces of teeth, where decay occurs most often in children and adolescents. Deep pits and fissures can retain food debris and bacteria, making them difficult to clean, thereby causing them to be more susceptible to dental caries. The application of a pit and fissure sealant, a non-invasive preventive approach, can prevent dental caries by forming a protective barrier that reduces food entrapment and bacterial growth. Though moderate-certainty evidence shows that sealants are effective in preventing caries in permanent teeth, the effectiveness of applying pit and fissure sealants to primary teeth has yet to be established. **Objectives:** To evaluate the effects of sealants compared to no sealant or a different sealant in preventing pit and fissure caries on the occlusal surfaces of primary molars in children and to report the adverse effects and the retention of different types of sealants. **Search Methods:** An information specialist searched four bibliographic databases up to 11 February 2021 and used additional search methods to identify published, unpublished and ongoing studies. Review authors scanned the reference lists of included studies and relevant systematic reviews for further studies. **Selection Criteria:** We included parallel-group and split-mouth randomised controlled trials (RCTs) that compared a sealant with no sealant, or different types of sealants, for the prevention of caries in primary molars, with no restriction on follow-up duration. We included studies in which co-interventions such as oral health preventive measures, oral health education or tooth brushing demonstrations were used, provided that the same adjunct was used with the intervention and comparator. We excluded studies with complex interventions for the prevention of dental caries in primary teeth such as preventive resin restorations, or studies that used sealants in cavitated carious lesions. **Data Collection And Analysis:** Two review authors independently screened search results, extracted data and assessed risk of bias of included studies. We presented outcomes for the development of new carious lesions on occlusal surfaces of primary molars as odds ratios (OR) with 95% confidence intervals (CIs). Where studies were similar in clinical and methodological characteristics, we planned to pool effect estimates using a random-effects model where appropriate. We used GRADE methodology to assess the certainty of the evidence. **Main Results:** We included nine studies that randomised 1120 children who ranged in age from 18 months to eight years at the start of the study. One study compared fluoride-releasing resin-based sealant with no sealant (139 tooth pairs in 90 children); two studies compared glass ionomer-based sealant with no sealant (619 children); two studies compared glass ionomer-based sealant with resin-based sealant (278 tooth pairs in 200 children); two studies compared fluoride-releasing resin-based sealant with resin-based sealant (113 tooth pairs in 69 children); one study compared composite with fluoride-releasing resin-based sealant (40 tooth pairs in 40 children); and one study compared autopolymerised sealant with light polymerised sealant (52 tooth pairs in 52 children). Three studies evaluated the effects of sealants versus no sealant and provided data for our primary outcome. Due to differences in study design such as age of participants and duration of follow-up, we elected not to pool the data. At 24 months, there was insufficient evidence of a difference in the development of new caries lesions for the fluoride-releasing sealants or no treatment groups (Becker Balagtas odds ratio (BB OR) 0.76, 95% CI 0.41 to 1.42; 1 study, 85 children, 255 tooth surfaces). For glass ionomer-based sealants, the evidence was equivocal; one study found insufficient evidence of a difference at follow-up between 12 and 30 months (OR 0.97, 95% CI 0.63 to 1.49; 449 children), while another with 12-month follow-up found a large, beneficial effect of sealants (OR 0.03, 95% CI 0.01 to 0.15; 107 children). We judged the certainty of the evidence to be low, downgrading two levels in total for study limitations, imprecision and inconsistency. We included six trials randomising 411 children that directly compared different sealant materials, four of which (221 children) provided data for our primary outcome. Differences in age of the participants and duration of follow-up precluded pooling of the data. The incidence of development of new caries lesions was typically low across the different sealant types evaluated. We judged the certainty of the evidence to be low or very low for the outcome of caries incidence. Only

one study assessed and reported adverse events, the nature of which was gag reflex while placing the sealant material. **Authors' Conclusions:** The certainty of the evidence for the comparisons and outcomes in this review was low or very low, reflecting the fragility and uncertainty of the evidence base. The volume of evidence for this review was limited, which typically included small studies where the number of events was low. The majority of studies in this review were of split-mouth design, an efficient study design for this research question; however, there were often shortcomings in the analysis and reporting of results that made synthesising the evidence difficult. An important omission from the included studies was the reporting of adverse events. Given the importance of prevention for maintaining good oral health, there exists an important evidence gap pertaining to the caries-preventive effect and retention of sealants in the primary dentition, which should be addressed through robust RCTs.

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322. THE ROLE OF PROSTAGLANDIN E2 ON OSTEOBLAST PROLIFERATION INDUCED BY HYDROXYAPATITE

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Objective: Prostaglandin E2 (PGE2) plays a crucial role in regulating bone cell differentiation and proliferation. The aim of the present study was to determine whether PGE2 may regulate osteoblast proliferation induced by hydroxyapatite. **Materials and Methods:** Osteoblasts (HOS cell line) pre-treated with cyclooxygenase (COX) inhibitors (indomethacin, aspirin and nimesulide) were then cultured. The cells were also pre-treated with or without nimesulide and then cultured with PGE2. The cell cultures were also treated with SQ22536 (adenylyl cyclase inhibitor) and added with Db-cAMP (cAMP analog), and/or PGE2. KT5720 [protein kinase A (PKA) inhibitor.], Db-cAMP and/or forskolin (adenylyl cyclase activator)-treated cultures were used to assess the role of PKA. The role of EP2 and/or EP4 was determined by using EP2 antagonist (PF-04418948) and EP4 antagonist (L-161,982) with PGE2. All cells were cultured with or without hydroxyapatite. The levels of PGE2 and cAMP were detected from the culture supernatants and the cell proliferation was assessed colorimetrically. **Results:** Nimesulide and indomethacin but not aspirin suppressed partially the cell proliferation but fully PGE2 production. PGE2 abrogated nimesulide-mediated suppression of cell proliferation. The cell proliferation was enhanced by low but suppressed by high concentration of PGE2. Moreover, the SQ22536-mediated suppression of cell proliferation was abolished by Db-cAMP but not PGE2. Conversely, PGE2, Db-cAMP or forskolin failed to eliminate KT5720-mediated suppression of cell proliferation. The effect of PGE2 on cell proliferation and cAMP levels was mediated predominantly via EP2 and to a lesser extent, EP4. The results of the controls for all experiments were significantly lower than hydroxyapatite-stimulated cell cultures. **Conclusion:** These results suggest that PGE2, acting via a COX-2-, cAMP-PKA- and both EP2 and EP4-dependent pathway may partially regulate hydroxyapatite-induced human osteoblasts in an autocrine fashion.

Keywords: Hydroxyapatite, Osteoblast, PGE2 , Proliferation

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323. CORRELATION BETWEEN SALIVARY ESTROGEN LEVELS AND ORAL EPITHELIAL CYTOKERATIN 5 EXPRESSION

Handajani J, Effendi N, Sosroseno W

Background: Estrogen expression levels may be associated with age and may affect keratinization of the hard palate. Keratinized epithelium expresses cytokeratin 5 and 14 in the basal layer. The aim of this study was to determine the correlation between the levels of salivary estrogen and number of cytokeratin 5-positive oral epithelial cells. **Methods:** A total of 30 female subjects were recruited and divided into children, adults and elderly (N=10 per group). Salivary estrogen levels and cytokeratin 5-expressing oral epithelial cells were assessed using ELISA and immunohistological methods, respectively. Data were analyzed using ANOVA with post hoc LSD test and Pearson's correlation coefficient. **Results:** The results showed that both the number of cytokeratin 5-positive cells and the level of salivary estrogen were significantly higher in adults but decreased in the elderly, as compared with those in children ($p<0.05$). Furthermore, the levels of salivary estrogen were significantly correlated with the number of cytokeratin 5-positive cells ($r=0.815$). The ANOVA result showed significance difference cytokeratin 5 expression and estrogen level ($p<0.05$). The post hoc LSD test revealed cytokeratin 5 expression and estrogen level to be significantly different in children, adults, and elderly participants ($p<0.05$). **Conclusions:** These results suggest that the profile of salivary estrogen and oral epithelial cell-expressed cytokeratin 5 may be positively correlated with age and depend on age.

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324. COMPARATIVE EVALUATION OF ANTIFUNGAL EFFICACY OF FIVE ROOT CANAL SEALERS AGAINST CLINICAL ISOLATES OF CANDIDA ALBICANS: A MICROBIOLOGICAL STUDY

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Aim and objective: The aim of this study was to evaluate and compare the antifungal efficacy of MTA Fillapex, Metapex, zinc oxide eugenol cement, Endomethasone, and Endoflas against *Candida albicans*.

Materials and methods: Root canal exudates of 30 patients were tested against MTA Fillapex (Angelus), Metapex (BioMed), zinc oxide eugenol (Deepak Enterprise), Endomethasone (Septodont), Endoflas FS (Sanlor Laboratories), MTA (Angelus) (positive control), and glycerine (negative control). Children with failed endodontic cases were included in the study. Tube dilution and agar diffusion methods were used to check the antifungal efficacy of the root canal sealers. In tube dilution method, 24-well culture plates containing freshly mixed material along with *Candida albicans* were used. Wells containing MTA (Angelus) along with Sabouraud dextrose agar and *Candida albicans* served as positive control while glycerine along with Sabouraud dextrose agar and *Candida albicans* served as negative control. All plates were incubated at 37°C for 24 hours. Growth of the fungi was monitored after 24 hours by the presence of the turbidity. The samples were recultured to test the experimental material using agar well diffusion method, and the Petri plates were incubated for 24 hours and 72 hours. Zone of inhibition was measured after respective time period. Paired t test was used for the data analysis.

Results: It was seen in tube dilution method Endomethasone showed least turbidity while maximum was shown by Metapex; similar results were seen in case of agar well diffusion method in which largest zone of inhibition was shown by Endomethasone while smallest was by Metapex. **Conclusion:** It was concluded that Endomethasone showed maximum efficacy against *Candida albicans* as compared to Metapex.

Keywords: Agar-well diffusion, *Candida albicans*, Endomethasone, Metapex, MTA Fillapex, Root canal sealers, Tube dilution test, Zinc oxide eugenol

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325. TO EVALUATE AND COMPARE THE EFFECT OF COMMERCIALLY AVAILABLE MODEL HARDENING AGENT ON SURFACE HARDNESS AND SURFACE ROUGHNESS OF REFRACTORY INVESTMENT MATERIALS: AN *IN-VITRO* STUDY

Jain A, Nasir RM, Chee LW, Xin LH, Yeih LZ, Ugrappa S, Marimuthu K

Background: Various studies are conducted to evaluate the effect of hardening agent on surface hardness of refractory investment material but these studies do not evaluate the amount of load and depth at which maximum hardness is anticipated. So, the present study was conducted to evaluate the effect of hardening agent on the surface hardness of dental refractory investment material when treated with hardening agent at varying degree of load and depth. **Materials and methods:** The commercially available phosphate-bonded refractory investment material (Adentatec-Vest PA, Adentatec GmbH, Germany) and hardening agent (Kalthärter cold hardener, Dentaaurum GmbH & Co. Deutschland) were used in this study. The specimens were fabricated and divided into two groups: Group A: specimen without hardening treatment; Group B: specimen with hardening treatment. Surface hardness test was performed with the use of a nano indenter (NTBerkovich indenter); while surface roughness test was measured with Surfcom-130A using an electrically operated stylus arm. The data were tabulated and analyzed using t-test for both the surface hardness and surface roughness parameters with p-value <0.05 was considered significant. **Results:** Both surface roughness (p=0.043) and surface hardness (p= 0.017) of group A and group B specimens were comparable and have shown with significant difference. **Conclusion:** The hardening treatment is effective on decreasing surface roughness and improving surface hardness of phosphate-bonded refractory investment material.

Keywords: model hardening agent, surface hardness, surface roughness, refractory investment materials

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326. AN *IN VITRO* EVALUATION OF THE MECHANICAL PROPERTIES AND FLUORIDE-RELEASING ABILITY OF A NEW SELF-CURE FILLING MATERIAL

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Aim: The aim of this study was to examine and compare the flexural strength, shear bond strength, and fluoride-releasing ability of glass ionomer cement (GIC), Fuji IX GIC®, and a new alkasite filling material, Cention N®. **Material and methods:** The materials were divided into two groups, Fuji IX GIC® (n = 30) and Cention N® (n = 30) and further divided (n = 10) to test three parameters, the fluoride releasing ability, flexural strength, and shear bond strength. Fluoride release was checked using fluoride ion-selective electrode, and flexural strength and shear bond strength were tested using universal testing machine (Intron 3366, UK). **Results:** Fluoride release of Fuji IX GIC® was significantly higher compared to that of control Cention N® over a period of 21 days. Flexural strength of Cention N® was significantly higher compared to Fuji IX GIC® and there were no significant differences in shear bond strength of both the materials. **Conclusion:** From the results of the study, it can be concluded that Cention N® is an alkasite filling material for the complete and permanent replacement of tooth structure in posterior teeth and can be a good alternative when compared to GICs on the basis of their superior mechanical properties. **Clinical significance:** Cention N® is an innovative filling material for the complete and permanent replacement of tooth structure in posterior teeth and can be a good alternative when compared to GICs on the basis of their superior mechanical properties.

Keywords: Flexural strength, Fluoride release, Glass ionomer cement, In vitro, Restorative materials, Shear bond strength, Observational study

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327. COMPARISON OF FLEXURAL STRENGTH OF KEVLAR, GLASS, AND NYLON FIBERS REINFORCED DENTURE BASE RESINS WITH HEAT POLYMERIZED DENTURE BASE RESINS

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Introduction: Polymethyl methacrylate (PMMA) has been widely accepted and used in dentistry owing to its working characteristics, aesthetics and stability in the oral environment, ease in manipulation, and inexpensive processing methods and equipment. **Aim And Objectives:** The aim of this study was to evaluate the flexural strength of a high-impact PMMA denture base resin material and flexural strength of a commonly available heat cure PMMA denture base material with Kevlar, glass, and nylon fibers. **Materials And Methods:** The test samples were studied under two groups. The Group I (control group) comprised pre-reinforced PMMA (Lucitone 199; Dentsply Sirona Prosthetics, York, Pennsylvania, USA) consisting of 12 samples and second group comprised regular PMMA (DPI, Mumbai, India) reinforced with different fibers. The second test group was further divided into three subgroups as Group 2, Group 3, and Group 4 comprising 12 samples each designated by the letters a-l. All the samples were marked on both ends. A total of 48 samples were tested. Results were analyzed and any P value ≤ 0.05 was considered as statistically significant (t test). **Results:** All the 48 specimens were subjected to a 3-point bending test on a universal testing machine (MultiTest 10-i, Sterling, VA, USA) at a cross-head rate of 2 mm/min. A load was applied on each specimen by a centrally located rod until fracture occurred; span length taken was 50 mm. Flexural strength was then calculated. **Conclusion:** Reinforcement of conventional denture base resin with nylon and glass fibers showed statistical significance in the flexural strength values when compared to unreinforced high impact of denture base resin.

Keywords: Denture base resin, glass fibers, Kevlar fibers, nylon fibers, polymethyl methacrylate

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328. A COMPARATIVE EVALUATION OF THE EFFECT OF VARIOUS SURFACE TREATMENTS ON THE BOND STRENGTH OF CERAMIC FUSED TO DIRECT METAL LASER SINTERED COBALT CHROMIUM ALLOY- AN *IN-VITRO* STUDY

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Base metal alloys due to their low cost, are being used more often as the substructure because of their good mechanical properties, excellent metal ceramic bonding and biocompatibility. The bonding of porcelain to metal is an important point to be considered for the success of the restoration. **Aim:** To compare and evaluate the shear bond strength of porcelain fused to metal substructure fabricated using conventional and contemporary techniques. **Methods and Material:** Thirty sample discs were fabricated – 10 of cast nickel chromium alloy, 10 of cast cobalt chromium alloys and 10 of laser sintered cobalt chromium alloy. Conventionally used feldspathic porcelain was used and fired over the metal discs. These samples were placed in a specially fabricated jig, which was held in a universal testing machine. The samples were subjected to shear stress until they fractured and the readings were noted. The fractured surface of the sample was then viewed under stereomicroscope. **Results:** The mean shear bond strength was highest in group C (porcelain fused to laser sintered cobalt chromium), followed by group A (porcelain fused to cast nickel chromium) and group B (porcelain fused to cast cobalt chromium) which was the least. The level of significance was fixed at $p < 0.05$. After applying Student's Unpaired 't' test there is no significant difference in shear bond strength in group A compared with group B, highly significant in group A and group C and very highly significant in group B and group C. **Conclusions:** All the three groups showed adequate, but laser sintered cobalt chromium alloy had the highest shear bond strength to porcelain. Nickel chromium alloy fabricated by conventional casting method showed lesser values of the shear bond strength, followed by cobalt chromium alloy fabricated by conventional casting, which had the least shear bond strength.

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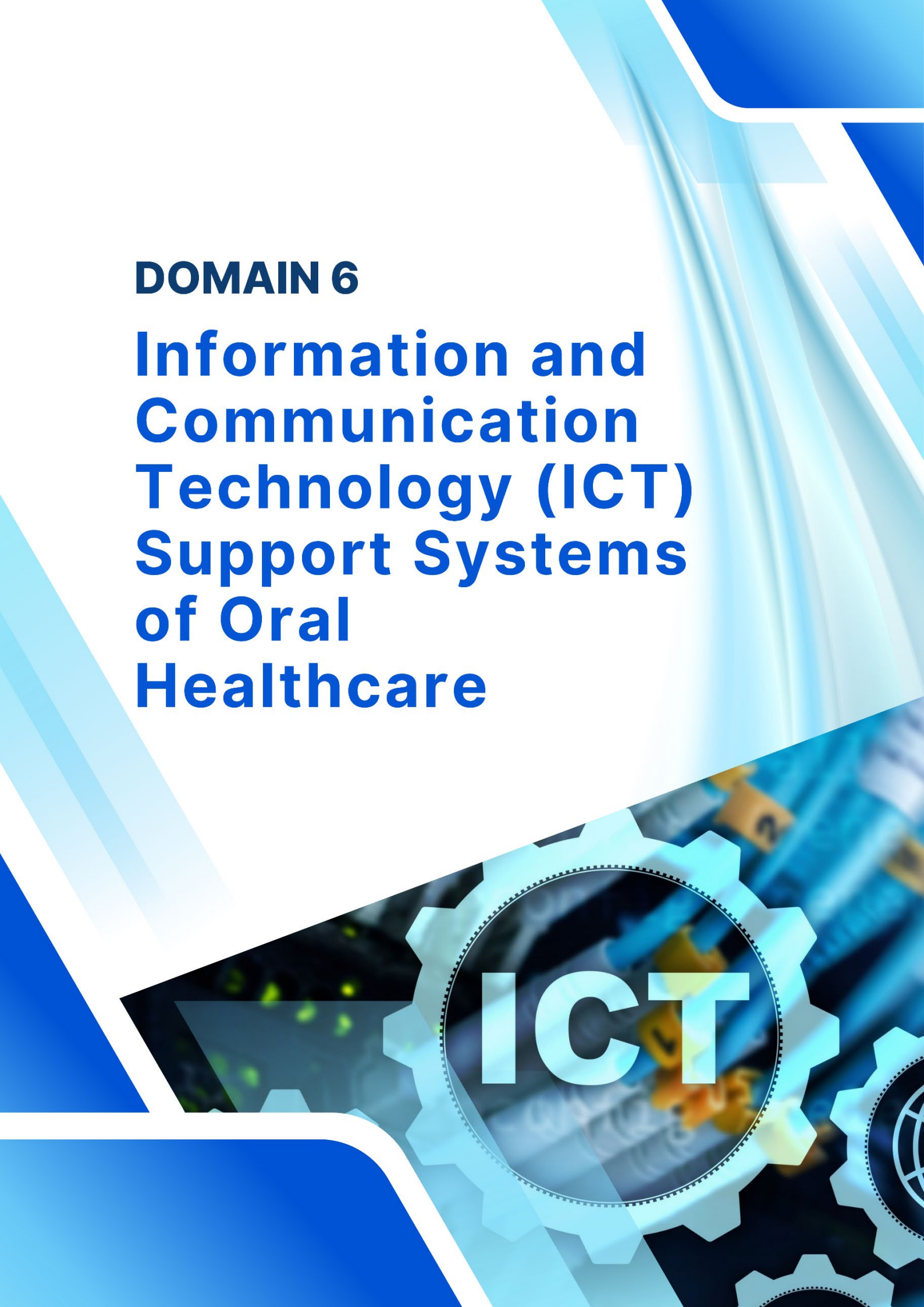
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DOMAIN 6

Information and Communication Technology (ICT) Support Systems of Oral Healthcare



ICT

The graphic features a large, light blue gear with a black outline, centered in the lower half. Inside the gear, the letters 'ICT' are written in a bold, white, sans-serif font. The background is a collage of blue and white geometric shapes, including triangles and lines, creating a modern, technological feel. There are also some blurred images of what look like dental equipment or data visualizations in the background.

329. MODIFIED GUSTAFSON'S METHOD FOR AGE ESTIMATION FROM PREMOLARS: A STUDY EMPLOYING DENTAL PANORAMIC TOMOGRAPHS

Sonjaya D, Nambiar P, Ramli H, Alias A

Age estimation plays an important role in forensic medicine, clinical dentistry and archaeology for the identification process. The age estimation becomes complex in adults when the mineralization process of all the teeth has completed. The objective of this study was to estimate the age of Malaysian adults by using Gustafson's method observed on the dental panoramic tomographs from mandibular premolars. Four hundred dental panoramic tomographs of 227 female and 173 male Malaysians aged between 18 and 74 years old were reviewed. The characteristics of secondary dentin formation, cementum apposition, periodontal recession and attrition were evaluated in all the mandibular premolars. There was a significant difference between right and left mandibular premolars using the paired t test ($p < 0.05$). The linear correlation of the individual characteristics with the chronological age of each premolar was examined. The multiple regression analysis was done for the equation of age estimation. The R values amounted between 0.77 and 0.79 with the mandibular left second premolar having the highest value. The method devised by Gustafson can therefore be used for forensic age estimation for the Malaysian population as it is considered as a less invasive method.

Keywords: Age determination, premolar, panoramic tomographs, forensic dentistry

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330. DEVELOPMENT AND USABILITY TESTING OF MOBILE APPLICATION ON DIET AND ORAL HEALTH

USM/JEPeM/19060364
NMRR-20-2825-57812

Akmal Muhamat N, Hasan R, Saddki N, Mohd Arshad MR, Ahmad M

Introduction: In several nations, caries in pre-school children remain a significant oral health issue. In an outbreak period such as the Coronavirus disease 2019 (COVID-19), remote contact and education aimed at the prevention of oral diseases and the preservation of children's oral health are more relevant than ever. Currently, the amount of published applications is far higher than the published scientific studies while the problems of usability remains vulnerable. **Objective:** The goal of this paper was to comprehensively document the phase of development and usability testing of a mobile application for diet and oral health, namely *Gigiku Sihat*, which was primarily intended to be used by parents and guardians of pre-school children. **Methods:** The mobile application was developed using the System Development Life Cycle principle. Apart from searching for the available oral health application on Android platform, the initial requirement gathering process consisted of situational analysis, concept generation, content development, and features and functional requirement determination. The mobile application design and implementation evolved at each phase before being finalised. *Gigiku Sihat* was successfully developed in the Bahasa Malaysia. Finalised *Gigiku Sihat* was installed on mobile devices to determine the usability using translated and validated System Usability Scale questionnaire namely *Skala Kebolehgunaan Aplikasi Mudah Alih* (SKAMA). **Results:** The mean score usability with score of 68 and above was deemed to have good usability. This study found that *Gigiku Sihat* mean (SD) usability score was 77.0 (14.18). The results were promising as they showed that *Gigiku Sihat* had a good usability. **Conclusion:** Thus, the development of this mobile application focusing on diet and oral health served as a new source of oral health education and provided a necessary foundation in developing future improved mobile application development for parents in the prevention of early childhood caries.

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331. THE TELEDENTISTRY, IMPACT, CURRENT TRENDS, AND APPLICATION IN DENTISTRY: A GLOBAL STUDY

Maqsood A, Sadiq MSK, Mirza D, Ahmed N, Lal A, Alam MK, Halim MSB

Objective. The present study was aimed at assessing the impact of teledentistry, its application, and trends in uplifting dental practice and clinical care around the world. **Material and Methods.** The present observational study comprised of an electronic survey distributed among dental professionals around the globe. The validated survey form consisted of a total 26 questions with 5-point Likert scale response. The questionnaire used was divided into four domains: usefulness of teledentistry for patients, its usefulness in dental practice, its capacity to improve the existing practice, and the concerns attached to its use. The statistical analysis was performed using SPSS-25. ANOVA test was used to assess the effect of independent variables on dependent variables. A p value of ≤ 0.05 was taken as statistically significant. **Results.** A total of 506 dental professionals participated in the study with the response rate of 89.39%. More than half of the participants (50-75%) endorsed that teledentistry is a useful tool for improving clinical practice as well as patient care. Two-thirds of the participants (69.96%) considered that teledentistry would reduce cost for the dental practices. On the other hand, about 50-70% of dental professionals expressed their concerns regarding the security of the data and consent of patients. The most preferred communication tool for teledentistry was reported to be videoconference followed by phone. The majority of participants recommended the use of teledentistry in the specialty of oral medicine, operative dentistry, and periodontics. There was a significant difference between the age, experience of dentists, and their qualifications with domains of teledentistry. **Conclusions.** The overall impact of dental professionals towards teledentistry was positive with adequate willingness to incorporate this modality in their clinical practice. However, the perceived concerns pertaining to teledentistry are significant impediments towards its integration within the oral health system. An in-depth study of its business model and cost-benefit needs of time, especially in the context of developing countries, in order to avail the optimum benefits of teledentistry.

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332. BONE AGE MEASUREMENT-BASED ON DENTAL RADIOGRAPHY, EMPLOYING A NEW MODEL

Sharifonnasabi F, Jhanjhi NZ, John J, Nambiar P

Bone age measurement is a process for evaluating skeletal maturity levels to estimate one's actual age. This evaluation is generally done by contrasting the radiographic image of one's wrist or dentition with an existing uniform map, which contains a series of age-recognized images at any point of its development. Manual methods are based on the analysis of specific areas of hand bone images or dental structures. Both approaches are vulnerable to observer uncertainty and are time-consuming, so this approach is a subjective approximation of age. As a result, an automated model is needed to estimate one's age accurately. This framework aims to develop a new Fatemeh Ghazal Sharifonnasabi (FGS) model for accurate measurement of bone age (± 1 year) or less than that with dental radiography. This study will use a new image processing technique, which involves creating a histogram of dental orthopantomogram (OPG) X-rays. In the machine, learning classification can be grouped as the training and testing phase. The training phase is used to extract all the images' features for the classification model. The convolutional neural network (CNN) and K-nearest neighbour (KNN) classifications are ideal for this problem, based on the available literature.

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333. DENTAL AGE ESTIMATION OF MALAYSIAN CHILDREN: A COMPARISON OF TWO-DIMENSIONAL VERSES THREE-DIMENSIONAL IMAGING ANALYSES OF THE DEVELOPING ROOT APICES

Asif MK, Ibrahim N, Khan IM, Khan SS, Nambiar P

Aim: This study compared the effectiveness of the three-dimensional (3D) cone beam computed tomography (CBCT) method of age estimation developed by Asif et al. with two-dimensional Cameriere's method. **Subjects and methods:** CBCT images belonging to 129 Malaysian Chinese and Malay ethnic groups aged 7-14 years were investigated and analysed. **Results:** The results indicated a strong correlation between chronological age and the predictor variables for both Cameriere's ($r = 0.984$) and Asif's ($r = 0.988$) methods of age estimation. Fisher Z test analysis indicated no statistically significant difference in the correlation values between the two methods. Mean absolute error (MAE) value of 0.613 was observed for Cameriere's and 0.290 was observed for Asif's method. **Conclusions:** The results indicated that the methods of age estimation from both Asif et al. and Cameriere et al. are applicable on Malaysian children. However, Asif et al.'s 3D CBCT method of age estimation resulted in greater accuracy and reliability in estimating chronological age.

Keywords: Cone beam computed tomography, age estimation, forensic odontology, three-dimensional, two-dimensional

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334. INFLUENCE OF WHATSAPP AND ELECTRONIC MAIL REMINDERS ON ORAL HYGIENE COMPLIANCE OF ORTHODONTIC PATIENTS USING PLANIMETRY

Saxena K, Gunjal S

Purpose: To determine the effect of WhatsApp (Facebook Inc., Menlo Park, CA, USA) and electronic mail reminders on oral hygiene compliance of orthodontic patients. **Methods:** A randomized, parallel group, double blinded study was conducted on 54 patients undergoing orthodontic treatment at a university clinic. They were randomized to 3 groups, i.e., WhatsApp (W) group, electronic mail (email) (E) group and control (C) group with 18 subjects in each group. Group (W) and group (E) received oral health messages once a week through WhatsApp and email reminders, respectively, while group (C) did not receive any reminders. Plaque was measured at baseline (T0), after 4 weeks (T1), and after 8 weeks (T2). For each subject, intraoral photographs were taken after application of a plaque-disclosing agent; and the area covered by plaque was measured on teeth 12, 13, 43, 22, 23 and 33 by planimetry. Data were analyzed using SPSS (version 22, IBM Corp., Armonk, NY, USA). Mixed analysis of variance (ANOVA) was used to compare plaque scores between and within the groups. **Results:** A total of 54 subjects (14 males and 40 females) with mean age of 22.43 years completed the study. At the end of 8 weeks, no statistically significant difference in the mean plaque score was found between the groups at the different time intervals ($p = 0.201$). **Conclusion:** WhatsApp and email reminders did not significantly influence the oral hygiene compliance of orthodontic patients.

Keywords: Compliance, Dental plaque, Email, Orthodontics, corrective, Preventive dentistry

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335. A NOVEL METHOD OF AGE ESTIMATION IN CHILDREN USING THREE-DIMENSIONAL SURFACE AREA ANALYSES OF MAXILLARY CANINE APICES

Asif MK, Ibrahim N, Al-Amery SM, Muhammad AMA, Khan AA, Nambiar P

The study aimed to develop a novel and reliable age estimation method using three-dimensional surface area analyses of maxillary canine apices among Malaysian children using CBCT data. A validated regression equation for age estimation was derived and correlation between chronological age and the surface areas of the developing maxillary canine's apices were investigated. Variations based on ethnicities, gender and status of root development were also investigated in terms of fit to the age estimation model. CBCT images of the patients ranging in age from 7 to 14 years were included in the study. Training sample of 191 intact permanent maxillary canines was selected from 191 CBCT images belonging to 100 Malays and 91 Chinese. Moreover, an independent validation sample of 96 permanent maxillary canines was selected from 96 CBCT images belonging to 48 Malays and 48 Chinese. Three-dimensional image modeling and surface area analyses of the developing canine's apices were performed using Mimics and 3-Matics software. A strong correlation ($r = 0.978$) was observed between chronological age and surface area of the developing maxillary canine's apices. 95.6% of the variation in age can be explained by surface area of canine's apices, gender and status of the root development (open/closed apices). However, ethnicity did not contributed to the fit of age estimation model. Female showed advanced development as compared to male. Mean absolute error values indicated that this newly developed 3D surface area analyses of canine apex can be used as a reliable method for age estimation among Malaysian children.

Keywords: CBCT, Three-dimensional, Age estimation, Malaysian, Canine, Apex

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336. POPULATION GENETICS IN MALAYSIA AND JAPANESE POPULATIONS USING POWER PLEX Y23 SYSTEM

Nakamura Y, Samejima M, Minaguchi K, Nambiar P, Hashimoto M

Population flow between Southeast Asian countries and Japan continues to gather pace. Accordingly, the number of foreigners involved in incidents in Japan has markedly increased, which means that forensic dentistry is now increasingly being faced with the need to analyze DNA from persons of non-Japanese extraction. The DNA test currently used for personal identification mainly utilizes short tandem repeats (STRs) on autosomal chromosomes and the Y-chromosome. This test was developed for use in personal identification, not for distinguishing among races; nonetheless, the standard method for personal identification is often used because the procedure has been established. To determine the degree to which racial differences can be distinguished by standard DNA analysis, 23 STRs located on the Y chromosome were investigated in 218 Malay and 426 Japanese males. The frequencies of each STR were calculated in the two populations. The difference in the power of discrimination between the Malay and Japanese populations ranged from a minimum of 0.01 to a maximum of 0.27; the difference in polymorphic information content ranged from 0.01 (minimum) to 0.23 (maximum). No major differences were noted in the polymorphisms in these two Mongoloid populations, but the distributions of the 17 STRs differed significantly. Short tandem repeat types demonstrating a likelihood of racial differences were identified in 14 of the STRs. Race-specific STR types were identified in 10 STRs. These results suggest that the likelihood of Malay or Japanese genetic background can be judged based on Y-chromosome STR test results.

Keywords: DNA identification, Malaysia, Race determination, STR, Y-chromosome

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337. AGE ESTIMATION FROM DEVELOPING THIRD MOLARS

Wilson YP, Nambiar P, Yaacob H, Asif MK

We investigated the development of third molars among Malaysians (including variations between jaws and genders) using Demirjian's method. Dental panoramic radiographs of 1224 subjects aged 8 to 24 years were examined, and the molars were assigned Demirjian et al.'s development grades (A-H). Results indicated that 18.8% had congenitally missing or extracted third molars. Development of molars begins earlier in females (also in the mandible), but by age 9, male children's molar development speeds up with more advanced grades in their middle teens than females. Grade C indicates the subject is a juvenile, while initiation of root development (Grade E), was observed from 13 years on. Grade H can occur in a child aged 18 years who technically is still a juvenile. We compared the development and growth patterns of the third molar from both the maxilla and the mandible.

Keywords: Age estimation, Malaysians, maxilla and mandible-dental development, panoramic radiographs, third molars

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338. USE OF VIRTUAL REALITY (VR) AS AN AUDIO-VISUAL DISTRACTION TOOL IN THE REDUCTION OF DENTAL ANXIETY DURING LOCAL ANESTHESIA

Cheruvattoor JJ, Kaini L, Hanafiah MABMA, Sihabuddin MAB, Marla V

Aims: Dental anxiety is a relatively common problem and it leads to undesirable distresses, such as postponement or avoidance of dental treatment thereby resulting in poorer quality of treatment and reduced oral health related quality of life. Dental anxiety is especially seen in patients undergoing dental injections. To evaluate the effectiveness of audiovisual distraction in the reduction of dental anxiety during la injection. Study design: Cross-sectional study. **Place and duration of study:** Patients visiting Penang International Dental College, Malaysia, between June 2017 and July 2018. **Methodology:** A total of 176 patients (88 female and 88 male) requiring endodontic therapy or tooth extraction were recruited for this study. A 14-question long questionnaire using Hamilton anxiety rating scale; and a separate feedback questionnaire was used to evaluate patients' anxiety level and the severity of anxiety symptoms. Paired t-test was used to analyze the data. **Results:** There was a significant reduction in the anxiety scores ($p < 0.001$) of the patients following the use of VR distraction during the la procedure. On an average, the pre-test scores were 1.932 points higher than post-test scores. **Conclusion:** Virtual reality could be used as a possible non-pharmacologic means of reducing dental anxiety in patients receiving local anesthesia.

Keywords: Audio-visual distraction, dental anxiety, LA injection, trypanophobia, virtual reality

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339. AGE ESTIMATION IN IRANIAN POPULATION USING TOOTH/PULP RATIO IN MANDIBULAR PREMOLARS BY PANORAMIC RADIOGRAPHY

Dabbaghi A, Kazemi M

Background: Age estimation is a fundamental part of forensic science. Considering the fact that pulp size decreases throughout the life because of secondary dentine apposition, many researchers have used it as a method for age estimation with great results. This study aimed to determine the applicability of tooth to pulp ratio in mandibular second premolars in an Iranian population using panoramic radiographs. **Methods:** The sample consisted of 153 digital panoramic images of male and female Iranians aged 13-70 years, and the tooth to pulp ratio of both left and right mandibular second premolars was obtained using AutoCAD software. Analysis of variance (ANOVA), Pearson's correlation, and regression analysis were used to analyze the data. A total of 20 images were reexamined after 30 days to test intra-observer error. **Results:** ANOVA test showed that gender had no effect on age estimation, and there was a significant correlation between age and tooth/pulp ratio ($r=0.679$ for right premolar, $r=0.712$ for left premolars, and $r=0.736$ for both premolars). Linear regression formulae were created based on the results and the mean differences between the estimated and actual age were reported to be 10.35 ± 0.51 , 9.17 ± 0.54 , and 8.83 ± 0.52 for right, left, and both premolars, respectively. Intra-observer error showed no significant difference between repeated measurements. **Conclusions:** Tooth/pulp ratio of mandibular second premolars is a reliable and repeatable method for age estimation in Iranian population and using premolars of both sides yields the best results.

Keywords: Age estimation, Cameriere's method, Chronological age, Panoramic radiograph, Pulp area, Forensic science

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340. TO ASSESS THE USEFULNESS OF THE MANDIBULAR RAMUS IN DETERMINING AGE AND GENDER AMONG MALAYSIANS IN DIGITAL OPGs

Garg R, Jacky T, Yung TGH, Li YW, Brahanudin TMBT

Dentists are becoming an essential part of the forensic team in identifying remnants at catastrophic disasters site. Mandible is the most unique and durable bone which retain its morphology and is easily retrievable from the tragedy site without much damage. Mandibular parameters can help in assessing age and gender of the individuals. A study of mandibular measurements on 180 OPGs at SEGi University was conducted. Measurement of the ramus was done utilizing VixWin™ Platinum 3.0 to assess the usefulness of the mandibular morphology in age and gender determination. Statistical analysis of the record of 180 patients was done using SPSS software. 40% (n = 72) were male and 60% (n = 108) were female. The height of coronoid and maximum ramus breadth between male and female of all age groups showed a statistically significant result ($p < 0.05$) for gender determination. Maximum ramus breadth ($p = 0.008$) shows significant result for ethnic determination whereas the minimum ramus breadth ($p = 0.021$) show significance in age estimation. Maximum ramus breadth and height of coronoid can be used effectively for the gender determination. Although only the maximum ramus breadth can be used for ethnic determination whereas minimum ramus breadth can be used for age estimation.

Keywords: Coronoid, Ramus, Mental Index, Orthopantomograph

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341. RELIABILITY OF ODONTOMETRIC PARAMETERS IN STATURE ANALYSIS

Ramya K, Deshpande A, Deepika AD, Rayudu GS, Pendyala SK, Kondreddy K

Background: To emphasize the role of odontometric parameters which may be used as a reliable forensic tool especially in cases with partial remains of the individual. **Aim:** To assess the reliability of odontometric parameters in stature analysis. **Materials and methods:** The study was conducted on 100 patients (50 male and 50 Female). Mesiodistal width of anterior teeth, inter-canine width, Inter-premolar width and maxillary arch length were the parameters included. The results were tabulated with a linear regression formula obtained for each parameter. **Statistical analysis:** The data collected was statistically analysed using SPSS version 20 and a linear regression formula was obtained thereafter. **Results:** Mesio-distal widths of individual maxillary canines, total mesiodistal width of maxillary anteriors and arch length showed a significant co-relation with stature. The combined linear regression formula was obtained for all parameters. **Conclusion:** Odontometric parameters of mesio - distal widths of individual maxillary canines, total mesiodistal width of maxillary anteriors and arch length can be used as reliable parameters for stature analysis.

Keywords: Forensic, forensic odontology, odontometric parameter, partial remains, stature analysis

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342. BITE-MARK ANALYSIS: NOVEL TOOL FOR ETHNICITY IDENTIFICATION IN MALAYSIAN POPULATION USING MANUAL AND DIGITAL METHOD

Vedam V, Thomas AL, Ganapathy S, Thomas RL, Hashim H

Abstract: Bite mark analysis has been used as an ideal tool for recognizing dental features that are unique to the gender, race or ethnicity of a person. but the challenge that most forensic odontologists face in identifying the bite-marks have been accredited to the poor quality, inaccuracy or lack of proper bite marks records. digitization in the forensic field, has been progressively evolving, but requires more focus to further advance this method for accurate identification of criminal cases. this comparative cross-sectional study assessed dental arch parameters and tooth parameters using manual method and image analysis digital method with ethnicity malaysian population. this study showed a definite variation in dental arch parameters and tooth parameters in bite-mark analysis between various races of malaysian population. comparison of digital method with manual method has been explored in this study. bite-mark analysis has gained utmost importance as a source of expert witness in the court of law. this study compared bite-mark variations between indian, chinese and malay races of malaysian population. importance of digital technology has been re-emphasized in relation to bite-mark analysis in forensic science studies.

Keywords: Forensic deontology, Bite-mark, Forensic sciences, Ethnicity, Image analysis

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343. TELEDENTISTRY: A NEW ORAL CARE DELIVERY TOOL AMONG INDIAN DENTAL PROFESSIONALS - A QUESTIONNAIRE STUDY

Raja KP, Pal A, Nayak SU, Pai K, Shenoy R

Background: The sudden massive spread of coronavirus disease 2019 (COVID-19) has led to a major public health emergency and changed the scene of the health care globally. During the COVID-19 pandemic, most dental treatment procedures were considered as major sources of infection transmission. Thus, the current survey aimed at evaluating knowledge, awareness and attitude of dental professional of India towards teledentistry. **Methods:** A pre structured questionnaire was framed and distributed among 600 dental professionals of India using email, WhatsApp and other social media modes. SPSS version 17 was used for data analysis. The Chi-Square, student t test and one way ANOVA test were applied to assess the association between qualification, type of practice and participant response. Logistic regression analysis was also carried out. **Results:** In total, 431 dental professionals completed the survey. Overall, 94.7% of dental professionals were aware about teledentistry and agreed it is useful in fulfilling needs of the community at great amount. A statistically significant difference was found for questions related to the application of teledentistry for all branches, whether it is a good tool to assess oral hygiene in remote areas and its usefulness in training in primary health care centre when comparison was done among dental professionals and specialist in different branches of dentistry. **Conclusions:** Within the limits of the study, findings show that study participants exhibited good knowledge and awareness regarding teledentistry. The participants exhibited positive attitude towards teledentistry but at the same time expressed the uncertainty in challenges which they may face in teledentistry. Lack of training, advanced infrastructure, good connectivity and network are main issues they were concerned about. The other important point of concern is many participants felt teledentistry cannot be applied for all branches of dentistry. Future research should focus on this aspect of teledentistry.

Keywords: Tele dentistry, Telemedicine, Health education, Oral care in rural area

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344. AWARENESS, KNOWLEDGE, ATTITUDE AND PRACTICE OF TELEDENTISTRY AMONG DENTAL PRACTITIONERS DURING COVID-19: A SYSTEMATIC REVIEW AND META-ANALYSIS

Lin GSS, Koh SH, Ter KZ, Lim CW, Sultana S, Tan WW

Background and Objectives: This systemic review aims to appraise and analyse the awareness, knowledge, attitude, and practice of teledentistry among dental practitioners during COVID-19. **Materials and Methods:** This review was registered in the PROSPERO database (CRD42021283404). Cross-sectional articles on dental practitioners' perceptions towards teledentistry published between March 2020 and September 2021 were searched in ten online databases (PubMed, Google Scholar, Web of Science, ScienceDirect, Cochrane, EMBASE, SIGLE, EBSCO, LILACS, and Open Grey). The Joanna Briggs Institute critical appraisal tool was employed to analyse the risk of bias (RoB) of each article, whereas the Oxford Centre for Evidence-Based Medicine recommendation tool was used to evaluate the level of evidence. Data were analysed using the DerSimonian-Laird random effect model based on a single-arm approach. **Results:** Six studies were included and demonstrated Level 3 evidence. A single-arm meta-analysis revealed that dental practitioners had a high level of awareness (70.4%) and attitude (72.5%) towards teledentistry during the COVID-19 pandemic, but their knowledge level (57.9%) was moderate with a poor practice level (35.8%). A substantial heterogeneity was observed with the overall I² ranging from 90.78% to 98.21%. Furthermore, meta-regression indicated that the sample size of each study had a significant ($p < 0.05$) impact on the degree of data heterogeneity. **Conclusions:** Despite their high degree of awareness and attitude, dental practitioners demonstrated moderate knowledge and relatively poor practice of teledentistry during the COVID-19 pandemic. More well-designed studies are warranted to investigate the alternatives for enhancing dental practitioners' knowledge and practice of teledentistry interventions.

Keywords: coronavirus, dental care, oral health, pandemic, telehealth

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345. THE ESTABLISHMENT OF A MULTI-SOURCE DATASET OF IMAGES ON COMMON ORAL LESIONS

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Purpose: To establish an oral lesion image database that could accelerate the development of artificial intelligence systems for lesion recognition and referral decision. **Materials and Methods:** We describe the establishment of a multi-sourced image dataset through the development of a platform for the collection and annotation of images. Further, we developed a used-friendly tool (MeMoSA® ANNOTATE) for systematic annotation to collect a rich dataset associated with the images. We evaluated the sensitivities comparing referral decisions through the annotation process with the clinical diagnosis of the lesions to identify lesions that are challenging to identify through images alone. **Results:** The image repository hosts 2474 images of oral lesions consisting of oral cancer, oral potentially malignant disorders, benign lesions, normal anatomical variants and normal mucosa that were collected through our platform, MeMoSA® UPLOAD. Over 800 images were annotated by seven oral medicine specialists on MeMoSA® ANNOTATE, to mark the lesion and to collect clinical labels. The sensitivity in referral decision for all lesions that required a referral for cancer management/surveillance was moderate to high depending on the type of lesion (64.3–100%). **Conclusion:** This is the first description of a database with well-annotated oral lesions. This database has already been used for the development of AI algorithm for classifying oral lesions. Further expansion of this database could accelerate the improvement in AI algorithms that can facilitate the early detection of oral potentially malignant disorders and oral cancer.

Keywords: Oral Cancer, Oral Oncology, Annotation Tool, Access to Care, Artificial Intelligence, Oral Diagnosis

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346. DEVELOPMENT AND TRAINEES' ACCEPTANCE OF AN ONLINE SELF-GUIDED PERIODONTAL HEALTH SCREENING MODULE

UKM PPI/111/8/JEP-2020-617

Teo HS, Mohd-Norwir NA, Ramli H, Husain J, Mohd-Dom TN, Mohd-Said S

Introduction: Periodontal disease is a silent endemic, still unknown by many and is challenging to identify within the population. **Aim:** We aimed to design a simple yet thorough module to screen patients' periodontal health and evaluate users' acceptance for its use. **Materials and Methods:** 156 final year trainees from three public universities were involved in this study. An online self-guided periodontal health screening module was developed based on the 2019 Basic Periodontal Examination (BPE), 2016 Malaysian Association of Dental Public Health Specialist-Colgate kit and 2017 Classification of Periodontal and Implant Diseases. In this new module, a step-by-step technique was emphasised through application of periodontal screening fundamental components. Trainees used the module and provided feedback on their: 1) understanding of the module content, 2) views on module design, and 3) perceptions on how the module could benefit their practice. **Results:** Majority of trainees found the new module to be easily understood (126, 80.8%) and easy to use (100, 64.1%) compared to BPE (100, 70.5% and 34, 21.8% respectively). Most found the design to be very good (63, 40.4%) and good (72, 46.2%). Further, they agreed that this new module will help them screen their patients faster (strongly agree 51, 32.7%, agree 62, 39.7%) and make better clinical decisions (strongly agree 67, 43.0%, agree 74, 47.4%). **Conclusion:** The new online self-guided periodontal health screening module was highly accepted by dental trainees for its easy understanding and technique, design and perceived benefits for faster and better decision making.

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347. HEALTHCARE PROFESSIONAL IN THE LOOP (HPIL): CLASSIFICATION OF STANDARD AND ORAL CANCER-CAUSING ANOMALOUS REGIONS OF ORAL CAVITY USING TEXTURAL ANALYSIS TECHNIQUE IN AUTOFLUORESCENCE IMAGING

Awais M, Ghayvat H, Krishnan Pandarathodiyil A, Nabillah Ghani WM, Ramanathan A, Pandya S, Walter N, Saad MN, Zain RB, Faye I

Oral mucosal lesions (OML) and oral potentially malignant disorders (OPMDs) have been identified as having the potential to transform into oral squamous cell carcinoma (OSCC). This research focuses on the human-in-the-loop-system named Healthcare Professionals in the Loop (HPIL) to support diagnosis through an advanced machine learning procedure. HPIL is a novel system approach based on the textural pattern of OML and OPMDs (anomalous regions) to differentiate them from standard regions of the oral cavity by using autofluorescence imaging. An innovative method based on pre-processing, e.g., the Deriche-Canny edge detector and circular Hough transform (CHT); a post-processing textural analysis approach using the gray-level co-occurrence matrix (GLCM); and a feature selection algorithm (linear discriminant analysis (LDA)), followed by k-nearest neighbor (KNN) to classify OPMDs and the standard region, is proposed in this paper. The accuracy, sensitivity, and specificity in differentiating between standard and anomalous regions of the oral cavity are 83%, 85%, and 84%, respectively. The performance evaluation was plotted through the receiver operating characteristics of periodontist diagnosis with the HPIL system and without the system. This method of classifying OML and OPMD areas may help the dental specialist to identify anomalous regions for performing their biopsies more efficiently to predict the histological diagnosis of epithelial dysplasia.

Keywords: VELscope®, autofluorescence imaging, oral cavity mucosal lesions, oral mucosal cancer, oral potentially malignant disorders (OPMD), texture analysis.

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348. M-HEALTH FOR EARLY DETECTION OF ORAL CANCER IN LOW- AND MIDDLE-INCOME COUNTRIES

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Background: Up to 86% of oral cancer (OC) patients present at the late stage where survival is dismal. Limited access to specialist diagnosis is a significant factor for late presentation. The increasing use of smartphones presents an opportunity to use digital technology to facilitate early detection of OC. **Aim:** To evaluate the feasibility of using Mobile Mouth Screening Anywhere (MeMoSA(R)) to facilitate early detection of OC. **Methods:** A mobile phone app named MeMoSA was developed and the feasibility of integrating this for documentation of oral lesions, and communication between dentists and specialists for management decisions were evaluated. The experience of dentists and specialists in using MeMoSA was determined using qualitative questionnaires. **Results:** Communication between specialist and dentists using MeMoSA stratified cases and streamlined referral of patients. Twelve of 48 patients were found to have oral lesions or signs suspicious of cancer and 3 required referrals. The patient's compliance for referral was tracked with MeMoSA. All dentists agreed that MeMoSA could facilitate early detection of OC and believed that MeMoSA could assist in the identification of oral mucosal lesions through direct communication with specialists and continuous learning in the recognition of high-risk lesions. **Conclusions:** MeMoSA has the potential to be used to promote equitable health care and streamline patient management that could result in early detection of OC.

Keywords: e-health, m-health, technology, teledentistry, telemedicine

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349. GENDER AND AGE ASSESSMENT BASED ON MANDIBULAR MORPHOMETRY ANALYSIS VIA ORTHOPANTOMOGRAPH – A RETROSPECTIVE STUDY

IREC 2021 - 032

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Introductions: Mandible is the strongest and most durable facial bone. **Objectives:** This study aimed at assessing age and gender based on mandibular morphometry via orthopantomographs. **Materials and methods:** 202 OPG consisted of 116 females and 86 males between ages of 18-50 years old were selected from the computer server at radiology department of Kuliyah of Dentistry ranging from 2010 until 2020. The OPG were viewed on Planmeca Romexis software where linear and angular mandibular parameters were assessed accordingly in millimeters. Relationship and correlation analysis among the mandibular morphometry measurements with regards to gender and age were tested respectively. **Results:** Four bilateral linear mandibular parameters (maximum ramus breadth, MxRB; minimum ramus, MnRB; coronoid height, CH and condylar height, CdH) showed statistically significant difference ($p < 0.05$) in terms of relationship between gender and mandibular morphometry. Meanwhile, only maximum ramus breadth (MxRB) bilaterally, right minimum ramus breadth (MnRB), right coronoid height (CH) and right gonial angle (GA) were found to be statistically significant and correlated with age. Hence, the regression equations for the correlated mandibular measurements were generated accordingly. **Conclusions:** A generally strong relationship between linear mandibular morphometry and sex for all landmarks were found. Meanwhile, for age assessment, only three linear mandibular measurements and one angular mandibular parameter were significantly correlated. In conclusion, OPG mandibular measurements were proved to be a good tool for gender and age assessment for certain morphometry.

Poster presentation at the 11th Dental Students' Scientific Conference (DSSC) on 28 March 2022. Corresponding e-mail: maxfacor@iium.edu.my

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350. VALIDATION OF DEEP NEURAL NETWORK FOR AGE ESTIMATION IN MALAY CHILDREN USING DIGITAL PANORAMIC DENTAL IMAGING

REC/07/2020(MR/166)

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Introduction: An individual's chronological age is one of the essential pieces of evidence required by authorities when determining refugee status and sentencing criminals. In some cases, estimating the age of deceased bodies at the forensic scene is also required. Radiographic examinations have traditionally been used to estimate age, and their application necessitates human expertise. Currently, forensic odontologists assess dental age manually using a scoring system that is arguably biased toward subjective grading. However, the existing technique can be time-consuming and challenging for a large-scale incident requiring a more significant number of forensic identifications, such as a mass disaster. As a result, the current technique requires the participation of many specialists, increasing workloads and lengthening the identification process. The advancement of medical imaging technologies enables the development of computer-based applications that leverage data mining in the medical industry to improve diagnostic reliability and speed while also increasing reproducibility. **Objectives:** To validate the accuracy and performance of a deep convolutional neural network for age estimation in Malay children using digital panoramic dental imaging. **Materials and Methods:** A dataset consisting of 240 images (20 per stage per sex) of retrospect digital dental panoramic imaging of patients between 5 and 14 years of age was retrieved. The methodology consists of four significant steps: image preprocessing in accordance with the inclusion criteria for panoramic dental radiographs, segmentation and classification of mandibular premolars using the dynamic programming-active contour method and deep convolutional neural network, respectively, and statistical analysis. **Results:** The proposed deep learning model underestimated chronological age with a small mean error of 0.02 and 0.003 for P1 and P2, considering females and males together and introduced additional sub-stages of stages D1, D2, D3, D4, and D5. **Conclusions:** Deep learning using the Tensorflow and Keras application programming interface makes developing the deep learning architecture model easier. The proposed model was expected to assist forensic odontologists during identification. Besides, this semi-automated approach is also expected to provide a fast-computational time which reduces approximately 90% of human intervention.

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351. THE APPLICABILITY OF WEB-BASED CEPHALOMETRIC TRACING IN POSTGRADUATE ORTHODONTIC TRAINING

DF CD2110/0022 (U)

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Introduction: Clinicians use lateral cephalometric (LC) radiographs for orthodontic diagnosis and treatment planning. The transition from manual to digital cephalometric tracing and analysis gained popularity as it aims to improve diagnostic value by saving time and cost. Artificial intelligence (AI)-assisted digital LC tracing and analysis could potentially reduce effort and errors. The primary goal of the AI is to improve precision and accuracy. Web-based digital LC applications further enhance the ability to trace and analyse LC radiographs on any internet-connected device. **Aim:** To investigate students' perception of digital cephalometric tracing using web-based AI software. **Methods:** Validation of the software (WebCeph™) was performed by two calibrated orthodontists using thirty good quality lateral cephalometric (LC) radiographs without gender, occlusal type, and skeletal pattern differentiation. Eleven anatomical landmarks were defined for eight skeletal and dental measurements. Ten orthodontic postgraduate students were trained virtually via *GoogleMeet* application by an orthodontic lecturer. Using the intraclass correlation coefficient (ICC), the students' inter-examiner reliability was assessed against the gold standard orthodontist, followed by their intra-examiner reliability two weeks later. Following training and calibration, the students were encouraged to use WebCeph™ to trace their patients' LC. A focus group discussion (FGD) was held to elicit students' perspectives on the benefits and drawbacks of digital tracing with WebCeph™. Data were transcribed and thematically analysed using the NVivo version12 software. **Results:** The inter-examiner reliabilities were excellent ($ICC > 0.9$; $p < 0.05$) for all measurements. Intra-examiner reliabilities were also excellent for most students except for a few students on certain linear measurement parameters ($ICC < 0.5$; $p > 0.05$). The FGD revealed that digital tracing eliminated the need for physical storage of printed radiographs but necessitated reliable electronic storage and portable encrypted storage for enhanced data security. It saved time because the AI generated the results, which clinicians could then adjust. The ease of access by allowing out-of-office tracing, easy revision of traced landmarks, and instant generation of various cephalometric analyses increases the adoption of the software. Accuracy was perceived to be better than printed radiographs due to the ability to adjust contrast and sharpness, which improved image clarity but hindered by software technical shortcomings such as pointer size, semi-adjustable scales, and non-customisable tooth templates. They also felt that a device's screen size and computer mouse sensitivity may also affect the tracing precision. To maintain patients' confidentiality, they use non-identifier codes and block out patients' and institution's name from the LC. **Conclusions:** Despite its limitations, digital cephalometric tracing using WebCeph™ was perceived positively by the students because it allowed for a convenient, self-paced cephalometric analysis generation and interpretation in a shorter time.

Poster presentation at the International University Carnival on E-Learning (IUCEL) Invention, Innovation & Design on e-Learning (IIDEL) Competition on 28 – 30 June 2022. Corresponding e-mail: eunicesoh@um.edu.my

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352. VALIDITY OF WEB-BASED ARTIFICIAL INTELLIGENCE-ASSISTED DIGITAL CEPHALOMETRIC TRACING AND ANALYSIS APPLICATION IN IDENTIFYING CEPHALOMETRIC LANDMARKS AND MEASUREMENTS

DF CD2110/0022 (U)

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Introduction: Clinicians use lateral cephalometric (LC) radiographs for orthodontic diagnosis and treatment planning. The transition from manual to digital cephalometric tracing and analysis gained popularity as it aims to improve diagnostic value by saving time and cost. Artificial intelligence (AI)-assisted digital LC tracing and analysis could potentially reduce effort and errors. The primary goal of the AI is to improve precision and accuracy. Web-based digital LC applications further enhance the ability to trace and analyse LC radiographs on any internet-connected device. **Aim:** To investigate the validity of a web-based AI-assisted digital LC tracing and analysis application (WebCeph™) in LC landmark identification and measurements. **Methods:** Two calibrated operators measured 11 landmarks and eight dental and skeletal parameters on 30 good quality pre-treatment LC radiographs, manually on printed radiographs and digitally on digital radiographs uploaded onto WebCeph™. AI landmark identification was adjusted when necessary. Inter-examiner reliability test followed by intra-examiner test two weeks later for the measurements on printed and digital radiographs were performed using intraclass correlation coefficient. Validity and agreement were assessed using paired t-test and Bland-Altman analysis. The statistical significance was set at $p < 0.05$, and the agreement was set at 2 mm for linear measurements and 5° for angular measurements. **Results:** The majority of inter-examiner and intra-examiner measurements had good to excellent reliabilities. The paired t-test indicated no statistically significant difference ($p > 0.05$) between manual and digital tracing except for SNA, ANB, and LIA. However, the Bland-Altman analysis showed that the 95 per cent limits of agreements for all measurements were greater than 2 mm and 5°. **Conclusions:** WebCeph™ is valid in lateral cephalometric landmark identification and measurements. However, clinicians need to be mindful that the methods should not be considered interchangeable. Cephalometric changes over time or treatment should be compared using the same method of measurement.

Poster presentation at the National Oral Health Research Initiative (NOHRI) Conference on 14 – 16 October 2022. Corresponding e-mail: eunicesoh@um.edu.my

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353. DENTAL IMPRESSION TRAY SELECTION FROM MAXILLARY ARCH IMAGES USING MULTI-FEATURE FUSION AND ENSEMBLE CLASSIFIER

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Dental impression tray is frequently used in dentistry to record the patient's oral structure for clinical oral diagnosis and treatment planning. Manual procedure of taking impressions is costly, time-consuming, and additionally, no research has been done on selecting dental impression tray from dental arch images using computer vision in real-life scenarios. In this spirit, an intelligent model is proposed based on computer vision and machine learning to select appropriate dental impression trays from maxillary arch images. A dataset of 52 patients' maxillary arch images have been acquired and various sets of features such as colors, textures, and shapes of the images were extracted to better characterize the maxillary arch images. Considering the importance of the features in describing the maxillary arch object and to improve the classification performance, a method based on multi-feature fusion with ensemble classifier is proposed. Besides, the performance of a deep learning based multilayer perceptron neural network is also investigated. The proposed multi-feature fusion with ensemble classifier attained 92.31% precision, 91.75% recall, 91.75% accuracy, respectively, on the dataset, which clearly establishes the feasibility of the proposed model. An illustration of a real-life application of the proposed model is also provided.

Keywords: Dental impression tray, dental arch image, automation in dentistry, computer vision, multi-feature fusion, ensemble classifier

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354. A CROSS-SECTIONAL STUDY TO ESTABLISH SOFT TISSUE CEPHALOMETRIC NORMS FOR ORTHOGNATHIC SURGERY IN KERALA POPULATION

Nasim R, Ramakrishnan R, Alkahtani ZM, Ganapathy S, Vedam V, Saluja P

Aim: The aim of the investigation is to establish soft tissue cephalometric norms for orthognathic surgery in the population of Kerala and to compare the values obtained with Legan and Burstone soft tissue cephalometric analysis. **Materials and methods:** Lateral cephalometric radiographs were taken for a total of 100 subjects (50 males and 50 females) of age group 18- 25 years, selected according to the inclusion criteria. All lateral cephalometric films were traced digitally and Legan and Burstone analysis was done using Nemoceph NX Orthodontic Cephalometric Software (version 6). The values obtained were statistically analyzed using the Statistical Package for Social Sciences (SPSS 16.0) and tabulated. The change in the values of different parameters were compared with the standard values of Legan and Burstone soft tissue analysis. **Results:** The study revealed almost all the values as statistically significant hence necessitating the importance of this study. The norms are discussed under facial form and lip position. When the values derived for facial form from Kerala population was compared with original Caucasian norms all the values obtained were found to be significant except lower vertical height depth ratio with a highly significant difference for vertical height ratio and lower face- throat angle. When the lip position and form was compared with the Caucasian norms, all the values were significant except the vertical lip- chin ratio with highly significant values for the upper lip protrusion, lower lip protrusion, mentolabial sulcus, maxillary incisor exposure and inter labial gap. Thus a different set of soft tissue cephalometric norms was necessary for Kerala population which can aid the clinicians for diagnosis and treatment planning and the present study has formed a norm which could be used for future reference for patients undergoing orthognathic surgery. **Conclusion:** COGS (Cephalometrics for Orthognathic surgery) can be used as the cephalometric norms for orthognathic surgery across the world in order to know the variation from normal and to bring these values to normal or near normal by orthognathic surgery. **Clinical significance:** This present study has helped to form a new norm for this population for orthognathic surgery using COGS (Cephalometrics for Orthognathic surgery) which could be useful in future for knowing the variation from normal and to bring these values to normal or near normal by orthognathic surgery.

Keywords: COGS, Legan and Burstone soft tissue analysis, Cephalometric Norms

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355. OPINIONS OF SECONDARY SCHOOL STUDENTS ON THE USE OF A SMARTPHONE APPLICATION AS ORAL HEALTH EDUCATION TOOL: A QUALITATIVE STUDY.

NMRR-18-3880-45396

Ab Mumin N, Yusof ZYM, Marhazlinda J, Obaidellah U

Background: The emergence of smartphone applications in oral health education (OHE) has encouraged the development of innovative applications to assist users in improving their oral health. However, creating such applications without considering the end-user's perspectives in the development process could result in applications being underutilised and ineffective. **Aim & Objective:** This study aimed to explore the opinions of secondary school students in Selangor, Malaysia regarding the use of a smartphone application for OHE. The specific objective was to identify the features for a smartphone application as OHE tool among adolescents in Malaysia from the perspectives of secondary school students. **Methods:** This was a qualitative study. Focus group discussions (FGDs) were conducted among Form Two (14-year-old) and Form Four (16-year-old) students from selected government secondary schools in Selangor state utilizing a semi-structured topic guide. FGDs were stopped upon reaching data saturation. Data was transcribed verbatim and analysed using NVivo software. **Results:** The respondents mainly used smartphone applications to follow the social media accounts of other people, to stay connected, and learn new information. Mixed responses were recorded relating to the use of smartphone applications for OHE. The preferred features were the application must be easy to use, fun and informative, allows users to ask questions, able to locate a dentist, able to detect disease, give reminders, and provide rewards for users. **Conclusion:** Identifying end-users' opinions and their preferences will help to create an application tailored to the target audience's needs, which is the first step in a user-centred approach for developing a smartphone application. As adolescents are among high user of smartphone, having an application directly installed in their phone could be a timely strategy to help improve their oral health knowledge and behaviours.

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356. EXPLORING THE USABILITY OF MYSMILE APP AS ORAL HEALTH EDUCATION TOOL AMONG ADOLESCENTS: A QUALITATIVE STUDY

NMRR-18-3880-45396

Ab Mumin N, Yusof ZYM, Marhazlinda J, Obaidellah U

Background: Health-related smartphone application (app) is gaining attention as one of the ways to assist patients manage their health. Realising the potential of smartphone app in promoting health, MySmile was developed under Faculty of Dentistry, University of Malaya aiming to help adolescents gain oral health knowledge and improve oral health behaviour. However, developing an app without considering its usability may result with an app that does not fit the target user's expectation, which would affect the app adoption. **Objective:** The aim of this study is to explore the usability of MySmile app (beta version) as oral health education tool among adolescents in Selangor Malaysia. **Methods:** Thirty secondary school students, Form Two (14-year-old) and Form Four (16-year-old) from two secondary schools in Petaling district, Selangor were purposely selected to use beta version of MySmile for 14 days. After the period ends, four online focus group discussions were conducted via Google meet using semi-structured topic guide developed based on Technology Acceptance Model (TAM). Data were analysed using framework method analysis. **Results:** Two main themes were created based on the construct in TAM, 1) perceived ease of use and 2) perceived usefulness. Three additional themes that emerged are 3) information receptivity, 4) interest to use, and 5) suggestion for improvement. **Conclusions:** To develop an acceptable, usable, and appropriate app for the target user, assessing the usability of MySmile app as oral health education tool is an important step during the app development. Ensuring that users' satisfaction was considered will increase the chances of app being used by them. Findings gained from this study will be used to further improve the beta version of MySmile before finalising the app.

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357. ADOLESCENTS' OPINIONS ON THE USE OF A SMARTPHONE APPLICATION AS AN ORAL HEALTH EDUCATION TOOL: A QUALITATIVE STUDY

NMRR-18-3880-45396

Ab Mumin N, Yusof ZYM, Marhazlinda J, Obaidellah U

Introduction: Developing health-related smartphone applications (HRSAs) for oral health education (OHE) should consider the end-user's perspectives to ensure they will be usable. This study aimed to explore the opinions of secondary school students in Selangor, Malaysia regarding the use of a smartphone application for OHE and to identify the features for an OHE smartphone application from the perspectives of adolescents. **Methods:** Focus group discussions (FGDs) were conducted among Form Two (14-year-old) and Form Four (16-year-old) students from selected government secondary schools in Selangor utilising a semi-structured topic guide until data saturation was achieved. Data were analysed using framework analysis. **Results:** Ten FGDs were conducted involving 77 participants. Mixed opinions were recorded on the use of HRSAs for OHE. The preferred features in a HRSA are disease detection, have games and rewards, educational and fun, access to a dentist, reminders, and user-friendliness. Adolescents are aware of the positive aspect of using HRSAs for OHE, however they are wary of the need to install one. Nevertheless, identifying adolescents' preferred features of an OHE app is the first step in developing an application tailored to their needs. Smartphone applications could be a timely strategy to improve OHE delivery and behaviour improvement for this age group.

Keywords: Malaysia, Smartphone, adolescents, focus groups, health education, mobile applications, schools

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358. EXPLORING THE OPINIONS OF SECONDARY SCHOOL STUDENTS IN SELANGOR, MALAYSIA ON THE STRENGTHS AND WEAKNESSES OF THE SCHOOL DENTAL SERVICE – A QUALITATIVE STUDY

NMRR-18-3880-45396

Ab Mumin N, Yusof ZYM, Marhazlinda J, Obaidellah U

Background: The Malaysian School Dental Service (SDS) was introduced to provide systematic and comprehensive dental care to secondary school students which includes promotive, preventive, and curative dental care. This study aimed to undertake a process evaluation of the SDS using the perspectives of secondary school students at government schools in Selangor, Malaysia. **Methods:** The study adopted a qualitative approach to explore the opinions of secondary school students on the SDS implementation in their schools. Data from focus group discussions involving Form Two (14-year-olds) and Form Four (16-year-olds) students from selected schools were transcribed verbatim, coded using the NVivo software and analysed via the framework method analysis. **Results:** Among the strengths of the SDS were the convenience it offers for students to have an annual oral examination and dental treatment without having to visit a dental clinic outside the school. The SDS also reduced the financial burden of dental treatment cost especially among students from low-income families and helped to increase oral health awareness. However, the students felt that the oral health education provided by the SDS personnel was infrequent while the content and method of delivery were perceived as less interesting. Poor attitude of the SDS personnel was also reported by the students. **Conclusion:** The SDS has succeeded in providing dental care to secondary school students. However, oral health promotion and education activities need to be improved by taking into account the changing needs of the target audience.

Keywords: Focus group, Oral health education, School dental service

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DOMAIN 7

Digital Technologies in Dentistry



359. RISK PREDICTION OF MAXILLARY CANINE IMPACTION AMONG 9-10-YEAR-OLD MALAYSIAN CHILDREN: A RADIOGRAPHIC STUDY

IREC 2021-006

Ismail AF, Sharuddin NFA, Asha'ari NH, Ali MAM, Zainol IZ, Alotaibi LH, Mallineni SK

Background: Early diagnosis and interceptive treatment of the maxillary canine impaction is crucial as it reduces treatment complexity and decreases complications and adverse outcomes. **Aim and Objectives:** To determine the mean maxillary canine position among 9-10-year-old children and predict the risk of impaction of the maxillary canines. **Methodology:** Panoramic radiographs (PANs) of 289 healthy children aged between 9 and 10 years were observed where the average position of maxillary canines was related to the lateral incisor, sector locations, and angulations to the bicondylar line were traced. The average position was obtained by using descriptive statistics. One sample Wilcoxon signed-rank test is done to predict the risk of canine impaction by comparing the data obtained to the average position from prior studies. **Results:** A total of 289 PANs (126 males and 163 females) were utilized for the analysis. The findings showed that the average position of the maxillary canines in our population was statistically different from the average position of nonimpacted canines in previous studies. However, on average, more than 85% of canines in our population were still located within the safe range of satisfactory position, with females showing slight predominance outside of the acceptable range. The mean scores of the angles between the right canine and lateral incisor were significantly higher among females than males ($p = 0.001$). Similarly, females had a significantly higher mean angle of the left canine than males ($p < 0.001$). In regard to the angles between the bicondylar line and permanent maxillary canine, the mean scores were not significantly different ($p > 0.05$) on both the left and right side. **Conclusion:** There is a low risk of impaction of maxillary canines in the Malaysian population. However, more retrospective studies using more radiographic and clinical indicators need to be done to confirm the risk of impaction further.

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360. STRESS AND DEFORMATION EFFECT OF NOVEL RAPID MAXILLARY EXPANDERS BY FINITE ELEMENT ANALYSIS

DF OS2034/0137 (L)

Lu TY, Ahmad MA, Hassan WNW, Hariri F

Introduction: Narrow upper arch or maxillary transverse deficiency can be treated either orthodontically with rapid maxillary expansion or surgically using surgically assisted rapid palatal expansion. **Objectives:** The aim of the study was to analyse the stress and deformation of the different type of rapid maxillary expanders under activation utilizing finite element analysis. **Material and Methods:** Three novel rapid maxillary expanders named RaMEX 1P, RaMEX 1B and RaMEX 1B(variant) were designed in this study. Prior to further customized clinical application as patient-specific implant, a finite element analysis of these prototypes was performed to analyse the stress and deformation of the expanders under activation. All the expanders were meshed in Workbench 2021R1(Ansys, Canonsburg, Penn) and analysed with Mechanical 2021(Ansys, Canonsburg, Penn) for the parameters of total deformation, elastic strain, equivalent stress and volume changes. **Results:** RaMEX 1P showed the least changes in all four parameters with total deformation of 1.46×10^{-7} m, elastic strain of 3.25×10^{-5} , equivalent stress of 3.47×10^6 Pa and volume changes of 2.11×10^{-10} m³. **Conclusion:** This study shows that RaMEX 1P can be considered as the most ideal design for clinical application as compared to RaMEX 1B and RaMEX 1B(variant).

Keywords: Rapid maxillary expansion, Maxillary expansion, Finite element analysis, Patient-specific implant

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361. ACCURACY OF 3-Dimensionally Printed Retainers and Aligners: A Systematic Review

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Introduction: With the constant improvement of photopolymerizable resin, direct 3-Dimensional (3D) printing of retainers and aligners (R&A) has gained popularity in recent-years. **Objectives:** (1) To determine the accuracy of three-dimensional (3D) printed retainers and aligners (R&A), in terms of trueness and precision. (2) To determine the printing time and resin used in relation to different printing angulation. (3) To determine the mechanical properties of 3D printed aligners. **Materials and methods:** Electronic database searches on Pubmed, Science Direct, Web of Science, Scopus, Ovid, and Clinicaltrial.gov were performed till 23 April 2022 using MeSH terms with no language and publication date limitation. The selection criteria include all study designs that assessed the accuracy of 3D printing of R&A. QUADAS-2 tool was used to assess the risk of bias and applicability concerns of the methodologic quality of the articles. Accuracy in terms of both trueness and precision was reported in root means square values. The trueness of landmarks was calculated and reported as the average absolute mean differences with standard deviation (in millimetres). **Results:** A total of 369 studies were identified, of which 10 in-vitro studies were selected. There were five studies that reported the accuracy of 3D printed retainers and another five studies reported on aligners. For 3D printed retainers, only one study (Naeem et al. 2022) reported both trueness (SLA= 0.121 mm, DLP= 0.242 mm, cDLP= 0.203 mm, PPP= 0.151 mm) and precision (SLA= 0.111 mm, DLP= 0.067 mm, cDLP= 0.052 mm, PPP= 0.101 mm) by comparing different types of printing technologies. For 3D printed aligners, only one study (Koenig et al. 2022) reported both trueness (0.14±0.020mm) and even distribution of landmarks in Modified Bland-Altman plots indicating high precision of aligners fabricated with photopolymerizable polyurethane resin printed by DLP printer. Other studies assessed only the trueness of 3D printed R&A. None of the studies reported only the precision of 3D printed R&A. The trueness of majority of the 3D printed R&A was within the clinically acceptable accuracy of 0.25mm. Printing angulations did not appear to affect the trueness. 3D printing of R&A at 45° was the most cost-effective and required around 98 to 120 minutes and utilized approximately 5.2 to 5.77ml of resin. Only Jindal *et al.* (2019) assessed the mechanical property of 3D printed aligners. Cured 3D printed aligners deformed elastically and are able to withstand a higher resistance load of 531-662N compared to thermoformed aligners (584N). Most of the studies had a high risk of bias and applicability concerns due to high heterogeneity. No meta-analysis was performed. **Conclusions:** The existing digital workflow involving various printing materials, angulations, printing thickness and printing technologies is feasible for the fabrication of direct 3D printing of R&A with various degrees of accuracy. Mostly were within clinical acceptable level of accuracy of 0.25 mm. Printing at 45 degrees is the most cost-effective in terms of printing time and resin used. Cured 3D printed aligners fabricated by photopolymerizable polymethylmethacrylate (PMMA) resin were stiffer, with higher yielding, lower displacement, and lower reversible deformation than traditional thermoformed materials. High-quality in-vitro and clinical studies, with standardized methodology and analytical assessment, are required for comparisons between studies.

Keywords: Accuracy, 3D printed retainers, 3D printed aligners, trueness, precision, cost-effectiveness

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362. THE LOCATION AND DIAMETER OF THE PRIMARY MAXILLARY SINUS OSTIUM IN MALAYSIANS: A CONE-BEAM COMPUTERIZED TOMOGRAPHY STUDY

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Rhinosinusitis is one of widely spread diseases in the region and the role of the anatomical variations in its pathogenesis remains unresolved. A retrospective study using CBCT scan was employed to locate and measure the diameter of 320 primary maxillary ostium (PMO) (n = 160 subjects) among the Malay and Chinese populations (Mongoloid race) in Malaysia. Image analysis was performed using the i-CAT Vision Software, employing the multiplanar reconstruction window in which axial, coronal and sagittal planes were visualized in 0.3 mm intervals. The mean diameter of the PMO was significantly larger in the Chinese than the Malay. Females had larger size than the male and bilateral asymmetry was noticed, where the right side PMO was larger than the left side ($p < 0.05$). In addition, PMO opened more in the posterior third position of the hiatus semilunaris (61.9%) than anterior and middle third. The PMO showed a statistically significant posteriorly placed position in the Chinese than the Malays and this was more evident in the right side PMO ($p < 0.01$). In conclusion, the PMO commonly opens in the posterior third of the hiatus semilunaris and its diameter is significantly greater in the Chinese female with evidence of bilateral asymmetry. Awareness the anatomical variation of the Ostium diameter and location among the Malay and Chinese populations potentially has important clinical effects during surgical procedures.

Keywords: Primary maxillary sinus ostium, dimension, location, CBCT, Mongoloid race

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363. A REVIEW ON AUTOMATED BONE AGE MEASUREMENT BASED ON DENTAL OPG IMAGES

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Bone Age Measurement (BAM) is a process of assessing skeletal maturity levels to measure one's factual age. It has been used for clinical and medical investigation and forensic science. This paper provided an overview of bone age measurement techniques and investigated their limitations to find the most suitable automated method for BAM. This assessment is usually achieved by two approaches: radiographic image analysis or traditional methods and machine learning technique. Traditional techniques have been applied to estimate chronological age by comparing the radiographic image of one's wrist or dentition with an existing standardized chart, which includes a set of recognizable images for age at each stage of development. Traditional methods are known based on the analysis of specific areas of hand, face, skull, dental structures, etc. Still, this method has various disadvantages, such as extensive error range, low accuracy, observer change, and time-consuming. This issue leads to the emergence of an automated process, such as machine learning algorithms. This article explores the automated techniques used in the previous literature and highlights the challenges and issues. Finally, we propose a framework based on the gap in the literature reviewed.

Keywords: Bone Age Measurement, Radiographic Image, Traditional Age Measurement, Automatic Age Measurement, Machine Learning Technique, Automatic Age Measurement

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364. A COMPARATIVE STUDY ON MANDIBULAR PREMOLAR ROOT CANAL MORPHOLOGY EMPLOYING CONE-BEAM COMPUTED TOMOGRAPHY AND MICROCOMPUTED TOMOGRAPHY IMAGING

Pang KC, Raja KK, Nambiar P

Aim: The present study was to investigate the root canal morphology of mandibular premolars in Malaysian population using cone-beam computed tomography (CBCT) and microcomputed tomography (micro-CT) scanned images. **Materials And Methods:** Sixty selected mandibular premolars were evaluated in vitro and the root canal morphologies of the samples were categorized based on Vertucci's classification. The position of apical foramen, presence, and location of lateral canal, as well as prevalence of apical delta, were also determined. **Results:** Invariably, Type I variety (Vertucci's classification) was the most frequent root canal morphology followed by Type V and Type III after micro-CT imaging. CBCT investigation also revealed Type I as the most numerous; however, the second most common configuration was Type III followed closely by others. There was a moderate agreement in Vertucci's classification of root canal configuration and also prevalence of apical delta (kappa: 0.516 and 0.550, respectively). However, only a fair agreement (kappa: 0.289) was observed between CBCT and micro-CT on the prevalence of lateral canal. **Conclusion:** CBCT should be cautiously used in determining root canal configuration as deficiencies were evident and revealed during micro-CT imaging.

Keywords: Apical delta, cone-beam computed tomography, lateral canal, microcomputed tomography, root canal morphology

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365. LASERS AND THEIR APPLICATIONS IN THE DENTAL PRACTICE

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The objective of implementing newer techniques in dentistry is to overcome the shortcomings of traditional ones. Dentistry, being a dynamic field, is always on the lookout for innovative techniques, and embracing newer technology has indeed improved patient care in many ways. Lasers are being used as an adjunct or alternative tool to conventional dental procedures. Many dental disciplines such as oral surgery, oral medicine, periodontics, paediatric dentistry, implantology, and operative dentistry have benefitted from the use of laser technology. Lasers have become an invaluable tool in many procedures, including caries removal, caries decontamination, caries prevention, cavity preparation, soft tissue surgeries, root canal decontamination, analgesic and anti-inflammatory effects, to name a few. Laser treatment in dentistry can be quicker and more efficient. Other benefits would include markedly less pain, lack of bleeding, minimal need of anaesthesia and reduced postoperative discomfort. Also, patients may be able to resume their daily activities shortly after the treatment is rendered, owing to faster healing. However, the caveat would be that adequate training is a mandatory prerequisite before handling patients with these powerful instruments. This article briefly reviews the basic science of lasers and gives a brief account on the updates of their diverse applications in the general dental practice.

Keywords: Lasers, Dentistry, Adjunctive Techniques, Laser Physics, Clinical Applications

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366. ASSESSMENT OF THE RADIOLOGICAL CHANGES INVOLVING ARTICULAR SURFACES OF TEMPOROMANDIBULAR JOINTS IN PATIENTS WITH OSTEOARTHRITIS AND RHEUMATOID ARTHRITIS USING COMPUTED TOMOGRAPHY

Priyanka EN, Kumar NP, Narayana S, Sarma G, Donepudi KK, Vijayan SP, Kolappan R, Pandarathodiyil AK

Background: Temporomandibular joint (TMJ) disorders refer to a complex set of conditions; manifested by pain in the area of the jaws and associated muscles and limitations in their ability to make normal movements like swallowing, mastication, and speech. Arthritis also affects the TMJ. **Aim:** The purpose of the present study was to assess the radiological changes involving the TMJ of patients with osteoarthritis (OA) and rheumatoid arthritis (RA) using computed tomography (CT) scans for early detection and disease management. **Materials and Methods:** The study group comprised of 30 patients between 18 and 70 years of age, who were randomly selected from patients visiting the orthopaedics and rheumatology department of a government institution. The patients were categorized into two groups based on the type of arthritis. All subjects underwent radiographic investigations and CT scans. Additionally, bio chemical blood test for the presence of RA factor, and digital radiographs of the long bones were done for all patients. **Results:** The female to male ratio for RA was 6.5:1 and for OA 3.2:1. In RA, the pathological findings were present in all age groups, and irregular joint space was the most predominant finding on both sides. In OA, the involvement was seen in the elderly age group, with a predominant finding of irregular joint space and flattening of articular surface on the right side and erosion of condyle and articular eminence space on the left side. Statistically significant values [$P = 0.002$] for flattening of articular surface on left side were obtained. **Conclusion:** CT study showed positive evidence of TMJ involvement in both types of arthritis. Thus, we conclude that CT scan would serve as a valuable tool for detecting TMJ disorders early and securing better treatment outcomes.

Keywords: Temporomandibular Disorders, Rheumatoid Arthritis, Osteoarthritis, Computed Tomography, Articular Surface

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367. APPLICATION OF OPTICAL COHERENCE TOMOGRAPHY TO STUDY THE STRUCTURAL FEATURES OF ORAL MUCOSA IN BIOPSY TISSUES OF ORAL DYSPLASIA AND CARCINOMAS

Obade AY, Pandarathodiyil AK, Oo AL, Warnakulasuriya S, Ramanathan A

Objective: This study aims to examine the ability of optical coherence tomography (OCT) to differentiate ex vivo epithelial structure of benign disorders, dysplastic, and oral squamous cell carcinoma (OSCC) in comparison with the structure of normal marginal mucosa of oral biopsies. As a secondary objective, we examined the inter- and intra-observer variations of OCT measurements of two calibrated assessors. **Materials And Methods:** Oral biopsies (n = 44) were scanned using the swept source OCT (SSOCT) and grouped by pathology diagnosis to benign, dysplasia or carcinoma. Two trained and calibrated assessors scored on the five OCT variables: thickness of keratin layer (KL), epithelial layer (EL), homogeneity of lamina propria (LP), basement membrane integrity (BMI), and the degree of reflection of the epithelial layer (Ep Re). Chi-square tests and Fischer's exact method were used to compare the data. **Results:** The OCT images showed breached BM status in all the OSCC samples (100%). Epithelial reflection was noted to be hyper-reflective in all the OSCC and oral dysplasia samples (100%). An increase in KL in 66.67% of the OSCC and 100% of the oral dysplasia samples was found. EL was increased in all the OSCC samples (100%) and 85.72% of the oral dysplasias. Kappa values showed that there was very good agreement (over 0.7) when scoring individual parameters between the two assessors. **CONCLUSION:** The study showed that the BM status was a key parameter in the detection of SCC and for differentiating SCC from oral dysplasia or benign disorders. **Clinical Relevance:** OCT is a non-invasive and non-radioactive adjunct diagnostic tool that can provide immediate results on the structure of oral mucosa. The BM status measured ex vivo was a key parameter in the detection of SCC and for differentiating SCC from oral dysplasia or benign disorders.

Keywords: Ex vivo, Normal oral mucosa, Optical coherence tomography, Oral cancer, Oral epithelial dysplasia

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368. EVALUATION OF DIAGNOSTIC EFFICACY OF IMPROVED INTERPROXIMAL PROGRAM AND BITEWING PROGRAM IN PROXIMAL CARIES DETECTION- AN EXTRAORAL RADIOGRAPHIC COMPARATIVE STUDY

Naduvakattu B, Chatra L, Shenai K, Ashir KR, Veerabhadrapa S, Shetty D

Background: To look for an alternative to intraoral bitewing radiographs when the intraoral placement of film is not feasible or multiple teeth have to be screened. **Objectives:** A study to evaluate and compare the efficacy of improved interproximal and bitewing programs for detection of proximal caries Planmeca ProMax was conducted. **Materials and Methods:** Fifty patients who were screened for proximal caries and confirmed with intraoral bitewing radiography were subjected to improved interproximal program and bitewing program in Planmeca ProMax (Planmeca Oy, Helsinki, Finland) after obtaining informed consent. These radiographs were evaluated by three observers. Intra- and interclass correlation was done to check reliability of the observers, and ROC analysis was done to evaluate the diagnostic accuracy. Critical ratio analysis was done to know the significance. **Results:** Both improved interproximal program and bitewing programs have similar diagnostic efficacy. ROC curve area of improved interproximal program was 0.833 while bitewing program showed 0.878. Bitewing program showed specificity value of 76% compared to 67% in improved interproximal program while both were equally sensitive. **Conclusion:** Both bitewing program and improved interproximal program are highly sensitive in detecting proximal caries when compared to intraoral bitewing radiography which is still considered the gold standard in diagnosis of an interproximal caries.

Keywords: Bitewing program, improved interproximal program, orthopantomograph, planmeca ProMax

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369. DIGITAL WORKFLOW FOR ARTICULATING MAXILLARY AND MANDIBULAR 3D ARCH MODELS USING AN OPEN SOURCE 3D MODELING SOFTWARE PROGRAM

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Virtual planning in digital dentistry enables easier communication between technicians, clinicians, and patients, and faster performance. Dental computer-aided design (CAD) software programs have been used for this purpose. One of the most crucial steps in virtual planning is mounting and articulating the maxillary and mandibular arch 3D models to simulate and evaluate the occlusion as a part of the virtual mock-up. The aim of this article was to describe a more cost-effective digital technique utilizing a scanned interocclusal record for articulating the cast models virtually. For this purpose, the open source Autodesk Meshmixer software program was used.

Keywords: digital articulation, digital dentistry, Meshmixer, virtual planning

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370. THE LOCATION OF THE MENTAL FORAMEN IN RELATION TO THE BIOMETRICS OF THE LOWER DENTITION AND MANDIBULAR ARCH: A CROSS-SECTIONAL STUDY

Key YW, Ng Z-B, Al-Namnam NM, Nambiar P, Ngeow WC, Chai WL, Lim ZYJ

Purpose: To evaluate the position of the mental foramen among Malaysian Malays and Chinese based on the biometrics of the lower dentition and mandibular arch dimensions. **Materials and Methods:** The horizontal and vertical position of mental foramen in relation to the midline, roots of teeth, mesiodistal dimension of the anterior and posterior teeth, and the mandibular arch length and width were measured and evaluated in 65 Cone-Beam Computed Tomography scans. **Results:** The location of mental foramen was predominantly located either between 1st and 2nd premolar or below 2nd premolar. There were no significant differences for all measurements of the mandible in relation to gender and ethnicities. There was a positive correlation of the mesiodistal diameter of the teeth with the mandibular arch length and width. However, mandibular arch length and width did not affect the location of the mental foramen. **Conclusions:** As the size of the teeth increases, the mandibular arch length and the width increase concurrently. However, regardless of the changes in the biometrics of the mandibular dentition and the arch dimensions, the anatomical position of the mental foramen remains the same. The mental foramen was located at the ratio of 0.5 vertically and 0.27 horizontally in the mandible. The inter-foramina distance of 51.36 mm suggests that Malaysian Mongoloids had sufficient space to receive five implants rigidly joined with a bar.

Keywords: Mental foramen, anthropometry, CBCT, Malaysian Mongoloids

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371. CENTRAL ODONTOGENIC MYXOMA: A RADIOGRAPHIC ANALYSIS

MU-DT/PY-IRB 2019/025.0205

Ghazali AB, Arayasantiparb R, Juengsomjit R, Lam-Ubol AI

Introduction: Hyaluronic acid has a long history and is widely used in cosmetics, medicine, and dermatology. It is still relatively in dentistry. **Objective:** This study aims to review at the current literatures about application of hyaluronic acid in dental implant treatment with a focus on animal studies. **Material and Methods:** A search in the PubMed, Science Direct and Cochrane databases was conducted in May 2022 using the keywords "hyaluronic acid", "hyaluronan," and "dental implant." **Results:** The literature search identified 1018 articles, and thirteen animal studies were selected in this study. Animals involved in the studies are pigs, rats, rabbits, and beagles. There are two main groups of studies involved, surface treatment of dental implant surface with hyaluronic acid and bone graft material with additional hyaluronic acid particles. Analysis conducted in the studies includes histology, histomorphometry, micro-CT, and immunohistochemistry. **Conclusion:** The results from multiple studies showed positive effect on bone formation, and one study showed no signs of inflammatory reaction. Overall, there are encouraging results regarding the use of HA in dental implant therapy from the animal study that can be progressed into human trials. **Objective:** This study aimed to determine the radiographic characteristics of odontogenic myxomas (OMs) and their associations. **Materials and Methods:** The study enrolled radiographs of patients taken between 2005 and 2019 with a confirmed histopathological diagnosis of central OM. OM radiographic features were evaluated, including location, border, locularity, involved area, the number of included teeth, root resorption, tooth displacement, bone expansion, bone perforation, and periosteal reaction. Fisher's exact test was used for statistical analysis. **Results:** Significant associations were found between the OM border and the affected jaw ($p = 0.036$), locularity ($p = 0.036$), involved areas ($p = 0.009$), and bone perforation ($p = 0.036$). OMs with an ill-defined border were associated with maxillary lesions, multilocularity, dentate areas, and cortical bone perforation. The number of included teeth (2 or fewer or 3 or more) was significantly associated with locularity ($p = 0.010$), involved area ($p = 0.045$), and bone expansion ($p = 0.010$). Larger OMs including 3 or more teeth, were associated with a multilocular appearance, dentate areas, and bone expansion. **Conclusion:** The border of OM and the number of included teeth are related to other radiographic appearances. Understanding these relationships could help in treatment decisions and help better understand the nature of OM.

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372. CEPHALOMETRIC CHANGES FOLLOWING ORTHODONTIC TREATMENT OF BIMAXILLARY PROCLINATION WITH A PRE-ADJUSTED EDGEWISE APPLIANCE

DF PD1912/0028

Mohd Tahir NN, Sivarajan S, Mohd Azahar MFR, Ehsan Sabri N, Wan Hassan WN, Maskim N

Introduction: Bimaxillary proclination cases are commonly being treated among Malaysian population, even though the treatment needs for this malocclusion is 'little' or 'none'. The treatment aim includes correction of upper and lower incisor inclination. **Aims:** To analyse the cephalometric changes following orthodontic treatment of bimaxillary proclination patients with pre-adjusted edgewise fixed appliances, with difference extraction patterns, in difference types of crowding and in comparison with the population norms. **Material and Methods:** This retrospective study was conducted at the Orthodontic clinic, Faculty of Dentistry, University Malaya. Clinical records and lateral cephalograms of 16 samples were assessed based on soft tissue and dental analysis landmarks during pre- and post-treatment. Changes occurrence tabulated and analysed using paired t-test. **Results:** Dental tissue showed significant changes comparing pre- and post-treatment cephalograms. The nasolabial angle and lower lip to E-line was the only significance cephalometric soft tissue changes. The first premolars extraction pattern resulted in more significant changes in dental tissue with a higher difference in angulation and measurement produced. In mild crowding cases, there was significant changes in distance of lips to E-line and dental tissue changes. Majority of soft tissue components achieved the similar characteristic in Chinese and Malay population norms after treatment, however only Malay population achieved similar characteristics postoperatively in dental tissue. **Conclusion:** Pre- and post- treatment cephalograms showed more significant changes in terms of dental tissue ($p < 0.05$) as compared to soft tissue changes. The choice of extraction pattern and amount of pre-treatment crowding will affect the treatment outcomes.

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373. AN OVERVIEW OF SYSTEMATIC REVIEWS AND META-ANALYSES EVALUATING DIFFERENT IMPRESSION TECHNIQUES FOR IMPLANT-SUPPORTED PROSTHESES IN PARTIALLY AND COMPLETELY EDENTULOUS ARCHES

Gaikwad AM, Joshi AA, de Oliveira-Neto OB, Padhye AM, Nadgere JB, Ram SM, Yadav SR

Purpose: To summarize the evidence and determine the most effective impression technique for implant-supported prostheses in terms of accuracy, time efficiency, and patient preference in partially and completely edentulous arches. **Materials And Methods:** The searches were performed independently up to April 30, 2021 by two review authors through the Cochrane Oral Health Review, MEDLINE/PubMed, LILACS, and Science Direct databases. Moreover, manual and gray literature searches were performed to identify further potential reviews. Only English language-based systematic reviews with and without meta-analyses evaluating the different dental implant impression techniques were included. The outcomes assessed were accuracy, time efficiency, and patient preference. The methodologic quality of the included reviews was investigated by using the R-AMSTAR tool, and the degree of overlap of primary studies was assessed by calculating the percentage of corrected covered area (CCA) as proposed by Pieper et al.(64) **Results:** The qualitative analysis included a total of 28 reviews, 8 of which included meta-analyses, published between 2008 and 2021, involving a total of 42 clinical trials and 203 laboratory studies. Digital vs conventional implant impression techniques were compared in 17 reviews, different digital impressions in 3 reviews, and different conventional impression techniques in the remaining reviews. Overall, the methodologic quality assessed by using the R-AMSTAR tool was moderate (mean: 26.7 +/- 5.5) with slight overlap of primary studies (CCA; 5.23%). **Conclusion:** Within an overall moderate methodologic quality, the digital implant impressions showed favorable outcomes in terms of accuracy, time efficiency, and patient preference in partially edentulous arches involving three or fewer implants. However, the accuracy of full-arch digital impressions involving multiple implants is not satisfactory and needs significant improvements. Hence, future studies following stringent guidelines and robust methodology are recommended to substantiate the findings of this overview and provide a high level of evidence.

Keywords: accuracy, conventional implant impression, digital implant impression, evidence-based dentistry, implant, overlap, patient preference, tertiary research, systematic review, R-AMSTAR

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374. KNOWLEDGE AND PERCEPTION ON AUGMENTED REALITY AND VIRTUAL REALITY IN DENTISTRY AMONG DENTAL PRACTITIONERS: AN ORIGINAL RESEARCH

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Aim: The purpose of the present research was to assess the knowledge amongst dental practitioners about the concept of augmented reality as well as virtual reality in dentistry. **Methodology:** Online survey was conducted amongst 60 dental practitioners to assess their knowledge as well as implementation of Virtual reality-based technology (VRBT)/Augmented Reality (AR) in their clinical practice using google forms. The Chi square test was used to test differences between groups. Values of $p < 0.05$ were considered statistically significant. **Results:** Dental practitioners have overall positive attitudes towards VRBT but very few have used VRBT in education and practice. The majority of respondents plan to use VRBT in their future clinical practice and believe that those technologies will be widely adopted by dental practices within 22 years. **Conclusion:** Learning about VRBT/AR and using them as part of undergraduate and continued education programmes could affect dental practitioners' willingness to implement new technologies and enhance critical assessment of new trends in dentistry.

Keywords: Virtual reality-based technology, Dental simulators, Digital impressions, Haptic technology

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375. THE LOCATION AND DIAMETER OF THE PRIMARY MAXILLARY SINUS OSTIUM IN MALAYSIANS: A CONE-BEAM COMPUTERIZED TOMOGRAPHY STUDY

Peter SS, Nambiar P, Krishnan S, Al-Namnam NM

Rhinosinusitis is one of widely spread diseases in the region and the role of the anatomical variations in its pathogenesis remains unresolved. A retrospective study using CBCT scan was employed to locate and measure the diameter of 320 primary maxillary ostium (PMO) (n = 160 subjects) among the Malay and Chinese populations (Mongoloid race) in Malaysia. Image analysis was performed using the i-CAT Vision Software, employing the multiplanar reconstruction window in which axial, coronal and sagittal planes were visualized in 0.3 mm intervals. The mean diameter of the PMO was significantly larger in the Chinese than the Malay. Females had larger size than the male and bilateral asymmetry was noticed, where the right side PMO was larger than the left side ($p < 0.05$). In addition, PMO opened more in the posterior third position of the hiatus semilunaris (61.9%) than anterior and middle third. The PMO showed a statistically significant posteriorly placed position in the Chinese than the Malays and this was more evident in the right side PMO ($p < 0.01$). In conclusion, the PMO commonly opens in the posterior third of the hiatus semilunaris and its diameter is significantly greater in the Chinese female with evidence of bilateral asymmetry. Awareness the anatomical variation of the Ostium diameter and location among the Malay and Chinese populations potentially has important clinical effects during surgical procedures.

Keywords: Primary maxillary sinus ostium, dimension, location, CBCT, Mongoloid race

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DOMAIN 8

Others

376. COMBINED EFFECT OF ACIDIC BEVERAGES AND IMMERSION TIME ON BONDING STRENGTH OF COMPOSITE TO ENAMEL: AN *IN-VITRO* STUDY

IREC 2021-031

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Introductions: Carbonated beverages are widely consumed over the world. The effect of acidic liquids on dental enamel has a significant impact on composite resin adhering to the enamel substrate. **Objectives:** The purpose of this study was to see how acidic beverages affected the bonding of composite resin to exposed enamel. **Methods and Materials:** 128 premolars were taken and divided into four groups for both 24 hours immersion (n=40) and 15 days immersion (n=40). The samples were divided into the following categories: G1: 3x/15 mins immersion in Beverage A, G2: 3x/15 mins immersion in Beverage B, G3: 3x/15 mins immersion in Beverage C, G4: 3x/15 mins immersion in artificial saliva as control group. Prior to immersion, the buccal surfaces of the enamel were minimally ground at the layer of enamel solely using a Tungsten carbide bur, then flattened with #600 - #1200 silicon carbide paper (SiC) paper. Specimens were submerged in the media for 24 hours and 15 days, respectively. Following immersion, the specimens' prepared surfaces were repaired using composite resin. The enamel pattern was morphological analyzed using a Scanning Electron Microscope (SEM) and the shear bond strength was determined. **Results:** One-way ANOVA with multiple comparison tests was used to statistically evaluate the data. When compared to control media, all of the beverages tested significantly reduced shear strength. Following immersion in the test beverages, enamel's morphology changed noticeably, with Beverage A group displaying the most pronounced morphological changes. **Conclusion:** All acidic beverages examined had a detrimental impact on shear strength. In different periods of time, varied degrees of enamel demineralization were detected.

Keywords: Soft drinks, composite resin, shear strength, enamel, acid

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377. EXPLORING THE ASSOCIATION BETWEEN EMOTIONAL INTELLIGENCE AND ACADEMIC PERFORMANCE AND STRESS FACTORS AMONG DENTAL STUDENTS: A SCOPING REVIEW

Jahan SS, Nerali JT, Parsa AD, Kabir R

Background: Numerous studies have been conducted to explicate the scope of emotional intelligence in educational success and coping with stress in different academic sectors, but very few have been conducted with dental students. This scoping review aimed to ascertain the role of emotional intelligence in academic performance and stress factors among dental students. **Methods:** All publications in the English language between 2001 and 2020 were retrieved employing MeSh keywords. Academic resources such as Pubmed, Pubmed Central, EMBASE, Web of Science, EBSCO-Host, Cochrane, PROSPERO, and ARU E-library were comprehensively searched for empirical research. One thousand, three hundred and fifty-nine papers were screened according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards for inclusion and exclusion criteria. These publications were then evaluated further by deleting duplicates, examining full-text articles, and conducting an abstract assessment. This review included a critical appraisal of 24 articles. **Results:** The narrative analysis method was applied to evaluate the data retrieved from publications regarding EI, academic performance, and stress factors. The review found that EI had a greater impact on the educational success of dental students throughout their clinical years. Moreover, EI may be a key tool in coping with stress and negative emotions. Higher EI scores were shown to be associated with better performance in organizational and leadership abilities, which are important for career advancement. **Conclusion:** The review suggested including EI training in the dental curriculum. Furthermore, EI should be used as a selection criterion for admission to dental education.

Keywords: academic performance, dental students, emotional intelligence, scoping review, stress

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378. REVISITING THE DELPHI TECHNIQUE IN ORTHODONTICS: A SYSTEMATIC REVIEW

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Introduction: The Delphi technique is an iterative, multi-stage process that consists of questioning a panel of experts through a structured group communication process to reach a consensus on specific issues. The study is a systematic review of the available literature in orthodontics which has utilised the Delphi technique to seek consensus on a range of issues. **Aim:** To identify and summarise the studies which have utilised the Delphi technique as a method for gathering consensus in the speciality field of orthodontics. The study evaluated the various characteristics of the Delphi technique. **Materials and Methods:** This systematic review followed the methodology of a preset article inclusion and exclusion criteria using an electronic database search using the keywords consensus, Delphi, Delphi technique, Delphi studies, expert opinion was conducted in March 2021. A range of electronic databases comprising PubMed, Excerpta Medica database (EMBASE), Google Scholar, Web of Science and Scopus were searched dated from (January 1990 to March 2021) to identify the studies which involved the use of Delphi in orthodontics. Following this, two authors reviewed and scored each of the studies before finalising a list of five studies to be included in this review. **Results:** The searches revealed a total of 187 studies out of which only five studies met the inclusion criteria and were included in this study. Each of the five studies was assessed by two independent assessors. The five studies involved an expert panel from multiple health professionals involving orthodontic specialists, maxillofacial surgeons, nurses, speech therapists, and nutritionists. Five domains (theme, panel constitution, panel size, number of iterations and the level at which consensus reached) were identified and assessed in each of the five studies. **Conclusion:** The study has identified and reviewed the Delphi technique and its usage in orthodontics but has also provided a sound description and elaboration of the various components and characteristics of the Delphi technique in addition to providing some correlations between expert panel size and the number of iterations.

Keywords: Delphi studies, Expert opinions, Electronic database, Iterations

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379. MEASURING COMPLEXITY IN PATIENTS WITH SPECIAL NEEDS ATTENDING SPECIAL CARE DENTISTRY (SCD) CLINIC IN MALAYSIA USING ADAPTED BDA CASE MIX MODEL

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In 2019, British Dental Association (BDA) developed a case mix tool for measuring patient complexity to aid commissioning and evaluation of special care services. This Case Mix Model identifies various challenges in patient complexity and every episode of care is measured separately to reflect the different complexities for the individual patient depending on the nature of each episode. Realizing that this original BDA tool cannot be used in Malaysian setting, a small study was conducted among the 7 SCD specialists as well as 10 general dental practitioners (GDP) who managed patients with special needs on daily basis, to test the original tool. Permission was granted from BDA prior the conduct of the study. Each component was tested and discussed thoroughly based on their understandings, current practice as well as the local rules and regulations. It was then modified accordingly and utilized for people with special needs attending SCD clinic to demonstrate the challenges and work load of the general dental practitioners and specialists. This data will be used to relate the complexity of the dental patients seen at the SCD clinic in Malaysia and the estimation of the number of specialists, GDPs with special interest and auxiliary dental staff required in managing such patients in the future development of SCD service.

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380. CITATION CLASSICS ON DENTAL CARIES: A SYSTEMATIC REVIEW

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Objective A systematic search was performed for the identification and analysis of the 100 most often cited articles on dental caries and to highlight the changing trends in the field of dentistry over time. **Materials and Methods** The search was performed without any restriction on the study design, publication year, or language using the Web of Science (WoS) group of Clarivate Analytics enabling the search through “All Databases.” Based on the citation count as available in WoS, the articles were sorted in a descending manner. Information regarding each article was then extracted, which included its authorship, counts of citation (in other databases), citation density, current citation index (2019), publication year, country of publication, journal of article, evidence level based on study design, and keywords description. **Results** The count of citation for each article varied in each database, that is, 175 to 2,003 in WoS, 89 to 1,981 in Scopus, and 126 to 3,492 when searched in Google Scholar. The highest number of articles ($n = 10$) related to dental caries were published in 2004. A total of 301 authors made valuable contributions to this field, out of which J.D. Featherstone had coauthored 6 articles. A significant negative correlation ($p < 0.01$) was found between the age of the article and the citation density ($r = -0.545$). However, a nonsignificant correlation ($p = 0.952$) occurred between the age of publication and the citation count ($r = 0.006$). **Conclusion** The results of this systematic review provide a critical appraisal of the context underpinning scientific developments in the field of dental caries and also highlighted trends in clinical management and research.

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