21ST ANNUAL SCIENTIFIC MEETING
&
23RD ANNUAL GENERAL MEETING
IADR MALAYSIAN SECTION

PROCEEDINGS

RESEARCH TO PRACTICE

Identifying the Gap, Solving the Problem

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Preface

The Annual Scientific Meeting and Annual General Meeting of the IADR Malaysian Section is a platform where Malaysian researchers and clinicians gather and share their scientific findings, discuss issues and challenges in dental research and network and initiate collaborations with other dental and healthcare professionals. It is also an event where discussions are held for the betterment of the organisation, its members and participants and the election of the committee members as successors to the organisation. This annual event covers all areas related to dentistry, from oral and maxillofacial research to population oral health and prevention. The event also welcomes undergraduate and postgraduate dental students to participate to expose them to the research field and encourage future research.

This, now yearly, full-paper proceeding book aims to publish selected research findings in disseminating knowledge and ideas for the benefit of the dental fraternity. This year's theme Research to Practice – Identifying the Gap, Solving the Problem was chosen to highlight the need to identify the gap in dental research in encouraging evidence-based problem-solving and treatment provision. This year we were privileged to have the scientific meeting conducted in a physical manner as opposed to the past 2 years where the events were held virtually due to the COVID-19 pandemic and restricted movement order.

Before we sign off for the 2022 scientific meeting, we would like to express our best wishes and special thanks to all the reviewers for their contribution to maintaining the high standard of the manuscripts included in this proceeding book. We would also like to extend our appreciation to the president, Associate Professor Dr. Siti Mariam Ab Ghani, for her leadership and guidance and the committee members for their tireless effort in ensuring the success of this year's event. We hope that the participants of the 21st Annual Scientific Meeting & 23rd Annual General Meeting had a fruitful and enjoyable time with us and we wish to see you again next year.

Dr. Jasmina Qamaruz Zaman
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CONTENT

Dental Students' Knowledge of the Appropriate Use of Systemic Antibiotics for Endodontic infections

Choong JW[1], Adriel Tan[1], and Baharin SA[2]

ABSTRACT

Background: Odontogenic infections including endodontic infections are polymicrobial, and in most cases, the prescription of antibiotics is empirical. Antibiotic overuse and the emergence of antibiotic-resistant bacterial strains are currently the major health threats globally. **Objective:** The present study aimed to determine the knowledge and practice of Malaysian undergraduate dental students on the appropriate use of systemic antibiotics in the management of endodontic infections. **Methods:** Final-year undergraduate dental students from 13 Malaysian universities were invited to answer an online questionnaire on antibiotic usage for the treatment of endodontic infections. Data were collected and analyzed by IBM SPSS© version 26. Frequency distributions were created to describe the frequency and percentages of responses. Results: A total of 287 responses were obtained from Malaysian dental schools, with a 43.2% response rate. Amoxicillin (85%) was the most prescribed antibiotic either alone or in combination with clavulanic acid, while Clindamycin was the drug of choice in healthy adults with penicillin allergy (53.7%). Approximately two-thirds of the participants were prescribed antibiotics for 5 days. Endodontic infection cases that had the most prescription of antibiotics were acute apical abscesses with systemic complications (fever, malaise, lymphadenopathy); however, a minority of students still opted to prescribe antibiotics in unnecessary clinical scenarios (apical periodontitis with or without sinus and pulpitis). **Conclusion:** This study demonstrates that it is essential to improve the knowledge of Malaysian undergraduate dental students on the appropriate antibiotic prescription and indications for their use in endodontics.

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INTRODUCTION

Dental practitioners regularly prescribe antibiotics for therapeutic or prophylactic purposes to manage oral and dental infections. Odontogenic infections, especially primary endodontic infections, are polymicrobial infections involving a combination of Gram-positive, Gram-negative, facultative anaerobes, and strictly anaerobic bacteria [1]. Even though most endodontic infections can be successfully managed by root canal treatment; however, antibiotics are still prescribed by dentists [2].

In 2018, the European Society of Endodontology proposed a guideline that specified the indication, contraindication, types, and dosage of systemic

antibiotic usage in endodontics [3]. The indications to prescribe systemic antibiotics include patients presented with acute apical abscess with systemic involvement, acute apical abscess in medically compromised patients, trauma-associated cases, progressive infections, and regenerative endodontics. This guideline has acted as the benchmark for dental practitioners in Europe in prescribing antibiotics and preventing unnecessary prescriptions, which help to reduce the risk of bacterial resistance.

Antibiotics are often prescribed during the treatment of specific clinical conditions related to acute apical infections and as an adjunct to local treatment in endodontics. Evidence has proved that resistance of oral

microflora to antibiotics has increased over the past decades [4], and both misuse and overuse of antibiotics in dental practice have been observed [5]. Side effects associated with antibiotic use include nausea, vomiting, diarrhoea, and stomach cramps due to disturbances of gut microflora. Other risks include allergic reactions ranging from rash, skin reactions, and Stevens-Johnson syndrome to anaphylaxis. A particular concern of prescribing oral antibiotics is the development of Clostridium difficile infection, which is mostly seen in patients taking Clindamycin, Amoxicillin, and Cephalosporins.

Antimicrobial resistance (AMR) is the ability of a microorganism to withstand the effect of antibiotics [6,7], which may occur due to certain bacterial species developing resistance to antibacterial agents shortly after they are used [8]. Inappropriate prescription and use of antibiotics have been identified as major factors in the emergence of AMR [7]. Consequences of AMR include higher treatment costs, longer hospital care time, health complications, mortality, and ineffectiveness of antibiotics. This problem thus has emphasized the need for rationalization of antibiotic use in the treatment of infections [9,10].

The prescriber's knowledge and the patient's expectations have a direct link to antibiotic prescribing patterns [11]. To the best of our knowledge, there is still no reported data on the knowledge of undergraduate dental students from Malaysian universities concerning antibiotics recommendations in managing endodontic infections.

Thus, this study aims to determine the knowledge of undergraduate Malaysian dental students on the appropriate use of systemic antibiotics in the management of endodontic infections. The objectives are to (a) determine students' knowledge regarding common indications, types, dosage, and duration for prescribing systemic antibiotics among undergraduate dental students, and (b) determine students' knowledge of the alternative antibiotic recommendations for patients with and without penicillin allergy among undergraduate dental students. The findings of this study could serve as a baseline for future in-depth research studies to design a more appropriate curriculum and guidelines on antibiotic prescription in the management of endodontic infections in Malaysia.

METHODOLOGY

This study was approved by the Research Ethics Committee of Universiti Kebangsaan Malaysia (UKM) [Reference Number JEP- 2021- 462]. The study was conducted among final-year dental students from government-funded and private universities in Malaysia. The total population sampling method adopted in this study is (N=780). The sample size required for this study was 258 students (n = 258), with the population being 780 students (N=780), with a confidence

level of 95% and a confidence interval of 5. As a 10% attrition rate was expected, a minimum of 285 students was required to complete the questionnaire (n=285), with an average of 21 students from each dental school. All final-year undergraduate students from all dental schools are included in this study. Students other than final-year undergraduates from Malaysian dental schools as well as questionnaires received after three weeks of the scheduled completion date are excluded from this study.

A two-part modified questionnaire based on a previously published study (Salvadori et al. 2019) was constructed in English, the first part consisting of subjects' demographic data and the second part consisting of the behavior of the respondents when prescribing antibiotics in the management of endodontic infection. Respondents were required to select the indications, duration, and frequency of prescribing systemic antibiotics in endodontic infections as well as alternative antibiotics based on their current knowledge. The Malay questionnaire was cross-culturally translated from an English questionnaire and validated using content validity and reliability tests. Questionnaires were reviewed by endodontic lecturers at the National University of Malaysia (UKM). A pilot test was carried out by recruiting 20 final-year undergraduate dental students from UKM to answer the questionnaires and to check for any grammatical errors and unambiguity of items to be asked.

The questionnaires were adjusted accordingly and created using a web-based survey tool (Google form). The questionnaires were then distributed through emails together with a participant information sheet summarising the aims of the study and a consent form, based on the inclusion and exclusion criteria. The participants were then given the questionnaire in English and Malay language and requested to fill in their demographic data and students' behavior while prescribing antibiotics for endodontic infections. The participants were given three weeks to complete the online questionnaire. A reminder was sent two weeks after the initial online questionnaire.

Data were collected in a Google Sheet format, and all statistical tests were conducted using IBM SPSS© version 26. A descriptive analysis was performed to identify the detailed sample composition in relation to gender, age, race, and dental schools. Frequency distributions were created to describe the percentages of responses regarding the experience of managing endodontic infections and prescribing antibiotics, as well as the cases where respondents considered that the use of antibiotics was appropriate.

RESULTS

The online questionnaire was distributed to all 13 (6 government-funded and seven private) dental schools in Malaysia. Questionnaires were distributed to 665 final-year undergraduate dental students, and a total of 287 responses were collected from all 13 dental schools. The highest number of respondents were from UKM, which has 38 students (13.2%) while the least respondents were from SEGi, which had 19 respondents (6.6%).

The survey included male and female participants (32.1% male vs. 67.9% female). Most of the respondents were 24 years old (64.1%) with the mean age of respondents being 24.11 years old. The racial distributions of the respondents were Malay having the highest percentage of respondents which was 43.6% (n=125) followed by Chinese respondents who were 43.2% (n=124).

3.1 Students' Awareness of Antibiotic Prescription in Endodontic Infections

A total of 161 students (56.1%) have had the experience of managing endodontic infections, with 26.8% of them reporting prescribing antibiotics for endodontic infections. Meanwhile, 126 students (43.9%) had never managed endodontic infection before. The majority of students (88.5%) stated to have knowledge of antibiotic prescriptions for endodontic infections.

3.2 Students' Behaviour when Prescribing Antibiotics in Dental Practice

The pattern in prescribing antibiotics for specific endodontic infections was summarised in Figure 1. Most of the students prescribed antibiotics for the patients who presented with acute apical abscess with systemic complications (fever, malaise, lymphadenopathy) (88.5%), followed by chronic apical periodontitis with sinus tract (29%) and acute apical abscess without systemic involvement (23.3%). The situation with the least systemic antibiotic prescription was symptomatic reversible pulpitis (5.6%). Only 1% of Malaysian undergraduate students participating in this study were never prescribed antibiotics for any endodontic infection.

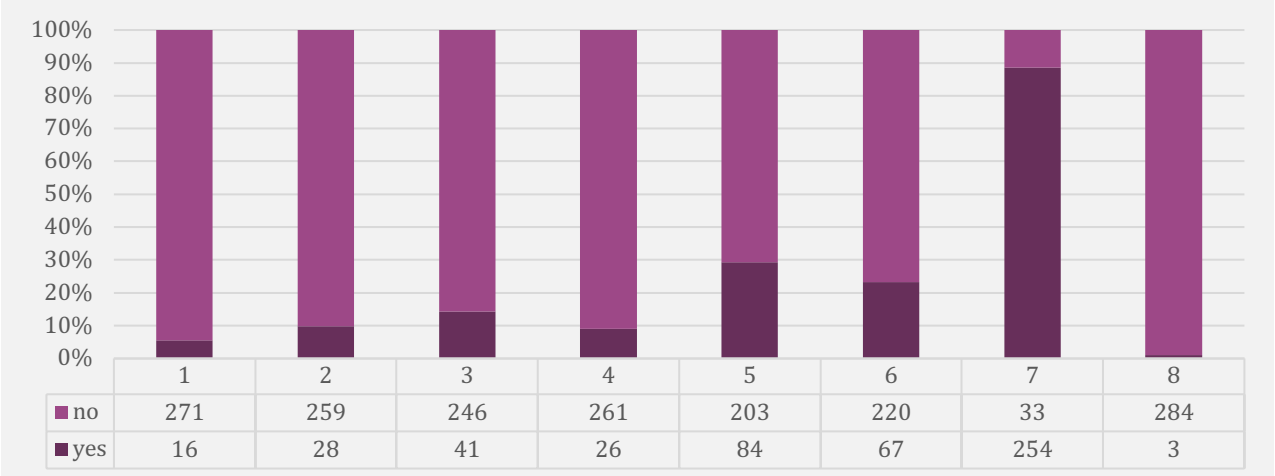


Figure 1: Antibiotic prescribing patterns of all participants in specific endodontic cases.
(1) Symptomatic reversible pulpitis; (2) Symptomatic irreversible pulpitis; (3) Symptomatic apical periodontitis; (4) Asymptomatic apical periodontitis without sinus tract; (5) Asymptomatic apical periodontitis with sinus tract; (6) Acute apical abscess without systemic involvement; (7) Acute apical abscess with systemic complications (fever, malaise, lymphadenopathy); (8) Never.

There was a significantly high number of respondents, (n=203; 70.7%) who were aware to only prescribe antibiotics for endodontic problems to a limited number of patients, while 17.4% (n=50) will prescribe antibiotics to patients with pain. A mere 1.0% (n=3) of respondents thought that they must prescribe antibiotics to all patients with endodontic problems, while 10.8% (n=31) would never prescribe antibiotics. More than two-thirds (67.9%) of participants were aware of the availability of guidelines for prescribing antibiotics for endodontic infections. On the other hand, 87.1% of students claimed that they were aware of the consequences of antibiotic overuse. Most answers are antibiotic resistance or other phrases indicating a similar meaning. For the duration of antibiotic prescription, 64.8% of students prescribed antibiotics for five days, whereas 17.1% and 16.1% of students prescribed antibiotics for three days and seven days respectively. (Figure 2)

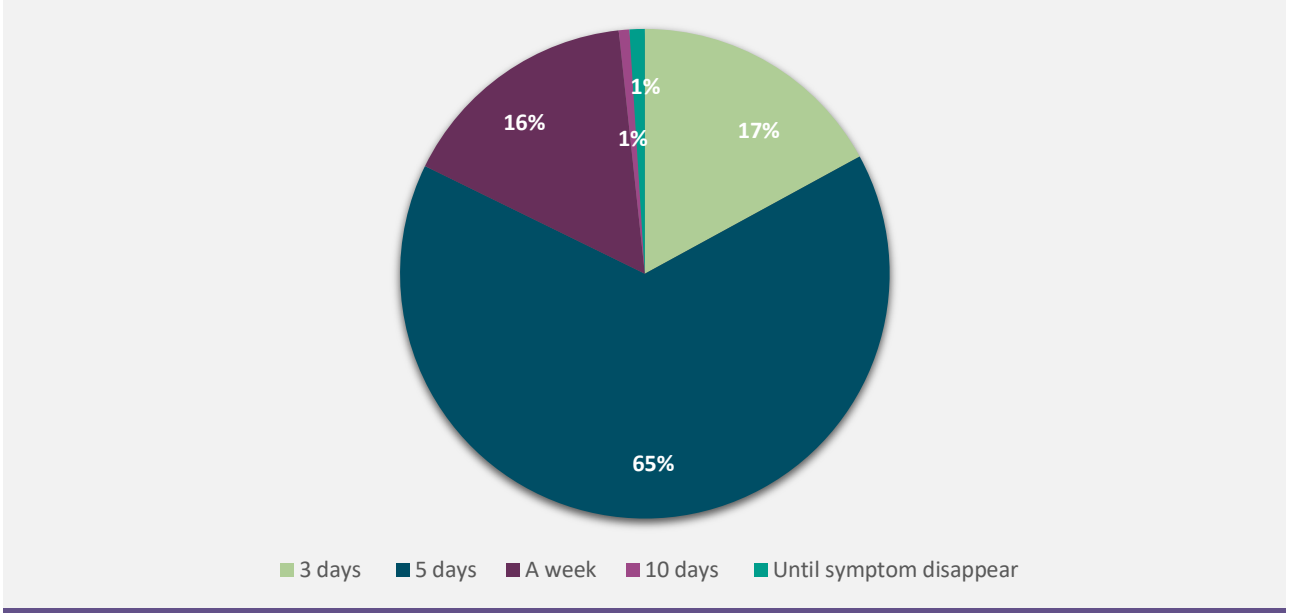
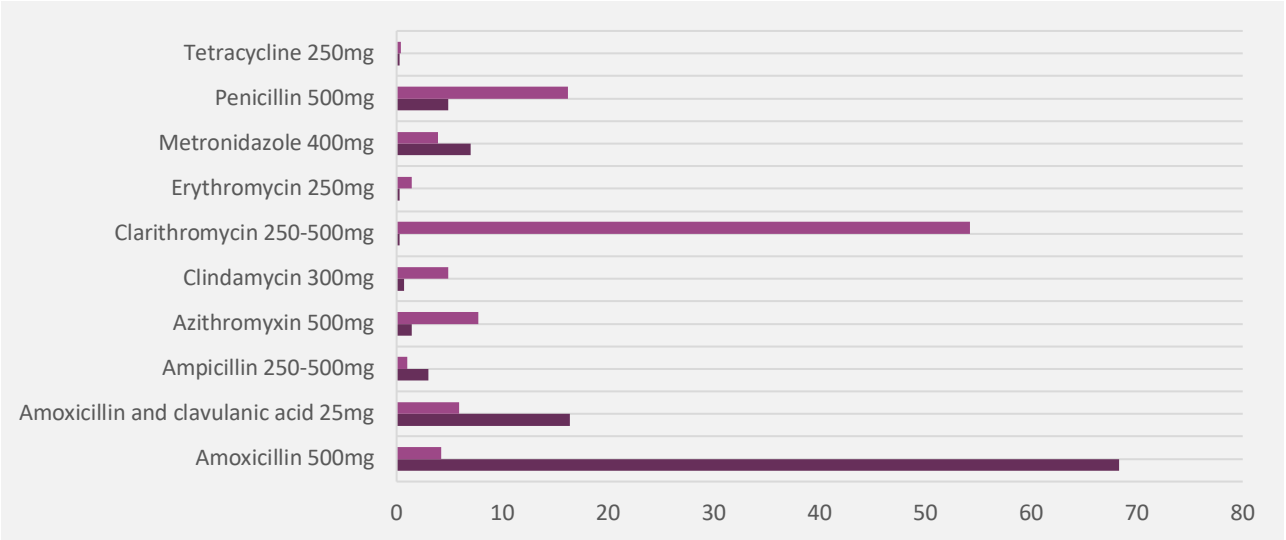


Figure 2: Duration (in days) of Antibiotic Prescription

3.3 Students' Choice of Systemic Antibiotic Prescription

For healthy patients without allergies, Amoxicillin (68.3%) was the first choice of antibiotic followed by Amoxicillin with Clavulanic acid combination (16.4%). A minority of students considered prescribing Metronidazole (7%) and Penicillin (4.9%). Meanwhile, Clindamycin (53.7%) and Metronidazole (16%) were the systemic antibiotics of choice for a patient who reported allergies to Penicillin. (Figure 3)



	Amoxicillin 500mg	Amoxicillin and clavulanic acid 25mg	Ampicillin 250-500mg	Azithromyxin 500mg	Clindamycin 300mg	Clarithromycin 250-500mg	Erythromycin 250mg	Metronidazole 400mg	Penicillin 500mg	Tetracycline 250mg
Penicillin allergy	4.2	5.9	1	7.7	4.9	54.2	1.4	3.9	16.2	0.4
No medical allergies	68.3	16.4	3	1.4	0.7	0.3	0.3	7	4.9	0.3

Figure 3: Choice of systemic antibiotics for the treatment of endodontic infection in a healthy adult with no medical allergies and with penicillin allergy.

DISCUSSION

4.1 Experience and Awareness of Antibiotic Prescription in Endodontic Infections

This present study revealed that more than half of the respondents had experienced managing endodontic infections during their clinical practice and claimed to understand and were aware of the available guideline for antibiotic prescriptions for endodontic infections. Ministry of Health Malaysia (MOH) has published a National Antimicrobial Guideline (2019) for medical and dental officers' references; however, the antibiotic guidelines for oral health are not specific to endodontic infections. The most common antibiotic references specifically for endodontic infections are based on the AAE Guidance on the Use of Systemic Antibiotics in Endodontics (2017) and ESE antibiotic guidelines (2018). However, which guidelines were chosen as the students' preferences were not further explored in this study.

The importance of adhering to the available guidelines while prescribing antibiotics is that we, as dental practitioners will not prescribe antibiotics inappropriately and unnecessarily to patients. Antibiotics are essential medications, but their overuse and misuse can create resistant bacteria that are not susceptible to antibiotics. Based on the study conducted by Fridkin et. al (2015) [12], at least two million people in the U.S. become infected with multidrug-resistant bacteria each year, and 23,000 deaths have been attributed to these infections. In the present study, the majority of undergraduate Malaysian dental students were aware of the development of antibiotic resistance following the overuse of systemic antibiotics. Other consequences of antibiotic overuse answered by respondents include liver toxicity, diarrhea, vomiting, GIT upset, gut dysbiosis, allergic reaction (rash), immunosuppression, and superinfection.

A study conducted among final-year dental students at Cardiff University concluded that final-year dental undergraduates were aware of the antibiotic resistance crisis, but around a third of respondents were not aware of guidelines for the use of antibiotics in endodontic conditions [13]. Similarly, Salvadori et al. (2019) [14] evaluated the opinions of final-year dental students from twenty Italian universities. The results concluded that newly qualified dentists should receive training in line with international guidelines on the appropriate use of antibiotics in their daily practice.

4.2 Duration and Frequency of Antibiotic Prescription

The recommended duration of prescribing the antibiotic for endodontic infection is ranged from 3 to 7 days [15]. A longer duration than that was considered unnecessarily prescribed as endodontic infections have a relatively rapid onset and usually last for 3-7 days following the treatment [16]. An international survey conducted among Spanish undergraduate students revealed that 20% of them were prescribed antibiotics for more than seven days [17]. On the contrary, our results show that less than 1% of students unnecessarily exposed their patients to antibiotics for more than recommended duration. The average duration of antibiotic prescription has been reported to be 4.26 ± 1.26 days [18], while in another study, the average duration of antibiotic therapy was 5.5 ± 1.1 days [11]. The ideal duration of antibiotic therapy should be short and able to prevent both clinical and microbiological relapse. In addition, the short duration of antibiotic therapy can decrease the occurrence of antibiotic-induced toxicity as well as allergy reactions, most importantly reducing the risk of the development of antibiotic-resistant microbial strains such as methicillin-resistant Staphylococcus aureus (MRSA).

4.3 Antibiotic Choices for a Patient without Penicillin Allergy

Beta-lactam antibiotics (Penicillin V and Amoxicillin) are often considered the first choice for the treatment of endodontic infections [19]. In the present study, Amoxicillin was indicated as the first-choice antibiotic, followed by a combination of Amoxicillin and clavulanic acid. This finding concurs with other international surveys that were conducted among general practitioners and endodontists [4,7,8,20-22] where Amoxicillin was the first-choice antibiotic prescribed for endodontic infection in these surveys. Only a Turkish study reported that ampicillin was the first-choice antibiotic for endodontic infections. Our results regarding the use of Amoxicillin as a first-choice antibiotic are also in agreement with the studies carried out by Martın- Jimenez et al. (2018) [17] where they reported that Amoxicillin was chosen by 100% of the respondents. Amoxicillin which is a moderate-spectrum beta-lactam antibiotic is suitable for endodontic infections as it is effective towards gram-positive, gram-negative, anaerobic, and strictly anaerobic bacteria [19,22]. Additionally, Amoxicillin is also able to demonstrate greater efficacy and therapeutic value due to its ability to reach a high concentration in the plasma, especially within 2 hours after ingestion, and the absorption process is not hindered by the presence of food.

16.4% of respondents had chosen the combination of Amoxicillin and clavulanic acid as their second choice of antibiotic for patients without an allergy to penicillin. The reason why clavulanic acid is prescribed in combination with Amoxicillin is that Amoxicillin is susceptible to being degraded by beta-lactamase-producing bacteria. However, it may increase risk of the developing bacterial resistance to antibiotics as the combination of Amoxicillin and clavulanic acid can provide a much broader spectrum of activity compared to penicillin and Amoxicillin alone [21,22]. Data from the literature confirmed that either Amoxicillin alone or in combination with clavulanic acid represents the first choice of antibiotic in treating endodontic infections particularly in patients without any medical allergy, although care should be taken to ensure the correct antibiotic dosage and duration are prescribed [15].

4.4 Antibiotic Choices for a Patient with Penicillin Allergy

Clindamycin was the first antibiotic choice by Malaysian undergraduate dental students in patients with penicillin allergy and this result is consistent with the surveys conducted among Spanish endodontists [4]. Jain et al. (2015) [23] and Guzman-Alvarez et al. (2012) [24] reported Clindamycin as the most prescribed antibiotic in case of penicillin allergy in their studies. These results align with the available guidelines that recommend clindamycin, clarithromycin, or azithromycin in patients allergic to beta-lactam antibiotics [15]. This present study shows that Metronidazole is not the main antibiotic indicated for endodontic infections as it was found to be not effective against aerobic and facultative anaerobic bacteria; therefore the prescription of Metronidazole alone may not clinically adequate to eliminate the endodontic microorganism.

4.5 Indications for Use of Antibiotics

Antibiotic prescription is indicated in healthy patients with acute apical abscess with systemic involvement such as localized swelling, pyrexia, trismus, and lymphadenopathy), in progressive infections (severe infection with rapid onset, cellulitis or diffuse infection, osteomyelitis) where onwards referral to oral surgery is necessary, in the reimplantation of a permanent tooth following avulsion and in soft tissue trauma requiring treatment [15]. The majority of undergraduate Malaysian dental students seem to comply with this guideline, especially when dealing with acute apical abscesses with systemic manifestations. These results confirm that they were able to

recognize the clinical scenario in which the adoption of systemic antibiotic therapy is necessary. However, surprisingly less than a quarter of Malaysian undergraduate dental students claimed to prescribe antibiotics unnecessarily for the cases such as apical periodontitis with or without sinus and pulpitis.

In cases of symptomatic pulpitis, the use of antibiotics is often not necessary as it does not reduce the symptom as well as the necrosis process. Oftentimes, pulp remains vital, and there are lacking signs of systemic involvement, thus antibiotics are not indicated. Inappropriate use of antibiotics emerged in the management of chronic apical periodontitis with and without sinus tract, where 29.3% and 9.1% respectively, of the respondents would prescribe antibiotics for these clinical scenarios. The high percentage of respondents who would use antibiotics for chronic apical periodontitis with a sinus tract suggests that they believe the presence of a sinus tract in a dental infection indicates a worsening condition. However, the presence of a sinus tract does not mean an exacerbated endodontic infection. Besides, chronic apical periodontitis associated with a sinus tract should be treated with root canal treatment but not with antibiotics [25].

In addition, 23.3% of respondents would prescribe antibiotics in cases of acute apical abscesses without systemic involvement. However, the host defenses should be able to control endodontic infections after root canal treatment [1]. Therefore, the use of antibiotics in addition to analgesics for pain and local decontamination does not provide benefits to the patient. However, antibiotics may be indicated if the patient was medically compromised, the sinus tract did not resolve, or the patient experienced a flare-up with systemic involvement.

Antibiotic therapy should be restricted to cases when there are signs of cellulitis, lymphadenopathy, limitation of mouth opening, symptoms associated with pyrexia, and general malaise. All these signs and symptoms suggest that the immune system is unable to control the infection, which could spread to other regions, causing serious health problems [1,22]. Most respondents indicated the use of antibiotics for this situation, which was in agreement with previous reports [4,5].

Although antibiotics are very useful adjuncts in endodontic infections, they are not substitutes for endodontic treatment. The key to obtaining a successful result in an endodontic infection is the chemomechanical removal of the infecting agent from the root canal system as well as the drainage of pus [26]. When antibiotic is prescribed rationally and restricted to indicated cases only, favorable results are likely to be obtained for the complete eradication of the infection.

CONCLUSION

This survey showed that most Malaysian undergraduate dental students adhere to the existing guidelines (ESE, AAE) in prescribing antibiotics for endodontic infections regarding the indications and duration of antibiotic exposure. However, despite high awareness of the consequences of antibiotic overuse, a minority of students still opted to prescribe antibiotics unnecessarily. Therefore, there is a need for undergraduate dental students as well as newly qualified dentists to receive training in line with international guidelines on the appropriate use of antibiotics in their daily practice. Results of the present study identified where gaps in knowledge and training existed, and they must be effectively incorporated into undergraduate dentistry courses to ensure dentists of the future have the necessary tools for the effective prevention and treatment of infections and to work towards addressing the devastating consequences of AMR.

Limitations

The subjects in this study were recruited among final-year undergraduate dental students from 13 dental schools, hence they may not represent the overall Malaysian undergraduate dental students. Sample size calculation was carried out to achieve the minimum sample size. Future studies should be carried out to include fourth-year dental students, hence increasing the sample size to better determine the knowledge of undergraduate dental students in Malaysia regarding systemic antibiotics prescription for endodontic infections.

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PROCEEDINGS OF THE 21ST IADR MALSEC SCIENTIFIC MEETING
& 23RD ANNUAL GENERAL MEETING

Hand Hygiene Knowledge and Practice in Generation Z Dental Students in Malaysia

Ismail.N[1], Mohamed.N[2], A.Zaki. NH, A.Sobri. NH

ABSTRACT

Introduction: Hand hygiene is the most effective infection control measure for preventing nosocomial pathogen transmission and illness. Hand hygiene compliance must be continuously evaluated, especially in Generation Z dental students. The objective of this study was to assess the hand hygiene knowledge and practice of Generation Z dental students in Malaysia. **Objective:** This study aimed to assess the hand hygiene knowledge and practice of Generation Z dental students in Malaysia. Methods: This study was a cross-sectional study carried out from March 2021 to December 2021. A questionnaire was developed and distributed to the sample size of Generation Z final-year dental students from five selected universities. All dental faculties at Klang Valley are listed due to the accessible location by the researcher. The computer randomly selected three government and two private universities. The data collected was analysed using SPSS Version 26.0. A total of 211 respondents were retrieved. **Results:** A response rate of 91.7% was recorded from the questionnaire distributed. Significantly, of all the questions asked, most respondents answered the correct answers except for one question. Only 30 percent of the respondents know the primary source of pathogens causing nosocomial infections. **Conclusion:** The findings proved that the level of hand hygiene knowledge of Generation Z dental students is up to its best, in parallel with their practice. This shows that the teaching of the hand hygiene technique in the dental syllabus has successfully addressed the theory of hand hygiene and its practical implementation.

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INTRODUCTION

Our hands serve as a critical vector in the transmission of germs [1]. Nevertheless, hand hygiene practice is a breakthrough in the prevention of infectious diseases. It has long been acknowledged as a way of avoiding communicable diseases that is easy, efficient, and cost-effective. According to World Health Organization, hand hygiene refers to any hygienic hand antisepsis intervention to mitigate transient microbial flora, generally performed either by hand-rubbing with an alcohol-based formulation or handwashing with plain or antimicrobial soap and water. A causal connection between hand hygiene and infectious disease rates has also been identified previously. A meta-analysis of 30 hand hygiene studies found that improved handwashing reduced the incidence of upper respiratory tract infections by 21% and gastrointestinal illnesses by 31% [2].

Currently, COVID-19 has swept the globe, leaving nearly no location unaffected. Due to the rapid spread of COVID-19 and the alarming fatality rates, numerous nations and jurisdictions have implemented prevention measures, with handwashing featuring prominently. During the COVID-19 epidemic, handwashing has garnered much attention. It is a straightforward basic

preventative step that most individuals can carry out independently.

Despite the proven importance and benefits of hand washing, proper hand washing is not as common as previously needed to prevent infections, especially in developing countries with the highest burden of infectious diseases. Several studies in Malaysia addressed hand hygiene among the different populations in this country; however, hand hygiene studies among college or university students are very limited [3,4]. Improving hand hygiene compliance is essential, especially when educating young prospective healthcare professionals. These are nowadays mainly members of the so-called Generation Z, i.e., those born between 1995 and 2012 [5]. With the limited research on hand hygiene knowledge and practice among university students, this study will evaluate hand hygiene knowledge, practice, and other related factors among Generation Z dental university students in Malaysia.

Ethics approval was obtained from the ethical committee, Universiti Sains Islam Malaysia, before conducting the study. A reliable and valid questionnaire about hand hygiene knowledge has been prepared. The questionnaire was adapted and merged from two sources, the Hand Hygiene Knowledge Questionnaire for Health-Care

METHODOLOGY

Workers from the World Health Organization (WHO; revised version of August 2009) and a previous survey done among prospective healthcare student workers [6]. Permission was requested from the authors, and a pilot study was conducted before being distributed to the participants. The questionnaire consists of two parts- part I on hand hygiene knowledge and part II on hand hygiene practice. Part I has 11 questions, while Part II has eight questions. An expected number of 235 respondents of Generation Z dental students from three public universities and two private universities (University A, University B, University C, University D and University E) are recognised and given the online questionnaire to be answered. The period of time given to answer was initially from March 2021 to July 2021 but was extended up to December 2021. Consent was obtained from participants. Statistical analysis of the data collected was performed using SPSS 26.

Inclusion Criteria: Malaysian dental students who are born in the year 1995 to 2003 and are currently studying in Year 5 in the five selected universities.

Exclusion Criteria: Dental students who are not studying in Malaysia and who have graduated from dental school

RESULTS

Out of 230 questionnaires distributed, only 211 responded. A response rate of 91.7% was recorded. More than half of the respondents were females (146 respondents, 69.2%). According to races, the respondents came from various races; 159 respondents (75.4%) were Malays, 39 respondents (18.5%) were Chinese, 12 respondents (5.7%) were Indians and one respondent (0.5%) was others.

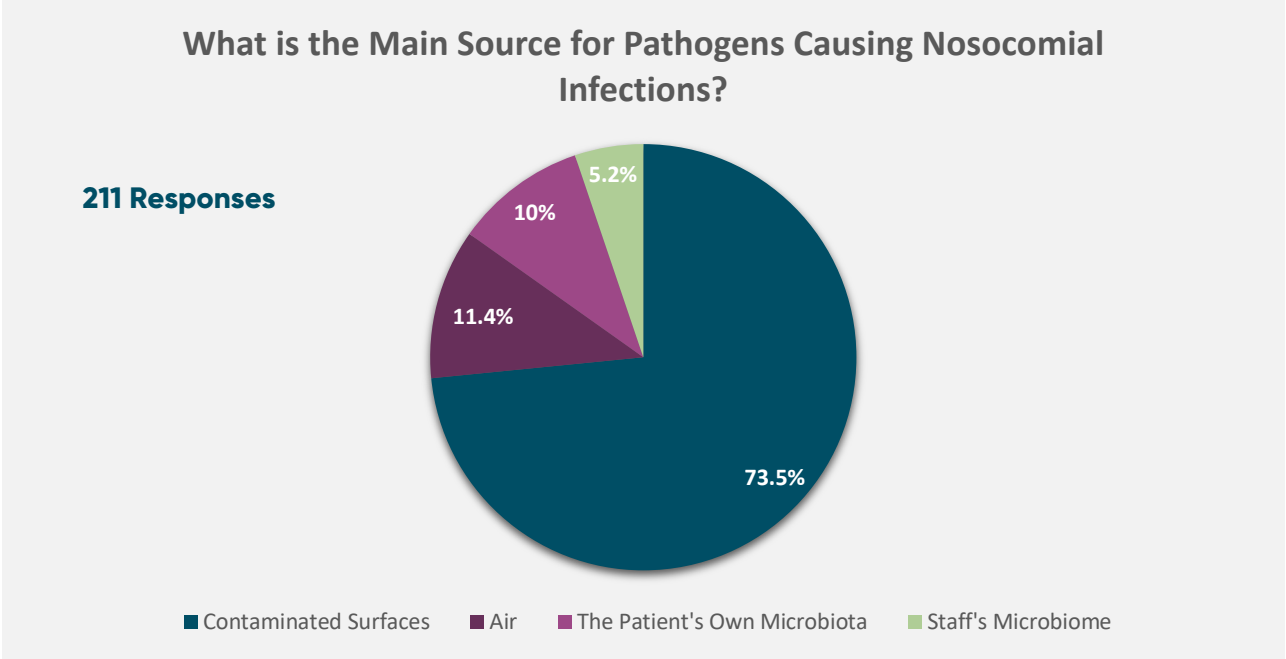


Figure. 1. Question Which Received the Most Significant Difference in Answers

Significantly, of all the questions asked, most respondents answered the correct answers except for one Question (Question 5- what is the main source for pathogens causing nosocomial infections?). Question 5 shows that most respondents answered wrongly. The correct answer is the patient's own microbiota. Only 21 respondents (10.0%) answered correctly; meanwhile, 73.5% chose contaminated surfaces,11.4% chose air, and another 5.2% chose staff's microbiome as the answers. All five universities show no significant difference in the percentage of correct answers chosen.

All questions answered have a high percentage of correct answers chosen, and the number of students who chose the wrong answers is not significant. Some questions are in the true or false form, which are questions 6, 7 and 8. The students answered these three questions well; all of them (100%) chose the correct answers to all three questions. The three questions are listed in Figure 2.0.

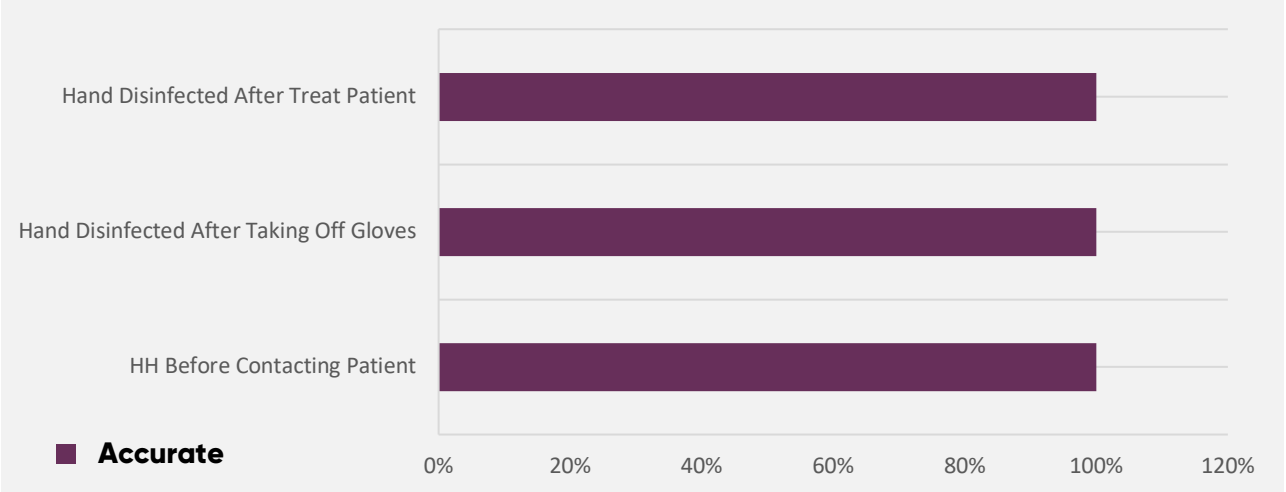


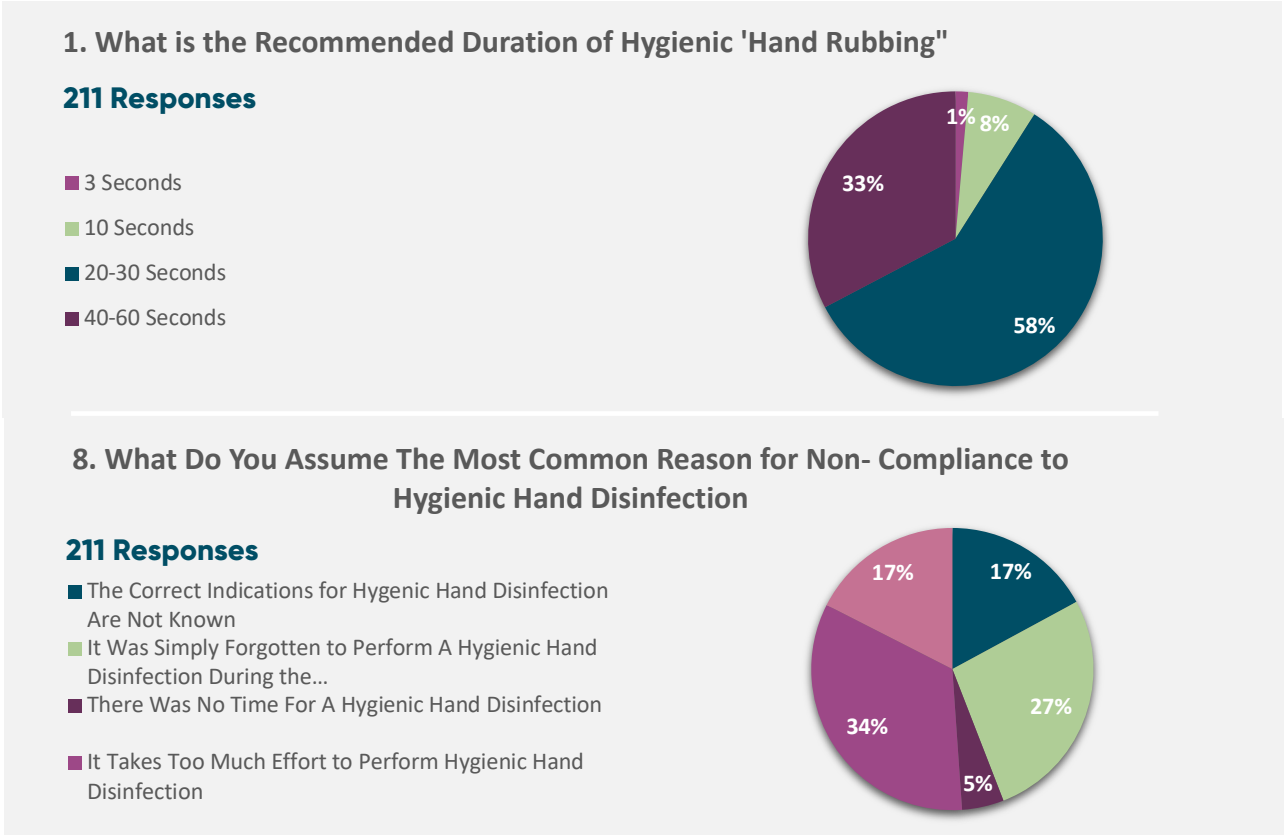
Figure. 2: The Three Questions with All Correct Answers

The second part of the questionnaire shows that all eight answers are answered correctly with a percentage of 80.1%- 100% per question. The high percentage of correct answers in each question reflects the excellent hand hygiene practice among Generation Z dental students in Malaysia.

All eight questions have one correct answer each, except for the final question, Question 8. Thus, there are two questions that the study would like to highlight- firstly, Question 1 on the recommended duration of hygienic hand rubbing, in which the answers from the respondents are quite variable. The answer 20-30seconds was the most common answer (58.3%), to 40-60 seconds as the second most common answer (32.7%), followed by 10 seconds and 3 seconds with 7.6% and 1.4% respectively. This is one of the questions that has slight gap on the answers chosen by respondents. The second question is the Question 8- which revolves on the assumptions of the students on the non-compliance of hand hygienic hand disinfection. The two most chosen answers are "too much effort needed" with 33.6% and "simply forgotten to perform hand hygienic hand disinfection" with 27.0% of respondents chose this one as their answers.

Another finding that could be extracted from the study is on the distribution of subjects in which hand hygiene is being taught. Question 2 has two follow-up questions. The respondents are required to answer if they answered 'yes' to the primary Question of Question 2. Listed below are the results for each question.

According to the findings from Question 2 part two in the hand hygiene knowledge section, most universities teach hand hygiene knowledge and practice in either Oral Maxillofacial and Surgery (OMFS) subject (31.8%), followed by Microbiology (15.6%) and General Medicine and General Surgery (GMGS) (11.8%). The result also shows that the students had started learning hand hygiene knowledge and practice as early as in Year 2 (40.8%) and Year 3 (53.1%).



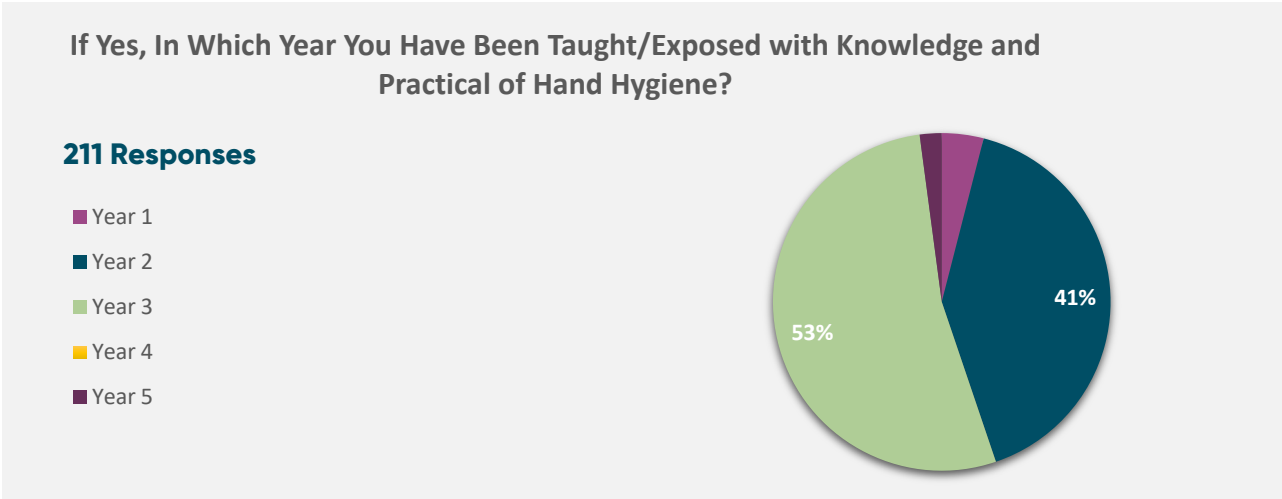


Figure. 2: Results for first subsequent Question for Question 2

If YES, in which subject you have been taught/exposed with knowledge and practical of hand hygiene?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Community dentistry	8	3.8	3.8	3.8
	Comprehensive care dentistry	10	4.7	4.7	8.5
	Doesn't remember	17	8.1	8.1	16.6
	Doesn't remember	2	.9	.9	17.5
	Foundation in dentistry (scrubbing)	5	2.4	2.4	19.9
	GMGS	25	11.8	11.8	31.8
	Health and safety	2	.9	.9	32.7
	ICP	14	6.6	6.6	39.3
	Medical sciences	18	8.5	8.5	47.9
	Microbiology	33	15.6	15.6	63.5
	No specific subject	9	4.3	4.3	67.8
	OMFS	67	31.8	31.8	99.5
	Oral surgery	1	.5	.5	100.0
	Total	211	100.0	100.0	

Figure. 4: Results for second subsequent question for Question 2

DISCUSSION

According to WHO, there are two recognised techniques for performing hand hygiene: hand rubbing with an alcohol-based hand rub formulation and hand washing with soap and water. Both come with different indications, steps and needs. It is crucial for every healthcare practitioner to master the art and science of these hand washing and hand rubbing. This is to ensure that both techniques can serve the ultimate purpose of applying them in daily life. For instance, hand rubbing with an alcohol-based formulation is the preferred hand-cleansing procedure in most settings due to its quick and faster use. Other advantages of alcohol-based hand rub compared to soap and water include availability at the point of care as it is simple to practice and can be readily available even without water and sink. Specific indications for hand washing instead of alcohol-based hand rubbing include visible hand contamination with blood and body fluids. The general rule is that hand washing must also be performed after use of the restroom. Across the studies done in the healthcare field, it is no surprise that these two techniques, especially hand rubbing, have limitations and effects. One limitation is that irritant dermatitis can occur after repeated use of hand-hygiene products. One can experience common symptoms such as dryness, itching, and sometimes cracking and bleeding on the hands. This will affect them even more because hand hygiene protocol is more difficult to tolerate with damaged skin. These people will experience pain when practising those procedures. However, there are ways to overcome their problems, such as by avoiding the use of hot water when hand washing.

This study is focused on the level of hand hygiene knowledge and their practice in hand hygiene among Generation Z dental students in Malaysia. The five universities chosen, with 3 of them are public universities, are relatively meant to reflect the identity of the whole generation Z dental students in Malaysia. To get a more significant result, thus the study chose only the final-year dental students of the five universities. This ensures that all the respondents have about the same level of knowledge and skills. From the questionnaire results, it can be concluded that the level of hand hygiene knowledge among Generation Z dental students in Malaysia is high and on par with one another. All questions answered have a high percentage of correct answers chosen, and the number of students who chose the wrong answers is insignificant. Of all 11 questions, the most significant difference in the respondents' answers on the knowledge part is on this question (question 5, part 1). According to the questionnaire by Baier et al., the correct answer is supposed to be the patient's own microbiota [6]. However, most respondents chose contaminated surfaces as their answers. This reflects that the knowledge of this part has to be emphasised in the syllabus.

Moving on to the second part, which is on the practice of hand hygiene knowledge of generation Z dental students in Malaysia. Overall, the respondents show good practice of hand hygiene among all five universities (80.1% -100% per question). This study also analysed the non-compliance of the respondents towards hand hygiene, as the previous studies in other countries did. In the practice part, the study did ask on : What do you assume the most common reason for non-compliance to hygienic hand disinfection? The result of this question is that the respondents chose "too much effort needed" and "forgotten to perform hygienic hand disinfection." In another view, according to the survey by Graf et al. from 2011 (which addressed the millennials), the most common answer from medical students was "too lazy" [7]. Our study shows that not many chose no time as their answer because that reflects that the students are just lazy to perform hand hygiene disinfection. The survey by Graf et. al in 2011

mentioned that "laziness" is not acceptable as a reason for noncompliance [7].

When asked about the year of undergraduate studies in which hand hygiene is taught in the curriculum ; the distribution showed that the respondents, consisting of final year Generation Z dental students in Malaysia, started learning hand hygiene knowledge and practice as early as in Year 2 and Year 3 of dental school. Our finding also showed that the students learnt this hand hygiene knowledge and practice most commonly in Oral Maxillofacial and Surgery (OMFS) subject, followed by Microbiology and General Medicine and General Surgery (GMGS) (11.8%). The study has concluded that these early exposures to hand hygiene curriculum to the Generation Z dental students in Malaysia have resulted in a high level of hand hygiene knowledge and good practice in the dental dentistry. This could benefit the dental field and be applied when designing the curriculum in the long run.

CONCLUSION

In a nutshell, our study showed that the level of hand hygiene knowledge of Generation Z is up to its best, in parallel with their practice. This shows that the particular teaching on the hand hygiene technique in the dentistry syllabus has successfully addressed the indications for hand hygiene and their practical implementation. The high level of knowledge and practice shown by the Year 5 dental students has proven it. This data is helpful in regularly analysing hand hygiene knowledge during education to optimise and could be used to personalise curricular teaching. From another view, this issue is crucial as it relates to infection control. Infection control plays a huge role in a healthcare professional's life, especially Generation Z as they will work in patient care for many years ahead and act as role models for future generations.

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A Narrative Review on the In-Vitro Performance of Anterior All-Ceramic Resin Bonded Bridges

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ABSTRACT

Introduction: Resin-bonded bridge (RBB) is a minimally invasive restorative method for replacing a single missing anterior or posterior tooth. Currently, the success and longevity of RBB are mainly reported through clinical studies with limited finite element analysis (FEA) and in vitro studies. Both these studies are very important as a reference for future work and to investigate different parameters and dimensions prior to clinical studies. This narrative review aims to critically examine the existing literature for FEA and in vitro studies in the field of anterior all ceramic resin-bonded bridges.

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INTRODUCTION

Resin bonded bridges (RBBs) are a minimally invasive method to replace a missing tooth with either metal ceramic or all ceramic materials. The survival rate has been reported up to 82.9% in 10 years [1] and includes both metal ceramic and all ceramic RBBs. However, one of the issues with an anterior metal ceramic RBB comes from the show of metal through the connector and wing retainer which is difficult to be masked due to the enamel translucency of the abutment tooth [2]. The use of an all-ceramic prosthesis was introduced to overcome these rising aesthetic concerns. Resin bonded bridges made from all ceramic materials such as zirconia, in-ceram and lithium disilicate have been used clinically with excellent success rates [3].

Debonding and fracture in the connector region of a two-retainer prosthesis led to the development of a cantilevered RBB design [4]. This debonding and fracture occurred due to differences in the movement of the two abutment teeth, causing a fracture in one side of the connectors. Following this, many clinicians have opted for a cantilevered design that has been reported to have excellent survival rates and clinical success [5]. Over time, the design of RBB has evolved from being fabricated from a metal-ceramic prosthesis to an all-ceramic to satisfy the needs of patients who prefer a metal-free option with better aesthetic values, even more so in the anterior region.

In vitro studies are conducted physically in a laboratory and is designed to examine and test a material or procedure outside a living organism. Finite element analysis on the other hand, allows analysis of any shape or form, and studies the stress in the material and its effect on certain structures by mathematical modelling [6]. Both in vitro and finite element (FE) studies form an important part of providing evidence in which treatment or technique can be proposed to be applied clinically. These experiments will allow the

interception of problems and create a better understanding of the materials tested. This review aims to examine the current literature on in vitro and finite elemental studies on all ceramic anterior resin bonded bridges with a focus on single retainer cantilevered prostheses.

METHODOLOGY

A literature search was conducted using three search engines i.e., Web of Science, PubMed and Scopus. The search terms used alone or in combination are: in-vitro AND cantilevered bridge, finite element AND cantilevered bridge, resin-bonded bridges, fixed dental prosthesis NOT implant AND resin-bonded, cantilevered resin-bonded bridge. Studies includes articles published until July 2022. The results were reviewed and limited to FEA and in vitro studies.

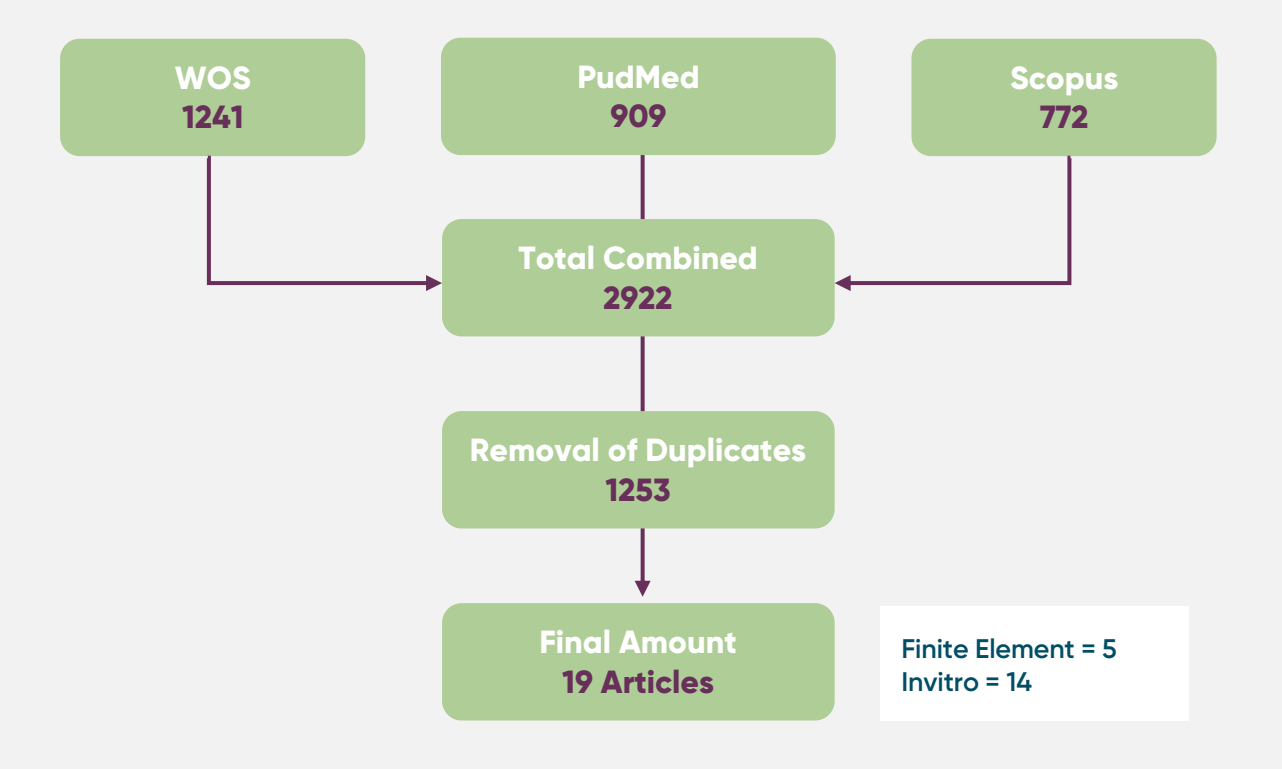

Table 1 ***List of articles covered in the narrative review.***

Type of Study	Author	Year	Materials	No of Retainers
Finite Element Study	Pospiech (7)	1996	Glass infiltrated high strength ceramic core (In-ceram alumina)	2
	Toman et al (8)	2015	Zirconium dioxide	Both (1 and 2)
	Keulemans et al (9)	2015	Lithium disilicate (IPS empress 2)	1
			Glass infiltrated high strength ceramic core (in-ceram zirconia)	
	Uraba et al (10)	2018	Zirconia (no brand stated)	1
	Dal Piva et al (11)	2019	Lithium disilicate (no brand stated)	Both (1 and 2)
	Kern et al (12)	1993	Glass infiltrated high strength ceramic core (In ceram alumina)	2

In-Vitro	Kern et al (13)	1994	Glass infiltrated high strength ceramic core (In ceram alumina)	2
	Koutayas et al (14)	2000	Glass infiltrated high strength ceramic core (In ceram alumina)	Both (1 and 2)
	Koutayas et al (15)	2002	Glass infiltrated high strength ceramic core (In ceram alumina)	Both (1 and 2)
	Rosentritt et al (16)	2008	Zirconia (Cercon base) Base metal ceramic (non-precious)	Both (1 and 2)
	Rosentritt et al (17)	2009	Zirconia (Cercon base)	Both (1 and 2)
	Sterzenbach et al (18)	2013	Zirconia (no brand)	2
	Nemoto et al (19)	2013	Zirconia (LAVA) Metal alloy (12% Au-Ag-Pd)	2
	Sillam et al (20)	2018	Glass infiltrated high strength ceramic core (In ceram	1
	Naguib et al (21)	2020	Lithium disilicate (e.max press)	2
	Gresnight et al (22)	2020	Lithium disilicate (e.max press) Zirconia (LAVA Plus)	1
	Di Fiore et al (23)	2020	Zirconia (Katana) Lithium disilicate (e.max press) PMMA base with ceramic fillers	1
	Noda et al (24)	2021	Zirconia (LAVA Esthetic)	2
	Kitani et al (25)	2021	Zirconia (Katana)	1

RESULTS

Table 1 summarises the literature covered in this review, 19 articles on anterior all ceramic restorations were identified.

DISCUSSION

4.1 Finite Element Analysis

The five articles on FE were conducted in a university setting. The characteristics of the included studies were similar in as they all imaged the maxilla, a central incisor, and a canine. However, there are differences in how the simulated models were obtained as 3 papers scanned the prosthesis whereas 2 studies created the FE model. All the studies applied a 45-degree load to the models. Only one study used a 60-degree angle in addition to the 45-degree load [6]. Bite force load were reported to also affect by gender, facial morphology, age, periodontal support of the teeth, and the presence of any temporomandibular disorders and pain [26]. The amount of load applied ranged from 90 N to 250 N showing the variability of bite force anteriorly. Whilst all studies placed loading onto the prosthesis, not all measured the same variables, as two papers measured strain and shear [9, 10]. With regards to the design of the prosthesis, of all the studies, only one mentioned the connector dimensions [7]. There are however limitations to finite element studies in which materials are expected to behave in a linear and isotropic manner.

4.2 In-Vitro Studies

From the search terms, fourteen studies were found. The publishing dates of the available articles ranged from 1993-2021. Clinical case reports regarding the use of an all-ceramic cantilevered RBBs started in 1997, however, in-vitro studies specifically testing cantilevered RBBs started in the year 2000. This study compared the fracture resistance of a one retainer and two retainer RBBs. Most of the in-vitro studies were exclusively testing two retainer RBBs (6 out of 14), whereas four studies were focusing on cantilevered and the other four studies focused on both. Hence more than half (70%) of the invitro studies included two retainers. This is not reflected clinically as there are many clinical studies conducted on the survival of RBBs with a cantilevered design but the literature on in-vitro studies appears rather limited.

The different types of all-ceramic materials studied were glass-infiltrated high-strength ceramic core (in ceram), zirconia and lithium disilicate (e.max) with two studies comparing with a metal alloy. Only two papers from the fourteen studies, used lithium disilicate (e.max press), whereas a little more than half (8 out of 14) used zirconia. All the prostheses were cemented with resin cements. The flexural strength in all three materials is different. The approximate flexural strength of glass infiltrated high-strength ceramic core (in ceram) is 420-520 MPa which is comparative to the flexural strength of e.max press 470 MPa (27). Whereas flexural strength of zirconia (3 yttria-stabilized tetragonal zirconia) is higher at 1200 MPa, and hence can resist higher loads compared to glass infiltrated ceramic and lithium disilicate. The opaqueness of zirconia limits its use in the anterior region and veneering is often used to improve its colour. Hence in 8 of the studies, veneering was done. In the more recent studies conducted in 2020, lithium disilicate (e.max press) and zirconia (Katana HT 10) were tested, reflecting the advancement of more aesthetic ceramics.

The connector dimension is an important factor as it represents the weakest area of the prosthesis as evident from finite element and conventional bridge studies. The manufacturers provide recommendations for connector volume via a two-dimensional measurement in mm2 units. Therefore, these values are described in this manner in 6 of the 14 studies. Connector volume can also be described according to its height and width. Four of the studies used similar height and width measurements [12–14, 22]. However, from the fourteen studies examined, two studies did not mention a connector volume or dimension [17, 25]. Traditionally, measurements for the connectors were conducted in mm2. However, connectors are not two-dimensional and hence a more accurate mm3 measurement might be more reflective of its connector dimensions.

Loading methods in the examined studies were also dissimilar. Methods used in the studies were shear force, dynamic loading and loading to fracture. Some studies used a chewing stimulation first before the prosthesis were loaded to mimic the fatigue placed onto the prosthesis during mastication [15, 17, 20]. The load applied during chewing is less than biting and its frequency changes with different foods and in different people [28]. This can be difficult to quantify. In another method named loading to fracture, the prosthesis is placed under mechanical loadings with occlusion from an opposing antagonist. The amount of load applied onto the prosthesis differed according to the aims of the in-vitro study. In two of the studies, loading volume were similar at 25N, and with cycles of 1.2 x 106 whereas in another a load of 50N was applied. The direction of load in a single retainer prosthesis is important as in a 0-degree direction of chewing force, was able to withstand higher loads than a more horizontal loading [13]. Possible limitations in vitro studies could be due to variables such as

the influence of bonding, different chewing and loading methods and the high cost for producing an all-ceramic resin-bonded bridge.

CONCLUSION

There have been many clinical studies conducted testing cantilevered all ceramic resin bonded bridges in patients but limited in finite element and in vitro studies. In a hierarchy of evidence-based dentistry, in vitro and finite element studies form an important base to further understanding the longevity of treatment and methods applied clinically. Furthermore, the effect of debonding, fracture or chipping from resin-bonded bridges maybe deemed less detrimental compared to other treatment modalities, and hence be considered safe for direct use in patients even with limited in-vitro studies conducted.

In conventional bridges, the connectors dimensions have been well examined in in-vitro studies on the ideal design and has been reported in the literature to be clinically applied. From the findings of this narrative review, it is recommended that more in-vitro studies and FE studies to be conducted to investigate anterior all-ceramic cantilever resin-bonded bridges for a possible suggestion on the ideal design based on the materials for a successful prosthesis.

Declaration of Competing Interest

The authors declared no conflict of interest related to this article.

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A Development and Validation of the Index for Prosthodontic Treatment Need (IPTN) in Adults: A Pilot Study

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ABSTRACT

Background: Literature suggests a high prevalence of prosthodontic treatment needs yet little is known from the dental patients' perspective and a valid and reliable instrument to assess them is lacking. This study described the development of a novel instrument that assesses the prosthodontic treatment needs in adults termed the Index of Prosthodontic Treatment Need (IPTN) and its implementation in a prospective pilot study. Following a literature review, consultation with health-care providers and semi-structured qualitative interviews with patients, a pilot instrument was developed. The IPTN consisted of 15 questions and a self-rated need for prosthodontic treatments, categorized on a Likert scale. Face validation was done with an initial group of 5 patients. A self-administered IPTN was then pilot tested on a convenience sample of 15 adults and a test-retest was carried out 2-6 weeks later. The IPTN demonstrated a high level of internal consistency and reliability with Cronbach's alpha being 0.92. The intraclass coefficient (ICC) was 0.92 with a 95% confidence interval from 0.84 to 0.97, $p<0.001$. A higher IPTN score indicated greater prosthodontic treatment needs. The proposed index is a promising tool for further prosthodontic research and clinical application. Additional application among Malaysian adult population is necessary for evaluation, and to establish population prosthodontic treatment needs.

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INTRODUCTION

World Health Organisation (WHO) defined oral health as a key indicator of overall health, well-being, and quality of life, which encompasses the psychosocial well-being of an individual [1]. FDI World Dental Federation in 2016 further defined it as multifaceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotions through facial expressions with confidence and without pain, discomfort, and disease of the craniofacial complex [2]. Hence, good oral health means fulfilled prosthodontics treatment needs.

Demands for prosthodontic treatments mainly involve concerns about tooth loss, its resulting mastication problem, poor appearance, and the need for replacement with dental prostheses such as removable dentures, fixed bridges, or implant-supported prostheses [3, 4]. A recent study reported that approximately 52% of the Malaysian population had needs for prosthodontic treatment [5].

Measures of prosthodontic treatment needs may lead to a better understanding of the treatment quality expected from the patients' perspectives. In the past decades, research gradually shifted to include dental patient-reported outcomes (dPROs) which are defined as any report of the status of a patient's oral health condition that comes directly from the dental patient, without interpretation of their response by a clinician or anyone else when assessing oral health so that

the quality of life by the individual patient can be directly measured [6, 7]. Often, a discrepancy is seen between a patient's perceived needs and dentist's assessment. Therefore, a standardized index can be used to assess relevant burden and plan personalized dental treatments [7].

Although many well-established instruments are used to measure dental treatment needs, such as the Oral Health Impact Profile (OHIP) which measure psychosocial impact; or the Geriatric Oral Health Assessment (GOHAI) which assesses oral function, the authors are unaware of any that assess specifically prosthodontic treatment needs. Therefore, the aim of this study was to develop and validate an index to assess the prosthodontic treatment needs in adult patients. This index can be used by dentists to assess oral health-related quality of life (OHRQoL), assess patients' perceived needs pre-treatment for comprehensive treatment planning and even be integrated for post treatment outcome assessment [8].

METHODS

The Index of Prosthodontic Treatment Needs (IPTN) was developed using the seven-step methodology as recommended by Guyatt et al, 1986 (Fig 1) [9,10].

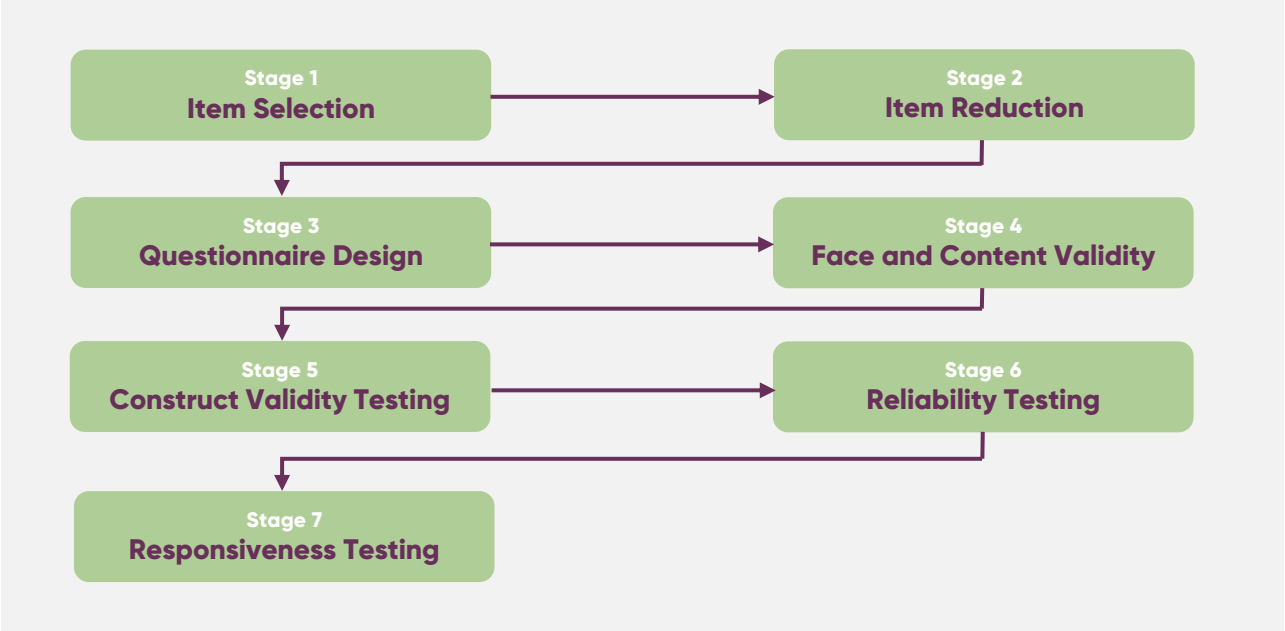

Figure. 1: Questionnaire design stages adapted from Guyatt et al.

2.1 Development of IPTN

This pilot study intended to develop a novel index to assess the prosthodontic treatment needs in adults.

Inclusion criteria:
i) Malaysian citizen, above 18 years old.
ii)Patients seeking for or attending prosthodontic treatment under the Faculty of Dentistry, National University of Malaysia (UKM).

Exclusion criteria:
i) Patients who are unable to understand English or complete index
ii) Patients unable to imply a valid consent
iii) Patients with acute dental pain, and no clear indication to any prosthodontic treatments.

Demographic data such as: age, ethnicity and employment status were collected. Each stage of the development of the index will be discussed.

2.1.1 Stage 1: Item Generation

Potential items for the index were generated from a literature review and semi-structured

qualitative interviews of patients undergoing active prosthodontic dental treatments in the university until data saturation was achieved. The interviews were done by phone conversations and not face-to-face due to the stringent Covid-19 measures implemented in the country. Reasons for which patients sought prosthodontic dental care and what did they expect from treatments were collected to form a concern inventory.

2.1.2 Stage 2: Item reduction

The goal of this stage was to determine which items were relevant. A discussion was done among the researchers which comprised of two prosthodontic dental specialists and two dental public health specialists familiar with instrument designs. 37 items were identified and brought forward to the next stage for assessment of face and content validity.

2.1.3 Stage 3: Questionnaire Design

This stage aimed to draft a questionnaire which can be used to ascertain prosthodontic treatment needs in adult patients to form a self-administered index. The index was formulated in English and comprised of two parts: Part A- demographic data, and Part B- a psychometric questionnaire. Statements of impact from the previous stage were rephrased as questions for the psychometric instrument. A Likert scale with 5 categories of choice per question (never, seldom, sometimes, often and very often) was used. The mathematical equivalents for these categories ranged from 0 for "never" to 4 for "very often".

2.1.4 Stage 4: Face and Content Validity

The aim of this stage was to validate and formulate a questionnaire that will be termed the IPTN. Content validity using the draft questionnaire was done to establish that individual items were relevant and key items were not excluded [11]. A panel of 6 experts in the same specialties apart from the researchers completed a quantitative content validation form in which each item was scored from 1 to 3 with a three-degree range of "not necessary, useful but not essential, essential". 22 items were dropped following this process to form the IPTN.

An interviewer-administered questionnaire with the 16 items was done on 5 patients to assess the time taken, the presence of any question on wordings or mistakes noted, and whether the patient understood each question as intended for face validation. The interviewer-administered questionnaire (excluding explanation, and instructions) took a maximum of 20 minutes and was usually between seven and 15 minutes. Overall, all 5 patients judged every item as understandable and relevant, so the interview process was stopped and not repeated. The questionnaire was then revised to be self-administrating and confirmed at 15 items rephrased as questions and a single-item rating on the need for prosthodontic treatment.

2.1.5 Stages 5, 6 and 7: Validity, Reliability and Responsiveness

2.1.5.1 Recruitment

The self-administered index was tested as a pilot study on a convenience sample of 15 participants who had not participated previously and were recruited from patients from the restorative dental clinic. The self-administered index took a similar amount of time to complete between seven and 15 minutes. The index was tested again on the same 15 pilot subjects two-six weeks after the first completion of the index.

2.1.5.2 Internal Consistency, Reliability, and Construct Validity

Two types of reliability were assessed in this study. Internal consistency was calculated using Cronbach's alpha while test–retest reliability was measured using intraclass correlation coefficients (ICC). Internal consistency evaluates how items in a scale measure the same concept, of which a high Cronbach's alpha of 0.70-0.90 confirms good internal consistency. ICC measures the degree in which repeated measurements in similar persons (test-retest) provide similar answers. ICC scores with values above 0.70 show high reliability [12].

Spearman's product-moment correlations were used to measure the inter-item and item-scale correlations.

2.2 Data analysis

All analyses were done using Statistical Package for the Social Sciences for Windows Release, SPSS 25.0 (IBM, New York, United States).

2.3 Ethics Of Study

Ethical approval was granted by the UKM Research Ethics Committee (Reference number: UKM PPI/111/8/JEP-2021-189).

RESULTS

Of the 15 participants who agreed to be included in the pilot study using the self-administered index, all returned to complete the index a second time, giving a response rate of 100% for test-retest analysis. The participants consisted of 7 (46.7%) males and 8 (53.3%) females with a majority who identified themselves as being Malay (60%, n = 15) and retired (46.7%) (Table 1).

The 16-item IPTN results from the pilot group were shown in Table 2. Correlation coefficients were high (>0.70) for most items in the index.

Table 1 ***Demographic characteristics of the participants (n=15)***

Characteristics	Male(n=7)	Female(n=8)
Age		
18-39 years old	0	2
40-59 years old	1	3
>60 years old	6	3
Ethnicity		
Malay	3	6
Chinese	3	2
Indian	1	0
Employment Status		
Government sector/agency	2	3
Private sector	0	1
Self-employed/own business	1	1
Retired	4	3

Table 2 *IPTN questionnaire items and mean responses(n=15)*

	IPTN Items	Mean Test (s.d.)	Mean Retest (s.d.)	Spear-man's r
1	Have you avoided going out because of problems with your teeth or mouth?	1.07 (.96)	1.00 (1.00)	.743 **
2	Have you faced problems in social or leisure activities because of problems with your teeth or mouth?	0.93 (.88)	1.2 (.78)	0.438
3	Have you worried about what your partner, relatives, or friends think about your teeth?	1.4 (1.3)	1.53 (.74)	.799**
4	Have you felt upset when comparing teeth with others?	1.6 (1.06)	1.6 (1.12)	.760 **
5	Have you felt unhappy, sad, irritable, or depressed about the appearance of your teeth or mouth?	1.4 (.83)	1.47 (.83)	.641**
6	Have you felt shy or embarrassed because of any problem with your teeth or mouth?	1.67 (.98)	1.4 (.83)	.707**
7	Have you felt not confident because of your teeth or mouth?	1.53 (.99)	1.53 (.83)	.928**
8	Have you disliked seeing or avoided showing your teeth in the mirror or on photographs or videos of yourself?	1.53 (1.19)	1.67 (.98)	.658**
9	Have you felt self-conscious about the appearance of your teeth?	1.93 (.96)	1.67 (.90)	.633*
10	Have you disliked your teeth colour?	1.4 (1.06)	1.4 (1.12)	.700**
11	Have you disliked your teeth when you smile?	1.6 (.99)	1.93 (.96)	.799**
12	Have you felt that your teeth are not attractive?	1.6 (.91)	1.93 (1.03)	.805**
13	Have you had a problem with chewing?	1.8 (.78)	2.2 (.78)	0.19
14	Have you avoided eating some foods due to your teeth or mouth?	2.27 (.70)	2.0 (.66)	.620*
15	Have you felt discomfort due to food getting stuck in between your teeth?	2.27 (.46)	2.47 (.83)	.774**
16	Overall, how do you rate your need for prosthodontic treatments?	3.00 (.54)	3.13 (.74)	.539*

*Correlations measured significant at p < .05, and at **p<.001

The inter-item and item-scale correlations were presented in Table 3 for the pilot test result and in Table 4 for the test-retest results 2-6 weeks after.

Table 3 *Inter-item and Item-scale Correlations for pilot testing of IPTN items (n=15)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Item/Scale Correlation
1	1.00																0.72
2	.59	1.00															0.59
3	.44	.52	1.00														0.50
4	.66	.66	.49	1.00													0.91
5	.41	.43	.37	.77	1.00												0.69
6	.56	.55	.62	.90	.80	1.00											0.90
7	.34	.29	.71	.63	.59	.86	1.00										0.65
8	.59	.65	.41	.81	.71	.78	.47	1.00									0.81
9	.39	.25	.48	.61	.31	.58	.42	.47	1.00								0.61
10	.68	.34	.08	.67	.62	.62	.33	.62	.52	1.00							0.72
11	.48	.46	.25	.87	.74	.82	.53	.87	.57	.78	1.00						0.83
12	.36	.32	.33	.79	.61	.80	.65	.67	.62	.70	.92	1.00					0.78
13	.02	.08	-.41	-.11	-.20	-.19	-.22	-.26	-.12	.19	-.11	-.12	1.00				-0.15
14	.71	.15	.19	.25	.049	.14	.09	.25	.24	.42	.17	.07	.24	1.00			0.35
15	.61	.22	.17	.24	-.11	.05	-.02	.25	.21	.36	.25	.27	-.04	.65	1.00	.	0.32
16	.41	.15	.31	.25	.16	.41	.41	.45	.28	.38	.41	.44	-.17	.19	.29	1.00	0.44

Index mean=27.00, s.d.=9.96, variance=99.14, Cronbach's alpha=.92. A high degree of reliability was found between measurements. The average measure ICC was .92 with a 95% confidence interval from .84 to .97 (F(14,210)= 11.97, p<.001).

Table 4 *Inter-item and Item-scale Correlations for test-retest of IPTN items (n=15)*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Item/Scale Correlation
1	1.00																0.66
2	.74	1.00															0.90
3	.67	.79	1.00														0.69
4	.57	.76	.62	1.00													0.84
5	.69	.62	.61	.60	1.00												0.71
6	.60	.65	.67	.65	.95	1.00											0.71
7	.60	.71	.89	.55	.75	.81	1.00										0.66
8	.37	.66	.56	.59	.56	.53	.67	1.00									0.70
9	.32	.72	.61	.50	.41	.38	.54	.84	1.00								0.67
10	.32	.56	.33	.70	.47	.51	.29	.39	.42	1.00							0.65
11	.52	.79	.65	.77	.67	.66	.67	.74	.72	.62	1.00						0.89
12	.35	.73	.42	.72	.37	.37	.38	.69	.74	.64	.86	1.00					0.80
13	.46	.40	.05	.51	.18	.20	-.07	-.09	-.10	.56	.21	.38	1.00				0.36
14	.44	.42	.00	.39	.26	.26	.00	.11	.12	.29	.34	.53	.70	1.00			0.44
15	.43	.62	.38	.67	.08	.12	.13	.29	.41	.55	.58	.70	.62	.52	1.00		0.59
16	.19	.32	-.01	.24	.35	.26	.11	.56	.50	.27	.51	.57	-.05	.44	.24	1.00	0.42

Index mean=28.13, s.d.=10.23, variance=104.55, Cronbach's alpha=.94. A high degree of reliability was found between measurements. The average measure ICC was .94 with a 95% confidence interval from .88 to .98 (F(14,210)= 15.72, p<.001).

Items (Content Summary)

1. Avoid going out
2. Problems with social or leisure activities
3. Worried about what others think
4. Upset when comparing teeth stuck
5. Unhappy about teeth appearance
7. Not confident
8. Disliked teeth show
9. Self-conscious
10. Disliked teeth colour
11. Disliked smile
12. Felt teeth unattractive
13. Problem in chewing
14. Avoided some food
15. Discomfort due to food getting
16. Prosthodontic treatment needs self

DISCUSSION

This study aimed to develop and validate a self-reported Index of Prosthodontic Treatment Needs (IPTN). The item inventory was based on patients and previous research exploring dental aesthetics and oral health-related quality of life, OHRQoL [13,14].

Study results demonstrated that the IPTN is internally consistent and reliable, as shown by the high Cronbach's alpha (.92) and ICC statistics (.92). Items in the IPTN scale can be used to measure prosthodontic treatment needs reliably and consistently in similar patients. Although some items had high correlations with each other in the pilot test such as items 4 & 6, and items 11 & 12 (Table 3); however, similar high scores did not appear in the test-retest results (Table 4). Consequently, all items were retained in the IPTN. The IPTN, which shared items with the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) reported comparable consistency, with PIDAQ having a Cronbach's α value of 0.88 [13].

A further cross-sectional study utilizing exploratory factor analysis will be used to categorize all items into conceptual dimensions of impact [15]. The different dimensions can then potentially be used to identify and prioritize patients for more personalized dental care and be compared to the local conceptual models as reported by the Malaysian Oral Health Impact Profile (OHIP) [16].

The IPTN can be used by dentists to evaluate prosthodontic treatment needs at two levels: individual, and population levels. At the patient level, the index can predict the success of prosthodontic treatment as practical and personal information was collected regarding the oral symptoms, functional, and psychosocial concerns important prior to treatment. At the population level, the IPTN could be a cost-effective way to gather epidemiological and oral-health related data. Furthermore, it can be expanded to demonstrate clinical outcome after prosthodontic treatments.

Limitations of this pilot study are the small sample size, the inability to objectively measure patients' oral health status or diagnose dental diseases. Further research is needed to determine whether IPTN will be sensitive enough to measure improvements to oral health status after dental treatment.

CONCLUSIONS

The newly developed IPTN appears to be promising and meets the standards of a good instrument, as shown by its high scale-consistency values and validity. Additional application among the Malaysian adult population is necessary for further evaluation in the use of IPTN to establish population prosthodontic treatment needs.

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Prediction Models for Alveolar Cortical Thickness: Development and Implementation Through Mobile Android Application

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ABSTRACT

Background: Alveolar cortical thickness is a crucial consideration in successful planning for orthodontic miniscrews placement. It can only be viewed with three-dimensional X-ray imaging. The objectives were to measure buccal cortical thickness and interradicular distance in maxillary and mandibular alveolar bone in subjects with Class I skeletal pattern and use the data to formulate a prediction model for alveolar buccal cortical thickness using artificial neural network (ANN). The other objective was to build an android mobile application to facilitate the use of the ANN model. Using cone beam computed tomography (CBCT) images of 180 adult subjects with Class I skeletal pattern, cortical thickness of maxillary and mandibular alveolar processes was measured from central incisor to second molar at 8mm from cementoenamel junction. Prediction models for buccal cortical thickness of anterior and posterior alveolar cortical thickness were developed using ANN. The developed models were tested and validated using the Mean Squared Error (MSE) and the Correlation Coefficient (R). Based on the ANN models, a mobile application on the android platform was developed. The app prediction performance was tested on an external sample of 39 subjects. Cortical thickness and interradicular distance showed different patterns in maxilla and mandible. Cortical thickness is highest between the two molars in both arches. Four ANN prediction models were developed. Mean Squared Error (MSE) for the test set was in the range of 0.104- 0.13, while the Correlation Coefficient (R) value for the validation set was in the range of 0.87- 0.97 and for the test set in the range of 0.86-0.95. For the mobile application, the MSE range was 0.12-0.23. ANN based prediction models can be used to estimate buccal cortical thickness without exposing patients to three-dimensional imaging. The mobile app could facilitate the use of ANN models.

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INTRODUCTION

Orthodontic treatment aims to achieve well-aligned teeth and normal occlusion between the maxillary and mandibular dental arches. Anchorage planning is a major factor in success of orthodontic treatment. Orthodontists are in continuous search of treatment modalities that requires minimal patient compliance while at the same time providing maximal anchorage. This has led orthodontists to use Temporary Anchorage Devices (TADS) such as mini-plates and miniscrews. Miniscrews feature several advantages such as their small size, low cost, relatively straightforward insertion and removal procedures and the ability to provide adequate anchorage to enable orthodontic movements especially in cases where anchorage requirement is critical [1].

Miniscrews can be placed in maxillary and mandibular alveolar interradicular spaces, they

can be also inserted in the palate and retromolar area. Cortical bone thickness plays a critical role in primary stability of the miniscrews. Sites with higher cortical thickness reduce the possibility of premature loosening and loss of miniscrews [2].

Cortical thickness can only be viewed with three dimensional imaging by computed tomography (CT) or Cone Beam Computerized Tomography (CBCT). Although CBCT radiation dose is less than CT, it is still higher than the conventional 2D images. With recent advances in Artificial Intelligence (AI) and the advances in computational technology, more precise and reliable tools are available for modelling of biological systems. Artificial Neural Networks (ANNs) are capable of modelling of biological systems [3]. To date, there is no deterministic cortical thickness model, thus the aim of this study was to assess maxillary and mandibular cortical thickness and interradicular distance in Class I subjects and utilize the data to create an ANN model for cortical thickness prediction to avoid the use of 3D imaging that exposes patients to high doses of radiation

MATERIALS & METHODS

The study was conducted retrospectively using CBCT images from records of 180 adult subjects (90 males, 90 females) with Class I skeletal pattern. Data were collected after ethical approval was obtained from faculty of Dentistry, UiTM (REC/510/18). The following general inclusion criteria were used: age between 20-45 years, Malay ethnic group, normal vertical relationship with SN/GoMe angle 27º- 37º, healthy alveolar bone level with no vertical or horizontal periodontal bone loss, no periapical or periradicular pathologies or radiolucency, no facial asymmetries, no cleft lip or palate or any craniofacial anomaly, no impacted or missing teeth in the measured quadrant, no history of orthognathic surgery or orthodontic treatment. Cortical thickness and interradicular distance of maxillary and mandibular alveolar processes were measured from central incisor to second molar at 8mm from cementoenamel junction (Figures1,2) [4]. Prediction models for buccal cortical thickness of anterior and posterior alveolar cortical thickness were developed using ANN. The developed models were tested and validated using the Mean Squared Error (MSE) and the Correlation Coefficient (R). Based on the ANN models, a mobile application on the android platform was developed. The app prediction performance was tested on an external sample of 39 subjects.

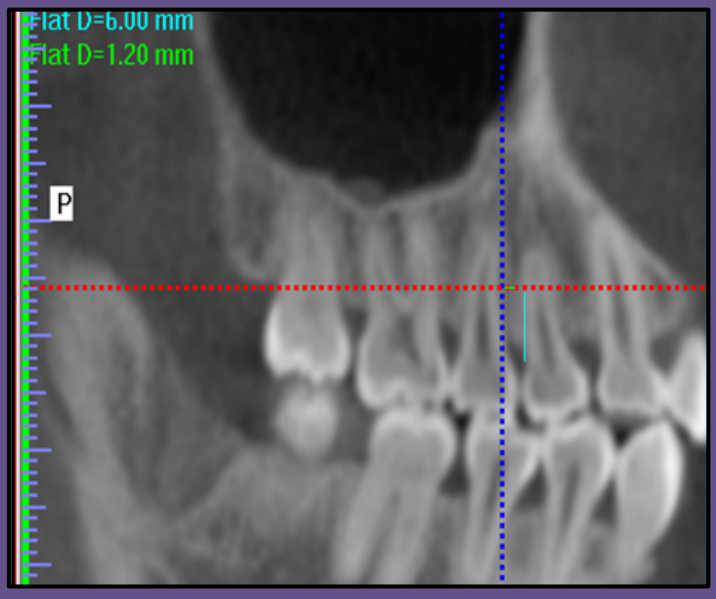

Figure 1: Interradicular Measurement

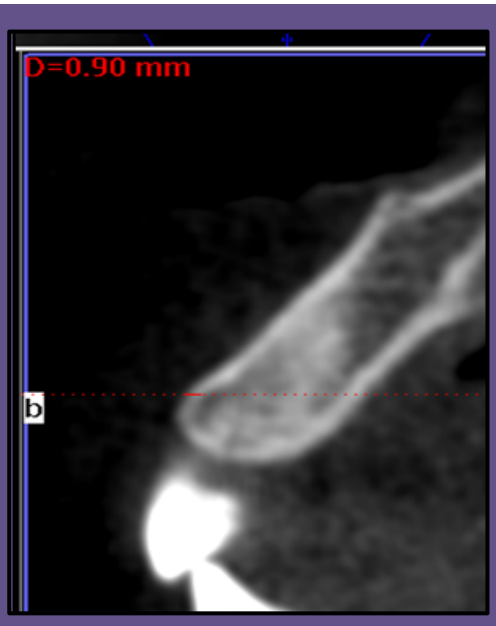

Figure 2: Cortical Thickness Measurement

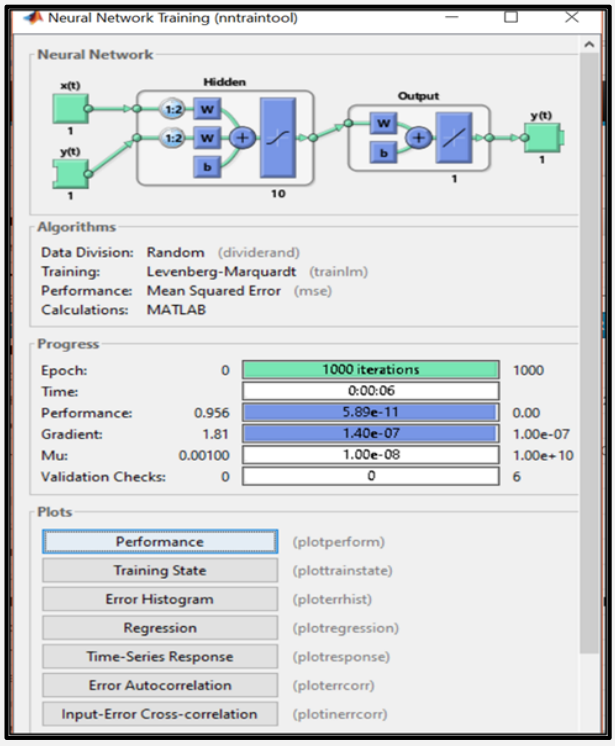

Figure 3: Neural Network Training

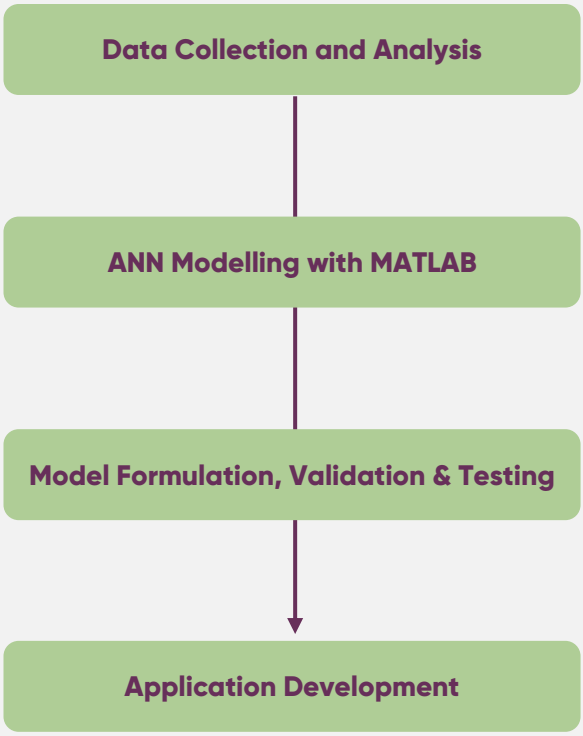

Figure 4: Research Flowchart

2.1 Model Development

Mean and standard deviation of all the variables were generated. Statistical analysis showed no significant difference between male and female mean values for all variables. To create the model, a specific type of ANN was used which is the Nonlinear Autoregressive Network with Exogenous Inputs (NARX). The training program that was chosen in this study, for the ANN, was MATLAB R2014a, which is a software package developed by MathWorks, Inc. (Natick, Massachusetts, USA) and is recommended to train this type of ANN (Figure 3). The data were then divided randomly, by the network, into training, validation, and testing sets. After training of the network, the mean squared error (MSR) and the correlation coefficient (R) regression values were obtained for each data set. Figure 4 shows a flowchart of the research process.

2.2 Android App Development

Based on the ANN models, a mobile application on the android platform was developed using MIT App inventor 2 (Figure 5). The app prediction performance was tested on an external sample of 39 subjects.

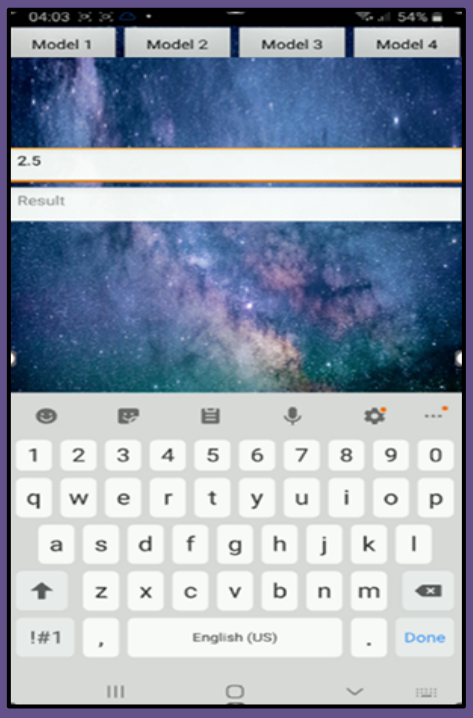

Figure 5: Buccal Cortical Thickness (BCT) Calculator App Interface

RESULTS

In the maxilla the highest mean value for interradicular distance anteriorly was available between the centrals while posteriorly it was highest between second premolar and fist molar. In the mandible the highest interradicular distance was between lateral and canine anteriorly and the two molars posteriorly. Cortical thickness in both arches was highest between lateral and canine anteriorly and the two molars posteriorly (Table 1). Four ANN prediction models were developed. Mean Squared Error (MSE) was in the range of 0.013-0.112 for the validation set, and 0.104-0.116 for the test set.

The Correlation Coefficient (R) value for the validation set was in the range of 0.87- 0.97 and for the test set in the range of 0.86-0.95. For the mobile application, the MSE range was 0.12-0.23.

Table 1 ***Cortical thickness and interradicular distance mean values***

Site	Maxilla		Mandible	
	BCT Mean ± SD (mm)	Root distance Mean ± SD mm	BCT Mean ± SD mm	Root distance Mean ± SD mm
1-1	0.65± 0.26	2.53± 0.66	0.27± 0.15	1.20± 0.28
1- 2	0.73 ± 0.21	2.31 ± 0.61	0.27 ± 0.15	1.52 ± 0.40
2-3	1.01± 0.18	2.52± 0.53	1.74± 0.36	2.52± 0.63
3-4	1.17± 0.27	2.31± 0.61	1.22± 0.27	2.17± 0.62
4-5	1.23±0.27	2.59±0.52	1.52±0.40	2.51±0.58
5-6	1.38±0.46	2.68±0.46	2.20±0.65	3.14±0.41
6-7	1.61±0.36	2.31±0.60	2.81±0.53	3.54±0.53

BCT (Buccal Cortical Thickness)

DISCUSSION

In this study buccal cortical thickness and interradicular distance of the maxilla and mandible were evaluated in areas of possible placement of orthodontic miniscrews. In this study only Malaysian Malay subjects were included as previous studies showed that ethnicity can influence bone dimensions [3]. The cementoenamel junction (CEJ) was used instead of the alveolar crest as the reference point to measure the vertical heights at 8 mm. Since previous studies reported that buccal cortical thickness could be influenced by the differences in vertical skeletal relation, in this study, only records with normal vertical relation were included [5].

A previous study reported that buccal cortical thickness differs significantly between subjects with different sagittal skeletal pattern [6]. Thus, only subjects with Class I skeletal relationship were included in this study. Understanding the characteristics of the corticalbone thickness of the maxilla and mandible not only has descriptive benefits, but clinical implications as well.

Miniscrews are being increasingly used by orthodontists as a tool to avoid loss of anchorage and to gain more control on tooth movement [6].

Anchorage is one of the most critical concerns in orthodontic treatment planning. Miniscrews provide a compliance independent means of absolute skeletal anchorage and can prevent undesirable tooth movement [7]. Although more than one factor affects the success of miniscrew placement, cortical bone thickness appears to be the most important factor [8]. Orthodontic miniscrews are placed in the maxilla and mandible and do not osseointegrate like traditional endosseous implants. In a meta-analysis for risk factors and failure rate of miniscrews, it was found that cortical bone thickness of more than 1 mm was associated with higher success rate [9]. The mean value, in this study, for labial cortical thickness in the anterior segment was 1 mm or higher in both arches at one site only, which is site 2-3. The results of this study showed that in Class I, the cortical thickness increases posteriorly in both arches, this agrees with results from previous studies [4, 6]. This pattern might be explained by the higher functional demands placed on the posterior teeth. Cortical thickness can only be assessed using 3D imaging which is associated with increased radiation doses to patients compared with conventional dental radiographic techniques. The models developed in this study could offer an alternative for measuring cortical thickness without exposing patients to high radiation doses.

The validity of the model was tested on a different set of data to ensure accuracy of prediction. In this study the R value of the test set of developed models was in the range of 0.86-0.95. It is reported that 0.8 R value and above is considered very strong [10]. Thus, it is safe to say that the developed models showed a high level of accuracy and could be used to predict buccal cortical thickness for orthodontic treatment planning.

One of the limitations of utilizing mathematical modelling are their complexity. In this study, the android app provided a platform for users to apply the models and predict the cortical thickness easily and accurately. However, the app is not yet publicly available as its interface is being improved.

CONCLUSIONS

ANN based prediction models can be used to estimate buccal cortical thickness without exposing patients to three-dimensional imaging. The mobile app could facilitate the use of ANN models.

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Self-Perceived Orthodontic Need and Perception Towards Fake Braces Among University Students in Malaysia: Preliminary Findings

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ABSTRACT

Background: Fake braces are fitted by unqualified individuals and have raised public concerns in Malaysia. This study aimed to explore self-perceived orthodontic needs and perceptions towards fake braces among university students in Malaysia. A cross-sectional study using self-administered questionnaire was distributed via Google Form. The data were analysed descriptively using SPSS. In total, 246 participants completed the questionnaire. Majority of them were female (68.3%) with a mean age of 21.74 (SD: ±1.08). More than half were Malay (56.1%) followed by other ethnicities. Only 44.3% of them were satisfied with their teeth appearance with 15.4% perceived they definitely need orthodontic treatment. Another 58.1% perceived they most probably needed orthodontic treatment. About 6.5% admitted have had experience wearing fake braces. Participants also reported having friends (27.6%) and family members (6.1%) wearing fake braces. Meanwhile, one third (33.7%) of them had searched for information about fake braces. Only a small proportion (8.1%) agreed with the benefit of fake braces in improving alignment of teeth, while the majority (67.5%) of them believe the risks of wearing fake braces were greater. There are mixed perceptions towards fake braces among Malaysian university students, with a minority favouring fake braces treatment.

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INTRODUCTION

As our population's health and expectations improve, there is an increase in the demand for orthodontic treatment. Previous studies demonstrated that patients' decisions to seek orthodontic treatment were influenced by a variety of circumstances and reasons [1] but mainly because they are unhappy with the state of their teeth and lack dental aesthetics.[2] Braces are a popular status symbol among teens in Southeast Asia because they are known to be associated with wealth.[3] This has led to a rise in the trend of fake braces, which are sold on the illegal market. This fake braces phenomenon has been reported in South East Asian countries like Thailand, Malaysia, Indonesia and the Philippines.[4] According to the 2020 Annual Report by the Oral Health Programme Ministry of Health Malaysia, 61.2% (79) of complaints regarding illegal dental practices or unregistered dentists in Malaysia involved fake braces services.[5] Fake braces have raised public health concerns as they are fitted by unqualified individuals who have no formal clinical training and are therefore harmful to teeth and oral health.[4] Some of the hazards associated with this malpractice are unwanted tooth movement, worsening of crowding, poor periodontal health,

and other more severe effects such as ingestion of foreign bodies and death from heavy metal toxicity.[4] This paper will look at university students' self-perception of orthodontic treatment needs and their thoughts on fake braces.

MATERIALS AND METHODS

This study is part of a larger fake braces study among young adults in Malaysia. Ethical approval to conduct this study was obtained from the Medical Ethics Committee, Faculty of Dentistry, Universiti Malaya [DFCO2201/0015 (L)]. This was a cross-sectional study using a set of self-administered questionnaires via Google Form. Convenience sampling was employed in this study. Three public universities located in the East, South and Central of Malaysia were randomly selected and 400 students were invited to participate in this study. Sample size calculation was calculated based on the estimated number of students enrolled in first-year programmes in the public university (N=10,101), the estimated proportion of 50%, precision of 5% and confidence level of 95%. The minimum sample size required was 385. The final sample was rounded to 400. The questionnaire was developed based on literature[5,6] and expert group discussion. The questionnaire was face validated by two dental academics and necessary amendments were made to the questionnaire before distribution. The final questionnaire was distributed via WhatsApp network between representatives for each university. Data from Google Form were transferred to SPSS and analysed descriptively. Frequency data are presented using tables and graphs.

RESULTS

Demographic characteristics of the participants are shown in Table 1. In total, 246 participants completed the questionnaire with 61.5 % response rate. Majority were female (68.3%) with a mean age of 21.74 (SD: ±1.08). Most were Malay (56.1%) followed by Chinese (30.5%), Indian (8.5%) and other ethnicities (4.9%). More than half (54.5%) of them have parents with a degree qualification or higher education level.

Table 1 ***Demographic characteristics of the participants***

Demographic	Frequency	
	n	%
Gender		
Male	78	31.7
Female	168	68.3
Ethnicity		
Malay	138	56.1
Chinese	75	30.5
Indian	21	8.5
Others	12	4.9
Parents Education Level		
Degree/Master/PhD	134	54.5
Diploma/STPM	32	13.0
SPM/High School	68	27.6
Primary school	12	4.9

Only 44.3% of the university students were satisfied with their teeth appearance (Figure 1). A small proportion (15.4%) were not happy at all with the appearance of their teeth.

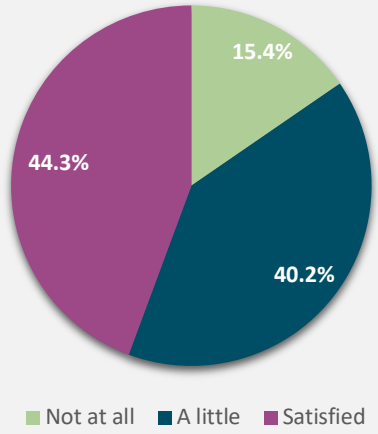

Figure 1: Self-perceived satisfaction of current teeth appearance

In terms of self-perceived orthodontic need, most of them rated they probably need orthodontic treatment (58%) and 15.4% reported they definitely need it (Figure 2).

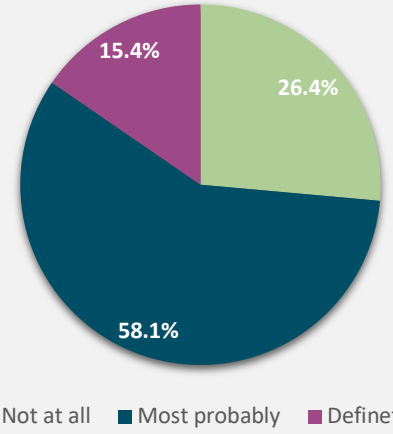

Figure 2: Self-perceived orthodontic need

In total, 16 students (6.5%) admitted they have had experience wearing fake braces. Of those, 10.3% were male and 4.8% were female.

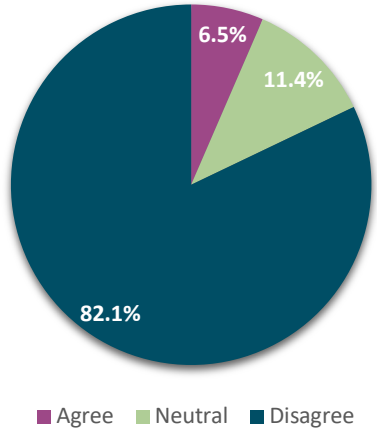

Figure 3: Experience wearing fake braces

In terms of participants' perceptions towards fake braces, a few of them (10.2%) admitted that they do not mind wearing fake braces, while 9.3% admitted they have a tendency to wear fake braces. Participants also reported having friends (27.6%) and family members (6.1%) wearing fake braces. Meanwhile, one-third (33.7%) of them had searched for information about fake braces. Almost half (48.0%) agreed they have seen social media posts from fake braces providers.

Table 2 ***Perceptions towards fake braces***

	Agree N (%)	Neutral N (%)	Disagree N (%)
Tendency to wear fake braces	23 (9.3)	49 (19.9)	174 (70.7)
I don't mind wearing fake braces	25 (10.2)	37 (15.0)	184 (74.8)
Have searched information about fake braces	83 (33.7)	65 (26.4)	98 (39.8)
Have friends wearing fake braces	68 (27.6)	53 (21.5)	125 (50.8)
Have family members wearing fake braces	14 (6.1)	33 (13.4)	194 (80.5)
Have seen social media posts from fake braces providers	118 (48.0)	54 (22.0)	74 (30.1)
Have contacted a fake braces provider before	14 (5.7)	34 (13.8)	196 (80.5)

Table 3 shows data on the perceived risk towards fake braces among university students. Generally, majority agreed on the risks of wearing fake braces. However, a small proportion of the participants perceived that there were no risks associated with fake braces, and some of them reported to be on the fence (neutral) when asked about such risks.

Table 3. Perceived risk towards fake braces

	Agree N (%)	Neutral N (%)	Disagree N (%)
There are no risks of wearing fake braces	18 (7.3)	52 (21.1)	176 (71.5)
There are risks of wearing fake braces	166 (67.5)	45 (18.3)	35 (14.2)
Wearing fake braces will worsen teeth condition	162 (65.9)	42 (17.1)	42 (17.1)
Wearing fake braces can affect my health	151 (61.4)	54 (22.0)	42 (26.7)

Only a small proportion (8.1%) agreed with the benefit of fake braces in improving the alignment of teeth. Meanwhile, 7.7% perceived fake braces are fashionable, and 6.1% of them perceived fake braces are cool and trendy.

DISCUSSION

The demand for orthodontic treatment in Malaysia is high, as evident in the long treatment waiting times for both public and private clinics. Findings from this study are similar to what has been reported by Kamarozaman et al., (2020) showing that the majority of young adults in their twenties have a high self-perceived need for treatment even though the majority are relatively happy with their teeth appearance.[8] This mismatch between treatment need and treatment demand among young Malaysian adults, no doubt places a large demand for orthodontic treatment in the country. In

contrast, a study among young Chinese adults showed that although majority had a relatively high orthodontic need based on specialist assessment, they had a low demand for orthodontic treatment as they perceived themselves as having low treatment need.[9] It is possible that young Malaysians have a higher demand for dental aesthetics or have a poor understanding of orthodontic treatment and view braces as fashion rather than therapeutic.[10] This is unnerving as this mentality makes them susceptible to Fake braces.

Studies have shown that it is not uncommon practice for patients to seek for information before deciding on seeking treatment. Many rely on friends and online platforms such as websites and social media.[6] A large number of our participants admitted to having friends wearing Fake braces and/or have come across advertisements for Fake braces on social media. This puts them at risk for falling prey to illegal dental treatment. A recent study by Rani et al., (2020) revealed that fake braces was the most common form of illegal dentistry being offered on Instagram and Facebook.[11]

In this study, a small proportion of participants (<10%), both females and males, were reported to have experience in wearing Fake braces. This is a similar finding that has been reported elsewhere.[8] Some participants even admitted that they had no problems with the idea of fake braces and were willing to give it a try. It has been proposed that low socioeconomic status, perceived susceptibility and severity of risks are influencing factors that lead youths to Fake braces.[6,12]

4.2 Study Limitations

This study has several limitations. Firstly the nature of a cross-sectional study has social desirability bias. Secondly, data could be generalised to all university students in Malaysia, although effort has been made to include University students from different regions.

CONCLUSION

There are mixed perceptions towards fake braces among Malaysian university students, with a minority favouring fake braces treatment. Thus, there is a need for continuous oral health promotion to deter young adults from seeking fake braces.

ACKNOWLEDGEMENT

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ACKNOWLEDGEMENT

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CONFERENCE ABSTRACTS

Senior Poster

Paper ID: 4

Proteomics of Periodontitis-associated Oral Bacteria and Its Possible Link to Rheumatoid Arthritis: A Narrative Review

Yeong Shue Kang, Cheah Chia Wei, Anis Rageh Mohammed Al-Maleki

Introduction: Periodontitis is a chronic inflammatory condition of the structures supporting the teeth. It is associated with host response towards the accumulation of dental biofilm along the gingival margin. Periodontitis-associated bacteria express their virulence factors in disease pathogenesis. The newly emerging pathogenic bacteria warrant further investigation at protein levels to gain a better understanding of the etiopathogenesis of periodontitis. Besides, many identified proteomes have not been analyzed, and discussed intensively in this regard. Rheumatoid arthritis (RA) is an autoimmune condition associated with chronic inflammation affecting small joints. The association between periodontitis and RA, is potentially through bacterial proteomes induced inflammation.
Objective: Therefore, this review investigated the molecular functions and pathways of the periodontitis-associated bacterial proteomes and their association with RA.
Methods: The search for related literature published from 2017 to 2021 was done on MEDLINE/PubMed, EBSCOhost, and Web of Science databases. Bacteria of interest include Porphyromonas *gingivalis (P. gingivalis), Tannerella forsythia (T. forsythia), Treponema denticola (T. denticola), Prevotella intermedia (P. intermedia), Fusobacterium nucleatum (F. nucleatum), Aggregatibacter actinomycetemcomitans (Aa), Campylobacter rectus (C. rectus), Eubacterium nodatum (E. nodatum), Parvimonas micra (P. micra) and Filifactor alocis (F. alocis).*
Results: Several virulence factors have been found to be involved in the inflammatory response, immune-modulation, motility, adhesion, colonization, biofilm formation, survival, nutrient acquisition, protein translocation, invasion, and tissue destruction. To date, evidence suggests *P. gingivalis* peptidylarginine deiminase (PPAD) and Leukotoxin A (LtxA) of Aa are associated with RA. However, the mechanistic link between them still requires further investigation.
Conclusion: The proteomic study could help us in understanding the bacterial involvement in the pathogenesis of periodontitis at a multifaceted molecular level. With molecular pathways and interactions unveiled to researchers, a more targeted periodontal therapy such as protein interaction inhibitor can then be developed. This periodontal therapy could also possibly help indirectly improve the management of RA.

Keywords: Periodontitis, Bacteria, Rheumatoid Arthritis, Proteomes, Virulence Factors

Paper ID: 12

Assessment of Digital Literacy Among Malaysian Dental Students

Amirul FL, Nawwal AMR, Budi AMS

Introduction: The greatest challenge in dental education is the need to consistently adapt and adjust to the advancement of digital dentistry and its application in dental practice. Thus, the scarcity of evidence on digital literacy (DL) levels among Malaysian dental students must be addressed to identify areas in dental education that need improvement.
Objectives: To assess the level of DL skills and its association with sociodemographic factors among Malaysian dental students. **Methods:** Online self-administered questionnaires were distributed to 668 Malaysian dental students thathave been proportionately sampled. A total of 501 (75%) dental students from 11 dental schools completed the validated questionnaire. The mean score of the DL skills level was analysed with the p-value set at 0.05.
Results: The majority of Malaysian dental students reported high skills level in uploading documents online (95.21%), sending and receiving e-mails (94.61%), and using different social media platforms (92.41%). Parametric tests of ANOVA and Independent t-test revealed no association between sociodemographic factors and the level of DL skills. Overall, the mean score of the dental students' DL skills level was categorised to be in a moderate range (DL [Moderate] = 29.01 – 32.99) with 31.13 (SD ± 4.95). In addition, after adjusting the relevant confounders, multiple linear regression predicted that dental students from public dental school positively influences the level of DL skills. However, it is predicted that if the respondent is from a private university, the level of DL skills is decreased (p=0.026).
Conclusion: Current dental education and training need to prioritize efforts that increase the levels of DL among undergraduates. This data presents an opportunity for the policymaker and educators to modify the current educational method to advance student's current learning method.

Keywords: Digital Literacy, Dental Students, Malaysia

Paper ID: 14

Evaluation and Comparison of Mechanical Properties of Lithium Disilicate-Based CAD/CAM Blocks

Sofya Zulkifli, Yeoh Oon Take, Noor Azlin Yahya, Muralithran Govindan Kutty

Introduction: The variations of IPS emax CAD were utilised for construction of dental prosthesis ever since its patent expired in 2015. However, data and studies concerning mechanical properties of these recent lithium disilicate-based CAD/CAM are scarce and it warrants for an investigation to provide scientific evidence to support its routine use.
Objective: To investigate and compare the mechanical properties of lithium disilicate-based CAD/CAM blocks from four different brands.
Methods: Four CAD/CAM lithium disilicate brands were investigated; IPS emax, Mazic Claro, Cameo, and Tessera. Specimens (n = 10) were cut and final crystallization was performed following manufacturer's instructions. Specimens were polished until the final dimensions for flexural strength (16 x 4 x 1.2 mm) and microhardness test (15 x 13 x 2 mm) were achieved. One specimen from each brand was analysed for the microstructure, elemental composition and distribution before and after heat treatment using scanning electron microscope and energy dispersive x-ray spectroscopy. The three-point flexural strength test (n=10) was performed using universal testing machine and microhardness test (n=10) was performed using

Vickers microhardness testing machine. Data were analysed using one-way ANOVA and Dunnett's T3 test.
Results: The highest mean flexural strength was from Group 4 Tessera (540.52 ± 143.33 MPa). For microhardness, the highest mean was from Group 1 Mazic Claro (667.70 ± 9.41 HV). Within the four groups, statistically significant difference is noted for flexural strength ($p=0.001$) and microhardness ($p<0.001$).
Conclusion: Tessera demonstrated significantly higher flexural strength than IPS emax and Cameo. Mazic and Tessera demonstrated significantly higher microhardness than IPS emax and Cameo. There was a difference in the crystal size after the heat treatment of all four lithium disilicate CAD/CAM blocks. All the materials tested were above the threshold of 300 MPa, thus they meet the ISO 6872:2015 requirements for construction of Class 3 restorations.

Keywords: Lithium Disilicate, CAD/CAM, Flexural Strength, Microhardness, Microstructure

Paper ID: 15

A Narrative Review on The In-vitro Performance of All-ceramic Resin Bonded Bridges

Mohd Osman ML, Lim TW, Ab Ghani SM

Introduction: Resin-bonded bridge (RBB) is a minimally invasive restorative method for replacing a single missing anterior or posterior tooth. Currently the success and longevity of RBB are mainly reported through clinical studies with limited finite element analysis (FEA) and in-vitro studies. The two later studies are very important as a reference for future work and to investigate different parameters and dimension prior clinical studies.
Objective: This narrative review aims to critically examine the existing literature for FEA and in-vitro studies in the field of all ceramic resin-bonded bridges.
Methods: A literature search was conducted using the Web of Science, PubMed, and Scopus for in-vitro and FEA studies on anterior resin-bonded bridges. The search terms used alone or in combination were in-vitro AND cantilever bridge, finite element AND cantilever bridge, resin-bonded bridges, fixed dental prosthesis NOT implant AND resin bonded, cantilevered resin-bonded bridges. Studies included literature published before July 2022. The results were then reviewed and limited to FEA and in-vitro studies published in English and prostheses made or simulated with all-ceramic materials.
Results: From the search, 18 articles were found: 4 FEA and 14 in-vitro studies. From the FEA studies, model simulation and loading conditions were investigated to allow for findings comparison. 3 studies had similar methodology producing similar findings and outcome. For the 14 in-vitro studies, observation was done on the methodology of testing method, tooth type used, and loading conditions. Majority of the studies were testing on fracture resistance with static loading of 45-degree angulation on extracted human tooth. However, major differences were noted on parameters tested in the studies.
Conclusion: This narrative review has found that there are limited number of studies done both using FEA or in-vitro testing on anterior resin-bonded bridges with no ideal model or standardization on testing can be concluded.

Keywords: In-vitro, Finite Elemental Analysis, Fixed Dental Prosthesis, Resin-bonded Bridges

Paper ID: 20

Effectiveness of Dental Plaque Removal of Selected Eco-Friendly Toothbrush Bristles vs Nylon Bristles – In-Vitro Study

Ahmad Ubaidillah AH, Abdul Razak MA, Abdul Aziz A, Munusamy SM

Introduction: Plastic products have always been in high demand, and it has a significant influence on the consumer economy. However, the rise in plastic pollution due to high consumption is very worrying. Unfortunately, the use of modern toothbrushes with nylon bristles and plastic handles contributes to pollution. Replacing the conventional nylon bristles toothbrush with an eco-friendly toothbrush has the potential in reducing its impact on pollution. The effectiveness of eco-friendly bristles in eliminating plaque is crucial to be examined since the bristles are the most critical portion of the toothbrush in the mechanical removal of plaque.
Objective: To investigate the efficacy of selected eco-friendly toothbrush bristles in plaque removal.
Methods: Three types of toothbrushes with different bristles were chosen and divided into three respective groups (n=15); Group 1: Conventional nylon bristles, Jordan Clean Smile (Control group), Group 2: Bio-based bristles toothbrush, Jordan Green Clean, Group 3: Miswak bristles, Al-Abyad Miswak Toothbrush. The artificial plaque (Arti spray) was sprayed on the upper anterior teeth and lower left posterior teeth segment of the dental Kavo model. Toothbrushing simulation was done by a volunteer for 30 seconds per segment with horizontal brushing motion. After brushing, the remaining plaque index was evaluated with Turesky modification of the Quigley Hein plaque index. Statistical analysis was performed using One Way ANOVA.
Results: Group 3 showed the lowest mean plaque index (MPI) after the toothbrushing simulation (1.55±0.29). The difference in MPI was statistically significant ($p < 0.05$; $p = 0.003$) between Group 1 and 3, where the latter group has more plaque removed after the toothbrushing simulation.
Conclusion: Eco-friendly toothbrush bristles have the potential to replace conventional nylon bristles as shown by their efficacy in mechanically removing plaque substrates from the tooth surfaces.

Keywords: Eco-Friendly Toothbrush, Dental Plaque, Laboratory Study, Artificial Plaque, Manual Toothbrushing

Paper ID: 25

Dental E-Professionalism and Ethics in Social Media in Malaysia

Abdul Raob Na, Md Bohari Nf, Md Sabri Ba

Introduction: E-professionalism is a subset of professionalism described as applying conventional professionalism concepts to online activities. The concept of e-professionalism is nested in the ethics of healthcare. Dentists as professionals still need to adhere to the principle of ethics while using social media.
Objectives: To assess the knowledge, attitude, practice and perception of dental e-professionalism and ethics in social media among dentists in Malaysia.
Methods: An online structured questionnaire-based, cross-sectional study was administered to 482 registered dentists and specialists in Malaysia. The study population was selected using stratified random sampling.

Results: The response rate of the study participants was 70.5% (n=340). Knowledge of dental e-professionalism and ethics was found to be significantly associated with age, working experience and university graduates ($p < 0.05$). Significant association were also found between perception and working experiences, females and local university graduates, with higher mean scores ($p<0.05$).
Conclusions: Participants in this study had a good understanding of e-professionalism and ethics that govern dentists' conduct on social media. However, a minority of the participants in the research lacked sufficient knowledge and practice of ethics. Integrating moral principles into dental practice in social media is crucial. In order to advance toward good ethical behaviour in dentistry, it is necessary to offer the dental profession the necessary training approaches or conducive guidelines.

Keywords: Social Media, E-professionalism, Ethics, Dentistry

Paper ID: 27

Analysis of Health Profile and Treatment Provided in Patients with Special Health Care Needs - An Institutional Study

Tun Yasmin Iffah Mohd Suria Affandi, Mas Suryalis Ahmad, Ilham Wan Mokhtar

Introduction: Special Care Dentistry (SCD) provides oral health care to the person who are disabled by their environmental, cultural, or social setting that echoes on their oral health.
Objective: This study aims to analyse patient's profile managed at a Special Care Dentistry Clinic at a teaching hospital based on the sociodemographic background, medical or disability condition, dental diagnosis and treatment provided.
Method: It is a cross-sectional audit study includes patients seen from the inception of the clinic until June 2022 from the faculty's record management system. The pattern of patients seen arranged on an Excel sheet and analysed using SPSS.
Results: There is an increase in number of patients seen since 2017 until June 2022 by 220%. Majority of patient seen are diagnosed with intellectual disability (46.2%), followed by medically compromised (15.1%) and patients with genetic condition or syndromic (12.0%). Meanwhile, the combination of periodontal and restorative treatments has the highest percentage (20.1%). 42.7% patients presented with caries and 31.6% of patients are diagnosed with periodontal disease.
Conclusion: This study provides information on the type of patients seen in SCD specialist clinic according to their health profile, oral diagnosis and treatment provided hence providing valuable information in cultivating a comprehensive care dental centre for this group.

Keywords: Special Care Dentistry, Special Health Care Needs, Disability

Paper ID: 28

Development and Validation of the Index for Prosthodontic Treatment Needs (IPTN) in Adults: A Pilot Study

Soo Suet Yeo, Lee Siw May, Tew In Meei, Tuti Ningseh bt Mohd Dom, Nurul Asyikin binti Yahya

Introduction: The literature suggests a high prevalence of prosthodontic treatment needs yet little is known from the dental patients' perspective and there is still a lack of valid and reliable instrument to assess them in the adult population.
Objectives: This study described the development of a novel instrument that assess the prosthodontic treatment needs in adults termed the Index of Prosthodontic Treatment Needs (IPTN) and its implementation in a prospective pilot study.
Methods: Following a review of the literature, consultation with health care providers and semi-structured qualitative interview with patients, a pilot instrument was developed. The IPTN consisted of 15 questions and a self-rated need for prosthodontic treatments, categorized in a Likert scale with 5 categories of choice per question. Face validation for the IPTN was done by the researcher (SML) with an initial group of 5 patients. A self-administered IPTN questionnaire was then pilot tested on a convenience sample of 15 adults and a test-retest carried out 2-6 weeks later to perform reliability and validity analysis using SPSS v25.
Results: The IPTN demonstrated a high level of internal consistency and reliability as measured by a Cronbach's alpha of 0.92. The average measure intraclass coefficient (ICC) was also 0.92 with a 95% confidence interval from 0.84 to 0.97, $F(14, 210) = 11.97$, $p<0.001$. A higher IPTN score indicated a greater need for prosthodontic treatments.
Conclusions: The results suggest that the proposed instrument, termed the Index of Prosthodontic Treatment Needs (IPTN), is reliable and might be a promising tool for further research and clinical application in prosthodontics. Additional application of the IPTN among the Malaysian adult population is necessary to further evaluate the instrument's validity and reliability, and to establish population norms of prosthodontic treatment needs as measured by the IPTN.

Keywords: Prosthodontic Treatment Needs, Index, Patient-Reported Outcome Measures, Questionnaire, Restorative Dentistry

Paper ID: 32

The Effects of Concentrated Growth Factor (CGF) on the Augmentation of Bone Regeneration: A Systematic Review of Animal studies

Nik Fatin Sarah Nik Mhd Abdul Nasser, Nur Zety Mohd Noh, Erni Noor

Objectives: The biocompatibility of autologous platelet concentrates as well as the high growth factor that promotes tissue healing have made them widely tested *in vitro* and *in vivo*. Therefore, this review aims to evaluate the effects of concentrated growth factor (CGF) on bone regeneration in animal studies.
Methods: A literature search was conducted on PubMed, Scopus and Web of Sciences from inception up to June 2022 for relevant studies. Studies utilizing diagnostic imaging modalities to assess quantitative bone formation were selected without language limitations or follow-up duration restrictions.
Results: A total of 13 studies were selected from 253 studies that were identified and screened from databases, eight of which examined critical-size calvaria defects, two examined peri-implant defects, and one examined extraction sockets, maxillary sinus floor augmentation, and mandibular defects separately. The total amount of mineralized bone was greater in CGF groups compared to unfilled groups in rats and rabbits with surgically induced calvaria defects. The amount of newly formed bone was significantly increased when CGF was combined with bone

marrow- derived mesenchymal stem cells (BMSC), adipose-derived stem cell (ADSC) sheets, bone collagen, and nano-hydroxyapatite (n-HA) hybrid scaffolds. The combined use of CGF and autogenous bone grafts produced similar results in the treatment of peri-implant deficiencies. Mandibular anterior teeth extraction sockets were also effectively regenerated with CGF. In beagle dogs, the combination of Bio-Oss® with CGFs also promoted new bone regeneration more efficiently than Bio-Oss® alone in maxillary sinus augmentation procedure. A micro-CT analysis of the surgically created mandibular defect revealed that the Nano- hydroxyapatite/collagen (nHAC) combined CGF group had better new bone regeneration than nHAC alone. **Conclusion:** CGF may act as potential booster bone regeneration. In addition, it was evidenced that the combination of CGF with different types of scaffolds may also enhance bone regeneration.

Keywords: Concentrated Growth Factor; Bone Regeneration; Regenerative Therapy

Paper ID: 35

Strategies to Reduce Sugar Intake in Adults: A Systematic Review

Azhar Hilmy SH[1], Yusof N[1], Nordin N[2]

Introduction: Sugar is a risk factor for many non-communicable diseases, including dental diseases. It is essential to develop effective interventions to reduce sugar intake among adults to prevent dental caries in Malaysia.
Objective: To identify various interventions used in health promotion among adults in reducing sugar intake and their impact on the amount or frequency of sugar intake or behaviour change towards that action.
Methods: The search involves articles published from 2000 to June 2022 using four databases (MEDLINE, PubMed, EMBASE and Web of Science). All human experimental and observational studies involving participants aged 18 years and above were included. The interventions included health promotions globally. No restriction on settings, sex, or follow-up period. The outcome was reported on sugar intake or the changes in sugar reduction behaviour. Two reviewers independently assessed the study's methodological quality using the risk of bias 2 tools and MMAT for cross-sectional studies.
Results: In this review, four RCTs and two cross-sectional studies with 1763 participants were included. Most studies were judged with an overall low risk of bias and raised some concerns. Interventions were varied, adopting behavioural approaches such as motivational interviewing in delivering knowledge either face- to-face or technology-mediated approaches.
Conclusions: There is enough evidence to merge the traditional way of health promotion by giving knowledge only to combine with various techniques of behaviour change either by technology or face-to-face. The need for a well-designed and adequately powered intervention is essential to determine the best intervention to reduce sugar intake among adults.

Keyword: Adults, Sugar Intake, Face-to-face, Technology-mediated, Intervention

Paper ID: 36

Self-Perceived Orthodontic Need and Perception Towards Fake Braces Among University Students in Malaysia

Mohd Nor NA, Yasmin K, Bahar AD, Cheong JM, Mohd Nor N, Hamdan RH, Silahudin S

Introduction: Fake braces are fitted by unqualified individuals without formal dental training targeted to young adults. This illegal practice is becoming a major concern in Malaysia.
Objective: This study aimed to explore self-perceived orthodontic need and perceptions towards fake braces among university students in Malaysia.
Methods: A cross sectional study using self-administered questionnaire was distributed via Google Form to university students located in the East-Coast, South and Central of Malaysia. The data were analysed descriptively using SPSS.
Results: In total, 246 participants completed the questionnaire. Majority of them were female (68.3%) with a mean age of 21.74 (SD: ±1.08). More than half were Malay (56.1%) followed by Chinese (30.5%), Indian (8.5%) and other ethnicities (4.9%). Only 44.3% of them were satisfied with their teeth appearance with 15.4% perceived they definitely need orthodontic treatment. Another 58.1% perceived they most probably needed orthodontic treatment. About 6.5% admitted have had experience wearing fake braces. Similar proportions of fake braces were observed among Malay and Chinese students, and there was no significant difference in terms of gender. Participants also reported having friends (27.6%) and family members (6.1%) wearing fake braces. Meanwhile one third (33.7%) of them had searched for information about fake braces. Most of them agreed barriers towards orthodontic treatment include long waiting lists in government clinics (67.1%) and expensive treatment fees in private dental clinics (56.5%). Only a small proportion (8.1%) agreed with the benefit of fake braces in improving alignment of teeth, while the majority (67.5%) of them believe the risks of wearing fake braces were greater.
Conclusions: There are mixed perceptions towards fake braces among Malaysian university students, with a minority favouring fake braces treatment. Thus, there is a need for continuous oral health promotion to deter young adults from seeking fake braces.

Keywords: Fake Braces, Illegal Dentistry, Illegal Orthodontics, Perceptions, Young Adults

Paper ID: 37

Social Media Compliance of Dental Clinics on Instagram

Zakaria NN[1], Ong VX[2], Peh WY[3], Kamarudin Y[1]

Introduction: Instagram has quickly become an alternative method for dental clinics to advertise their services. Information disseminated to the public via social media, however, are governed by guidelines set by the Malaysian Dental Council (MDC).
Objective: This study aimed to investigate Instagram posts of dental practices in Malaysia and their compliance with MDC guidelines.
Methods: This was a cross-sectional analysis of Instagram posts by private dental clinics in Malaysia. Instagram accounts were identified using the keywords 'dental clinic', '*klinik pergigian*', 'dentist' and *doktor gigi*'. Data was extracted from posts uploaded over a six-month period between 1st October 2021 and

1st April 2022. Information available, frequency of posts and type of posts were recorded. Each post was then categorised as being compliant or non-compliant with the Code of Professional Conduct (2008) and the 3rd edition of Public Information Guidelines set by the MDC, using an assessment framework. Data was tabulated in Google sheets to generate descriptive statistics with frequency tables.
Results: In total, 95 Instagram accounts were analysed. More than two thirds of the accounts had information regarding the clinic's address, contact number and email. Only two accounts provided information on the dentist's qualification. Frequency of posts were mainly irregular (56%), with only 16% of pages actively posting more than once a week, with seven clinics reaching more than 10,000 followers. A total of 3876 posts were analysed over the six months period. Types of posts were mainly advertisements (49%) and sharing of clinical photos (20%). 17% of posts were non-compliant with MDC guidelines, mainly due to elements of soliciting patients (72%) and for recommending specific products (27%).
Conclusions: This study concluded that majority of dental clinics are posting advertisements or clinical photos on their social media pages and not all posts are compliant with MDC guidelines.

Keywords: Malaysian Dental Council, Guidelines, Advertising, Professionalism

Paper ID: 41

Differences In Salivary Proteome In Relation To Age

Zamirah Zainal Abidin[1], Nor Rohana Abdul Rahim[1], Zaleha Shafei[1], Saiful Anuar Karsani[2] and Mariati Abdul Rahman[1]

Introduction: Saliva contains a vast array of proteins with important biological functions for oral health. Physiological and biochemical changes occur with ageing. This may result in modifications to the proteome profile of saliva. Utilizing comparative proteomics, these distinctions can be studied and identified.
Objective: The purpose of this study was to compare and identify changes in unstimulated whole salivary protein levels between two age groups of female participants (n=3) (20–30 years old vs 50–60 years old).
Methods: Sixty micrograms of salivary proteins were separated by 2-DE over the pH range of 3 to 10. The protein spots were identified using matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF-MS). Using Student's T- test, the quantitative differences between the proteome profiles were analysed (using the Image master software).
Results: More than 200 protein spots with high resolution were detected. A total of 37 protein spots with at least a two-fold difference in abundance were identified. Only four protein spots were found in the older group ($p<0.05$). In the older group, the abundance of 22 proteins increased while the abundance of 2 proteins decreased ($p<0.05$). Energy metabolic enzymes comprised the largest group of proteins with increased abundance, followed by structural proteins, ligand-binding proteins, and acute phase proteins.
Conclusion: In conclusion, differences were detected between the proteomes of these two age groups. These findings may contribute to a better understanding of the ageing process in humans.

Keywords: Proteomics, Saliva, Young, Old

Paper ID: 42

Salivary And Urinary Nickel Level Post Orthodontic Fixed Appliance Treatment

Muhamad Sabri NI[1], Noviaranny IY[2], Kazi JA[3]

Introduction: Nickel is a metallic element widely used in dentistry and orthodontic materials. Prolonged nickel exposure, even in low amount, is cytotoxic, genotoxic and carcinogenic. Previous studies focused on the nickel level before and during orthodontic treatment changes. However, there are insufficient reports on the nickel level post orthodontic treatment.
Objective: This study aims to evaluate the salivary and urinary nickel level post orthodontic fixed appliance treatment.
Methods: Saliva and urine samples of fourteen orthodontic patients were taken at debonding (T0), after one month (T1), and three months post-debonding (T2), and compared with control group. Samples were analysed using Inductively Coupled Plasma Optical Mass Spectrometry (ICP-MS) and IBM SPSS Version 27 was used for statistical analyses. The repeated measures Analysis of Variance (ANOVA) test was performed to compare mean salivary and urinary nickel levels between two groups based on different time points.
Results: The mean (SD) of orthodontic treatment duration was 33.6 (9.6) months. In comparison to the control group, the mean (SD) nickel levels in saliva and urine were highest at debonding (T0) with 12.71 ppb (9.64) and 9.71 ppb (8.27), respectively. In the test group, there was a significant difference of nickel level in saliva between T0 and T1 (MD = 9.75, 95% CI: 3.71, 15.71; $p < 0.05$) and in urine between T0 and T1 (MD = 6.46, 95% CI: 1.38, 11.55; $p = 0.012$).
Conclusion: The results demonstrated that the nickel level in saliva and urine remained higher at the end of orthodontic treatment compared to the control group. Further studies with a longer duration of observation and larger samples are essential to substantiate these results.

Keywords: Nickel Level, Orthodontic Treatment, Fixed Appliance

CONFERENCE ABSTRACTS

Senior Oral

Paper ID: 9

Sexual Dimorphism of Cusp and Crown Area of Maxillary Posterior Teeth in Malay Population

Riaz S., Khamis, M.F., Ahmad W.M.A.W., Yap Abdullah, J., Alam M.K.

Introduction: Studies have been conducted for sexual dimorphism in the Malay population on tooth size using linear measurement methods while there is a lack of data for 2D cusp and crown area measurement.
Objectives: To compare the cusp area and crown area of maxillary first premolar, second premolar and first molar between male and female Malay population.
Methods: Maxillary posterior teeth of 168 dental casts (84 male and 84 female) were selected for scanning. Inclusion criteria was Malay origin, completely erupted teeth, and teeth with clearly demarcated groove pattern for marking the cusp and crown area outline. Exclusion criteria were maxillary second and third

molar, a tooth with any anomaly or trauma obscuring the tooth occlusal morphology, restored tooth, damaged casts, and any distorted scanned digital cast. Measurement for cusp area and the crown area was performed on the selected dental casts using 2D-Hirox KH-7700. Data were analyzed using independent t-test. The significance level was set at 0.05.
Results: Measurements of all the crown and cusp areas were statistically significantly larger in males than in females ($p<0.001$). The most sexually dimorphic tooth was maxillary first molar (Mean difference 11.45mm^2), while the most sexually dimorphic cusp was the Protocone cusp (Mean difference 3.71mm^2) of maxillary first molar.
Conclusion: Maxillary posterior teeth in Malay population exhibit significant sexual dimorphism, thus may be used for sex determination along with other procedures.

Keywords: Cusp Area, Crown Area, Maxillary Teeth, 2D, Sexual Dimorphism

Paper ID: 10

Career Expectations and Satisfactions among Malaysian Dentists with Expanded Roles at Government Dental Specialist Clinic

Azizi AM, Nawwal Alwani MR, Muhd Firdaus CM

Introduction: Public dentists in Malaysia undergoing attachment at the Ministry of Health (MOH) Dental Specialist Clinic (DSC) hold enhanced skills that enable them to treat cases of intermediate complexity. Public dentists interested in pursuing post-graduate studies for career advancement were required to complete a period of clinical attachment at selected MOH DSCs.
Objectives: This cross-sectional study aimed to explore dentists' expanded roles, career expectations and satisfactions at the MOH DSC.
Methods: A total of 208 dentists from DSC nationwide completed an online questionnaire in June 2022. Demographic data and information on dentists' expanded roles were retrieved. Responses on dentists' career expectations and satisfaction were collected using a 5-point ordinal scale. Associations between sociodemographic and other variables were determined using the chi square, independent t-test and ANOVA ($p<0.05$).
Results: The mean age of the respondents was 32.68 ± 2.48. Almost half (49%) of the respondents were attached to a non-hospital-based clinic. 71% of the dentist was permanently attached at the DSC, while 21% were attached temporarily at the DSC. Permanently-attached dentists had significantly higher career expectations mean scores of 24.5 ± 5 compared to partially-attached dentists (27.2 ± 7) (p = 0.004). Dentists attached at a non-hospital-based clinic (p=0.046), working with more than 15 years of experience (p=0.013) and 12-18 months of attachment (p=0.014), had higher career satisfaction. Multiple logistics regression analysis revealed that non-Malay (OR=1.54; p=0.035) and those who applied for scholarships more than three times (OR=1.85; p=0.050) had a higher satisfaction level. In contrast, the duration of attachment at DSC of more than 19 months contributed to a lower career satisfaction level (OR=0.44; p=0.029).
Conclusion: Dentists at DSC, MOH demonstrated diverse career expectations and satisfaction levels despite working under a similar organizational structure. Dentists' ethnicity, duration of attachment, workplace and frequency of applying for scholarships influenced their career expectations and satisfaction.

Keywords: Expanded Roles, Career Expectations, Satisfaction

Paper ID: 13

Physiological Variations of Children with Neurodevelopmental Disorders in The Application of Passive Immobilization During Dental Treatment

Ismail N, Isa KAM, Mokhtar IW

Introduction: Passive immobilization is regarded to cause physical distress and intense anxiety manifestations in children during dental treatment.
Objective: The study aims to investigate the physiological variations of heart rate, blood pressure, and oxygen saturation level for children with neurodevelopmental disorders while using a papoose board, and a combination of Tell-Show-Do, Distraction, and Positive reinforcement techniques during dental treatment.
Methods: This is a crossover trial that involved 90 children with known neurodevelopmental disorders receiving standard dental care with two methods of behaviour guidance sequentially in which the exposure is randomised. Exposure A is a combination of basic behaviour guidance while exposure B is passive immobilization with papoose board. The subject child's blood pressure, heart rate, and oxygen saturation level were measured at four different times when receiving either dental prophylaxis or restorative treatment using slow-speed rotary handpiece. Seventy-four children's physiological data were successfully collected during the study protocol.
Results: The mean age of the children was 9.85 years (SD= 2.71). 64.9% of the children diagnosed with Autism Spectrum Disorder, 9.5% Attention Deficit Hyperactivity Disorder, 8.1 % Down syndrome, 2.2% Global Developmental Delay, Dyslexia 1.1%, and Cerebral Palsy with Intellectual Disorder 1.1%. The measurement of children's blood pressure, heart rate, and oxygen saturation level on the application of papoose board or combination of the basic behaviour guidance revealed no significant changes (P>0.05).
Conclusion: The use of papoose board is safe and has no discernible influence on the child's physiological responses. This study offered physiological evidence that the full-body passive immobilization technique can be considered reliable and applicable in paediatric dentistry, particularly among children with neurodevelopmental disorders population.

Keyword: Passive Immobilization, Physiological Response, Children, Neurodevelopmental Disorders

Paper ID: 16

Type 1 Diabetes Mellitus (T1DM) Patients' Awareness of Periodontal Diseases and Their Bidirectional Association

Z Zainal Abidin, E. Noor, NS Mohd Nor, NS Mohamed Nazari, A Anuar Zaini, NZ Azizi[6], SA Soelar, MM Shahrizad, R Abdul Halim

Introduction: One of the most common oral diseases in individuals with T1DM is periodontal disease. An adequate self-perception of periodontal status could contribute to its prevention

Objective: The study aimed to evaluate diabetic patients' self-perception of their periodontal health and the bidirectional association between periodontal disease and diabetes mellitus.
Methods: A 130 of children and adolescents, aged 18 years and below who were diagnosed with T1DM from the Faculty of Medicine Universiti Teknologi MARA and the University of Malaya were invited to participate in the study.
Results: A total of 113 completed the questionnaire and 104 were able to be examined for basic periodontal examination. The median age of participants was 11.4 ± 4, 56(49.6%) were females and 57(50.4%) males. 91(83.5%) participants rated their oral condition as good, and 30(27.5 %) participants reported they had gingival bleeding. Clinical examination revealed that 55(48.7 %) had a healthy gingiva whereases 54(47.8%) were found to have gingivitis. The question "Do you have the following symptom: Bleeding when brushing, flossing, or eating food?" had good accuracy in the evaluation of periodontal disease ($p < 0.001$).
Conclusion: The results presented here indicate that this instrument has a high probability of identifying individuals with a history of oral diseases who are at greater risk for future disease and in need of an oral examination. This would allow a non-dental healthcare provider to confidently suggest a dental visit and make the needed referral.

Keywords: Periodontal Disease, Type 1 Diabetes Mellitus, Self-perception

Paper ID: 17

Quantitative Measurement of Enamel Loss After Repeated Etching and Attenuation Coefficient of Resin Infiltration

DFA Ibrahim, NN Hasmun, YM Liew, A Venkiteswaran

Introduction: Resin infiltration is one of the materials used for management of demineralized enamel. The maximum application of resin infiltration recommended by the manufacturer is three cycles, but many clinicians exceeded this number to obtain a better aesthetic result. This followed by two applications of resin infiltration to minimize the shrinkage and improve the resin penetration into the demineralized enamel. The changes in the attenuation coeffeicient measured using optical coherence tomography (OCT) represents the optical penetration depth of resin infiltration.
Objectives: This study aims to investigate the incremental and total enamel loss following multiple etching cycles using 15% hydrochloric acid (HCl) and compare the attenuation coefficient of resin infiltration placed after each etching cycle protocol.
Methods: Artificial demineralization was prepared on the buccal surface of 27 sound extracted premolars. The teeth were divided into 9 groups (n=3); with each consecutive group having an additional etching cycle up, to 9 cycles. The teeth were scanned with OCT and enamel loss was measured with MATLAB software. Two cycles of resin infiltration applied with the first cycle (Resin 1) applied for 3 minutes followed by Resin 2 for 1 minute. One-way ANOVA used to compare the incremental and total enamel loss.
Results: No significant difference observed in incremental loss between groups (p=0.524). Etching with 15% HCl for 2 minutes results in loss of enamel 60.64 ± 59.15 µm for each cycle up to 9 applications. There was significant difference in total enamel loss between 8th (p=0.028) and 9th (p=0.04) etching cycles as compared to 3 cycles. There was no significant difference between attenuation coefficient of the resin placed for each etching cycle (p=0.633).
Conclusion: Repeated etching cycles results in incremental enamel loss, with remarkable loss observed when applied for 7th cycles and more; however no substantial effects on the penetration depth of resin.

Keywords: Resin Infiltration, 15% Hydrochloric Acid, Enamel Loss, Attenuation Coefficient, Optical Coherent Tomography

Paper ID: 39

Potential Haemostatic Activity From Locally Sourced *Camellia Sinensis Variety Assamica* Leaves Extract (CSALE)

Tengku Intan Baizura Tengku Jamaluddin, Muhamad Shirwan Abdul Sani, Ngeow Wei Cheong, Zainal Ariff Abdul Rahman, Azmeel Mazlee Anuar, Kazi Ahsan Jamil, Nur Atikah Anuar, Arisha Abdul Murad, Nabilah Mohd Amin

Introduction: The bioactive composition of *Camellia sinensis* (tea) has been advocated with potential haemostatic properties, highlighting opportunities for utilisation in dental and surgical fields.
Aim: Fresh *Camellia sinensis var. assamica* (J.W.Mast.) Kitam tea leaves (green tea) were obtained from the Malaysian highlands for this study which aimed to identify the bioactive compounds of the partially- purified CSALE (*Camellia sinensis var. assamica* leaves extract) and its potential haemostatic activity.
Methodology: In Vitro Study Phase One (IVSP1) employed three consecutive solid-liquid extractions using deionised water, calcium carbonate ($CaCO_3$), and diluted hydrochloric acid (1% HCl:0.16 mol) to produce CSALE 1, 2 and 3, respectively. Biomarker analysis was conducted using gas chromatography-mass spectrometry (GCMS) (Agilent Technologies, USA). Subsequently, the functional potentiality of the CSALEs in inducing haemostasis was tested in Phase Two (IVSP2) using coagulation time profiling. Fresh human venous blood was obtained and collected in 3.2% buffered sodium citrate solution tubes; coagulation was induced by adding 500µL of 0.1M calcium chloride ($CaCl_2$), and adsorption of plasma proteins from the CSALE-coated gauze samples (0.5cm x 0.5cm) was determined by measuring the absorbance at 540nm using a microplate reader, Thermo Scientific™ SkanIt™ Software.
Results: GCMS analysis revealed that caffeine was the major biochemical compound based on 90% similarity match against mass fragmentation patterns of the National Institute of Standard Mass Spectral 11 library (NIST11). The mean absorbance percentage escalated throughout the incubation period; 26.3%, 40.2%, 48.2% implying that the blood incubated by the CSALE 1-coated gauze validated the thrombogenicity (haemostatic activity) in comparison to other extracts.

Conclusion: Results from this study clearly exhibit that Malaysian *Camellia sinensis variety assamica* leaves extract has the potential application as a non-chemical haemostatic agent. Subsequent to the in vitro study, an animal study will be conducted to represent the in vivo effectiveness of our research intervention (CSALE).

Keywords: Tea Leaves, Chemical Composition, Coagulation Test, Oral Surgery

Paper ID: 18

The Effect of Microinvasive Treatment on Enamel Surface of White Spot Lesions (WSL)

Phang Kun Mun, Prema Sukumaran, Noor Azlin Yahya, Mohideen Salihu

Introduction: Microabrasion and resin infiltration are known as microinvasive treatments. They are known for their ability to reverse white spot lesions (WSLs). However, little is known about the surface roughness changes post intervention between microabrasion and resin infiltration.
Objective: The aim was to investigate surface roughness changes post microabrasion and resin infiltration.
Methods: Forty-five extracted premolars were selected, and artificial caries induction was done. Subsequently, the samples were randomly distributed into three groups Group 1 (control), Group 2 (microabrasion), and Group 3 (resin infiltration). Baseline data of surface roughness values was obtained using 3D optical (non- contact) profilometry Alicona Infinite Focus Metrology G4. Post treatments surface roughness evaluations were collected. Subsequently, all groups were immersed in SAGF artificial saliva for 7, 14, and 21 days. The surface roughness changes between groups were recorded on day 7, day 14, and day 21. Repeated measured ANOVA was used to analyse the surface roughness changes of all groups at different time points.
Results: The reduction of surface roughness was significant as compared to post demineralisation in Group 2 and Group 3. A pairwise comparison carried out to compare the surface roughness changes post intervention and there was statistically significant difference between Group 1 against Group 2 and Group 3. During subsequent artificial saliva immersion, there was statistically surface roughness reduction on all groups at day 14 and day 21.
Conclusion: Both microinvasive treatment was able to improve the surface roughness of WSLs. The action of artificial saliva for 21 days was able to recover the surface roughness of microabraded WSLs.

Keywords: White Spot Lesions, Microabrasion, Resin Infiltration, Surface Roughness Changes

Paper ID: 19

Evaluation of Interfacial Adaptation and Penetration of Bioceramic-based Sealers in Oval Root Canals

Chew Soo Teng, Afaf Yahya Al-Haddad, Kranthi Raja Kacharaju

Objective: To assess the interfacial adaptation and penetration depth of three different bioceramic based sealers (CeraSeal, EndoSeal MTA, Nishika Canal Sealer BG) compared to an epoxy resinbased sealer (AH Plus) in oval root canals.
Methods: Fourty extracted single-rooted mandibular premolar with oval canal were prepared and randomly allocated according to the obturation into; CeraSeal, EndoSeal MTA, Nishika Canal Sealer BG and AH Plus. The roots were sectioned at 3, 6 and 9 mm. The sealer adaptation and the penetration depth were evaluated under confocal laser scanning microscope. One-way ANOVA and Repeated measure ANOVA were used to statistically analyse the data.
Results: Nishika Canal Sealer BG showed significantly higher sealer adaptation than EndoSeal MTA ($P < 0.001$) at apical and middle thirds. Meanwhile, AH Plus showed significantly higher sealer adaptation than EndoSeal MTA ($P = 0.011$) at middle third. For sealer penetration, Nishika Canal Sealer BG showed the longest sealer penetration that was significant compared to AH Plus ($P < 0.001$) and EndoSeal MTA ($P < 0.001$) while CeraSeal was significantly higher than EndoSeal MTA ($P = 0.029$) at coronal third. For AH Plus, there was a significant less sealer penetration at coronal third compared to apical and middle thirds ($P < 0.05$). Whereas for EndoSeal MTA, the coronal third has significant less penetration compared to the middle third ($P = 0.032$).
Conclusion: Endoseal has the lowest adaptation and sealer penetration depth. Nishika Canal Sealer BG has better adaptation and penetration depth using single cone obturation technique in oval canal

Keywords: Adaptation, Bioceramic, Penetration, Sealers, Single Cone

Paper ID: 23

Colour Stability and Surface Roughness of Resin Infiltrated Teeth Subjected to Staining Solutions and Toothbrushing

Mohamad Khairi FA, Ahmad NA, Abdul Aziz A

Introduction: White spot lesion (WSL) is an early carious lesion on the enamel when the teeth are dried or moist. In improving the aesthetic of the WSL, resin infiltration (ICON®) has been shown to have a masking effect. Resin infiltrated teeth will be subjected to daily toothbrushing challenges and staining beverages; hence good colour stability is important to ensure the aesthetic outcome would not be compromised.
Objective: The aim of this study is to evaluate the colour stability (ΔE) and surface roughness (Sa) of ICON® in the treatment of WSL when immersed in staining solutions and subjected to toothbrushing.
Methods: Artificial enamel subsurface lesions were induced using acetate buffer solution on extracted sound human central incisor (N=48). Specimens were then infiltrated with ICON® and randomly assigned into 6 groups (n=8), 1: non-brushing+distilled water, 2: nonbrushing+coffee, 3: non-brushing+turmeric, 4: brushing+distilled water, 5: brushing+coffee, and 6: brushing+turmeric. Focus variation microscopy (Alicona) and spectrophotometer (CM5, Konica Minolta) were used to measure baseline data for the surface roughness and colour values (CIE L*a*b*). The specimens were then infused in the staining solution (distilled water, coffee, or turmeric solution) for 15 minutes, three times daily and brushed twice daily according to the group. The colour values, ΔE and Sa were remeasured after 14 days. Two-way ANOVA and Paired T-test were then used to analyse analyse ($p<0.05$).
Results: There is a significant difference in ΔE between each solution ($p<0.05$) but no differences between brushing or non-brushing. Turmeric had the highest ΔE. No significant difference was found in Sa after 14 days in all groups except in Group 1.
Conclusion: Resin infiltrated teeth present a significant colour alteration after infusion in staining solution with no difference when subjected to brushing. The surface roughness of resin infiltrated teeth does not differ after being subjected to staining and brushing challenges.

Keywords: ICON®, Staining, Surface Roughness, Toothbrushing

Paper ID: 24

Patients' Perceptions of Virtual Smoking Cessation: A Qualitative Study

Nurliyana R, Norashikin Y, Nor Faezah MB

Introduction: Among the clinical requirements for undergraduate (UG) dental students in the Faculty of Dentistry, Universiti Teknologi MARA (UiTM) is to deliver smoking cessation counselling to patients who smoke. As the institution was closed during the Movement Control Order (MCO) implementation, students were faced with delays in completing their tobacco cessation schedule. An alternative was to allow students to conduct virtual counselling (VC) for smoking cessation for their patients.
Objective: This study explores the opinions and perceptions of the patients receiving smoking cessation counselling through virtual platforms.
Methods: Semi-structured interviews among consented patients who completed three VC sessions for smoking cessation were conducted via phone or online, depending on the patient's preference. Uncontactable patients were excluded. Each interview session was recorded with the participants' permission. The recorded session was transcribed verbatim and thematically analysed using the qualitative data analysis software, NvivoTM.
Results: Nine male smokers were interviewed with a mean age (standard deviation, SD) of 33.11 (10.41). Five themes have emerged which are: 1) Opinions on VC, 2) Patient-clinician relationship, 3) Provision of remote access, 4) Technical issues, 5) Positive changes after VC.
Conclusion: VC has value in enabling remote access to counselling, but it is also subjected to some limitations, especially regarding human touch and internet problems. In the end, the behavioural change will depend on the patient's thrive in making a difference.

Keywords: Perception, Opinion, Interview, Virtual Counselling, Smoking Cessation

Paper ID: 26

Geospatial Intelligence: Analysis of Oral Health Workforce Equity to The School Dental Services in Pahang

Hidir MA, Nor Faezah MB, Budi Aslinie MS

Introduction: Equity in access to high-quality dental health care is essential for the improvement of several dental health outcomes. The optimal resource allocation in dental health care should guarantee that the majority of school student have access to equitable dental health care services when required.
Objectives: This research focuses on the geographical component of school dental service (SDS) workforce in relation to workload for each school. This research aims to provide a deeper knowledge of the geographical imbalance affecting the distribution of SDS workforce in Pahang.
Methods: Workforce and workload data for each corresponding school were obtained from Pahang State Health Department. Data on School location in Pahang and socioeconomic status were obtained from Population and Housing Census of Malaysia 2019. All information acquired were integrated and imported to ArcGIS Pro software for geospatial analysis. For statistical analysis, data were imported to SPSS software.
Results: In Pahang, schools located in rural area 565 (77.4%) is 3 times higher than in urban area 165(22.6%). Primary schools accounted for 71.9% (n=525) from total number of schools while secondary school accounted for 28.1% (n=205). Operator to student ratio for the whole Pahang is 1:470. Out of 10% (n=72) school with high ratio of one operator to total students, 47 of it are located in Kuantan. Jerantut has the farthest distance from dental clinic to school. All dental clinics that provide dental care for schools are located more in the south area , Increasing distance to travel to the school situated far to the north of Jerantut.
Conclusion: High ratio of one operator to total student distributed relative to urban area. High number of student resulting more students to treat per operator compare to schools located in rural area. The need to equally distribute SDS workforce based on workload is evident.

Key word: Workforce, School Dental Service, ArcGis Pro

Paper ID: 29

HLA Related Genetic Propensity for Manifestation of Oral Submucous Fibrosis among Indians

Bharathi M Purohit, Uma Kanga, Harsh Priya, Ritu Duggal, Shalini Gupta

Introduction: Oral Sub-Mucous Fibrosis (OSMF) is a pre malignant condition that alters the fibro elasticity of oral submucosa and is predominantly confined to South East Asian region. Variability in clinical course is intriguing, a fraction of betel nut users develop OSMF (0.1- 11%), while a majority show no signs and symptoms despite prolonged use. However, some severe forms are associated with very short history of tobacco use. Clear molecular mechanism involved in its pathogenesis still remains unexplored & this inconsistency in disease association can be indicative of genetic association, but specific role of any genes in defining its susceptibility remains largely unidentified. Investigating genetic predisposition to OSMF can potentially help characterize inter individual variations in immune responses and identify susceptibility/protective HLA alleles for OSMF.
Objectives: To explore the profile of HLA class II antigens among OSMF patients to investigate HLA association with OSMF, its severity and progression.
Methods: Total of 220 patients (with and without OSMF) were enrolled in the study, 110 patients in each group. The information on demographic details, type, frequency, and history of tobacco habit was recorded. Blood samples were collected and after DNA extraction and quality check, all samples were stored at -20o C for further use. HLA class II genotyping was performed using Next Generation Sequencing based protocol. Data was analyzed using sequencing software.
Results: Mean age of the population was 42.23±11.98 years with almost equal number of OSMF patients in mild (36.7%), moderate (36.7%) and severe categories (26.7%).
Conclusions: HLA genotyping was performed for HLA-DRB1, HLA-DQA1, HLA-DQB1 genes. Interim results show deviations in the frequency of HLA class II alleles in patients with OSMF when compared to those without OSMF and these will be presented.

Keywords: Oral Sub-Mucous Fibrosis (OSMF), Histocompatibility Antigens, Class II Allele Frequency Genotype, Precancerous Conditions

Paper ID: 30

Oral Health Beliefs, Perceptions and Utilisation of Oral Health Care Services Among Indigenous (Orang Asli) in Bera, Malaysia: A Qualitative Study

Izzati MK, Nor Faezah MB, Ilham WM

Introduction: A wide gap is still observed in the inequality among the Orang Asli and non-Orang Asli regarding the beliefs and perception of their oral health and acceptance of oral health care utilisation. Inclusivity is vital to ensure they are not excluded from getting quality oral healthcare services.
Objectives: To explore the oral health beliefs, perceptions, and utilisations of the oral health care services among the indigenous (Orang Asli) in Bera, Malaysia.
Methods: A qualitative study utilising Focus Group Discussions (FGD) was conducted to ascertain views and opinions among Orang Asli Semelai in Bera to determine current beliefs and perceptions of their oral health and assess their perceptions of the deployment of the oral health care services. Nineteen participants were involved in the FGD (response rate= 95%) from suburban and rural villages in Bera, Pahang. Qualitative data were analysed via thematic analysis, involving openand close- coding, followed by identification of emerging themes.
Results: The results showed that the Orang Asli Semelai believed that oral health problems are caused by improper oral health care, preferred modern over traditional medicine predominantly because of relative inaccessibility to traditional medicine, and considerable acceptance of dentists and dental treatments. Most still chewed betel nuts and believed that limestone paste caused oral cancer. The main barriers to utilising oral healthcare services were time constraints and distance to the nearby clinic.
Conclusion: The findings implied that most indigenous communities in Bera were open to modern oral healthcare to improve their oral health conditions. This study also provided recommendations for stakeholders to overcome barriers with future mobile dental clinics for Orang Asli to attend on the treatment needs and for oral health promotion programs to improve these indigenous communities' oral health and well-being.

Keywords: Oral Health Beliefs, Oral Health Care Services, Indigenous People, Orang Asli

Paper ID: 31

Prediction Models for Alveolar Cortical Thickness: Development and Implementation Through Mobile Android Application

Nagham M. Abdullah Al-Jaf, Mohamed Ibrahim Abu Hassan, Rohaya Megat Abdul Wahab, Wan Eny Zarina Wan Abdul Rahman, Aslan S. Abraham

Introduction: Alveolar cortical thickness is a crucial consideration in successful planning for orthodontic miniscrews placement. It can only be viewed with three-dimensional X-ray imaging.
Objectives: To measure buccal cortical thickness and interradicular distance in maxillary and mandibular alveolar bone in subjects with Class I skeletal pattern and use the data to formulate a prediction model for alveolar buccal cortical thickness using artificial neural network (ANN). The other objective is to build an android mobile application to facilitate the use of the ANN model.
Methods: Using cone beam computed tomography (CBCT) images of 180 adult subjects with Class I skeletal pattern, cortical thickness of maxillary and mandibular alveolar processes was measured from central incisor to second molar at 8mm from cementoenamel junction. Prediction models for buccal cortical thickness of anterior and posterior alveolar cortical thickness were developed using ANN. The developed models were tested and validated using the Mean Squared Error (MSE) and the Correlation Coefficient (R). Based on the ANN models, a mobile application on the android platform was developed. The app prediction performance was tested on an external sample of 39 subjects.
Results: Cortical thickness and interradicular distance showed different patterns in maxilla and mandible. Cortical thickness is highest between the two molars in both arches. Four ANN prediction models were developed. Mean Squared Error (MSE) for the test set was in the range of 0.104- 0.13, while the Correlation Coefficient (R) value for the validation set was in the range of 0.87- 0.97 and for the test set in the range of 0.86-0.95. For the mobile application, the MSE range was 0.12-0.23.
Conclusions: ANN based prediction models can be used to estimate buccal cortical thickness without exposing patients to three-dimensional imaging. The mobile app could facilitate the use of ANN models.

Keywords: Cortical Thickness, Prediction Models, Android Apps

Paper ID: 34

The Perceptions of Dental Personnel Managing a Dental Public Health Specialist Unit in Alor Setar, Kedah

Nurul Fahizha F, Norashikin Y, Budi Aslinie MS

Introduction: Dental Public Health Specialist Unit (DPHSU) in Kedah is among the earliest preventive dental clinic set up and managed by dental public health specialists. This unit conducts preventive cases referred by primary care and other specialities. The development of the units is to improve oral health status in Malaysia by targeting high-risk individuals.
Objectives: This study explore the experiences and barriers experienced by dental personnel managing DPHSU.
Methods: In-depth interviews were done with 11 dental personnel managing patients in DPHSU using semi-structured validated questions. Face-to-face and phone call interviews were conducted according to participants' preferences and recorded with a digital recorder. The recordings were transcribed verbatim and thematically analysed using the qualitative data analysis software, Nvivo™.
Results: Experiences and barriers were identified across four domains: patient management, training, human resources and suggestions**.** Primary care, orthodontics, periodontics and restorative dentistry were the specialities involved in references to the DPHSU. Patients referred consisted of those wishing to quit smoking, with poor oral hygiene, for caries risk assessment or dental anxiety management. Investigations were conducted to classify the patient's risk before starting with management. The management included tobacco cessation, dental health education, diet counselling, oral hygiene instruction and behavioural modification. Barriers identified were low attendance, lack of referral, unfollowed cases, undertrained personnel and understaffing.

Conclusions: Despite facing challenges and barriers in delivering preventive treatment to the referred patient, dental personnel encountered improvements in the oral health condition and patient motivation.

Keywords: Dental Public Health, Dental Public Health Specialist, Preventive Clinic

CONFERENCE ABSTRACTS

Junior Poster

Paper ID: 5

High Angle Cases in Different Types of Skeletal Pattern Among Malay Orthodontic Patients

Afifah Syariah AY, Amir Ashraf MS, Syiral Mastura A, Aspalilah A

Introduction: High angle cases is a type of malocclusion where the value of maxillo-mandibular plane angle (MMPA) exceeds normal value and orthodontists often face problem in managing patient with these types of cases.
Objectives: This study was conducted to determine the prevalence of high angle cases in Malay orthodontic patients treated in Universiti Sains Islam Malaysia (USIM) specialist clinic and the dentoalveolar features associated with it.
Methods: The sample comprised of 264 lateral cephalograms that were traced manually. ANB angle, MMPA, interincisal angle (IIA), upper molar angulation (UMA), and lower molar angulation (LMA) values were assessed based on 11 landmarks. Vertical skeletal pattern, anteroposterior skeletal pattern, and dentoalveolar features based on interincisal angle and molar angulation were calculated. Data were analyzed using descriptive statistics and chi-square test.
Results: The prevalence of high angle cases was the highest in class II skeletal pattern (n=25, 48.1%). There was a significant association between anteroposterior and vertical skeletal patterns. For dentoalveolar features, most patients were found with reduced IIA with the mean values for Class I, II and III were as follows 111.8º±8.8º, 109.4º±9.5º, 112.4º±11.04º. In contrast for UMA and LMA, the patients presented with average angles where mean UMA for Class I, II and III were as follows 85.7º±9.2º, 82.9º±6.5º, 85.9º±9.2º whereas LMA values were 95.5º±10.0º, 95.7º±8.9º, 95.7º±8.9º.
Conclusion: Most patients with high angles in vertical dimension were found in class II skeletal pattern with reduced interincisal angle and average molar angulation which normally indicated high anchorage demand and long-term retention after orthodontic.

Keywords: High Angle, Dentoalveolar Features, Vertical Skeletal Pattern, Anteroposterior Skeletal Pattern, Maxillary Mandibular Plane Angle

Paper ID: 6

Do Attractive Young Malay Females Correlate to Golden Proportion, Neoclassical Canons, 'Ideal' Ratios and 'Ideal' Angles?

Nurhaifa Adlina Mohd Yunos, Nurul Fatihah Hussien, Michelle Clare Mah, Roger Arthur Zwahlen, Lim Tong Wah, Noraina Hafizan Norman, Tan Su Keng

Introduction: Face plays a major role in determining the attractiveness of one's physical appearance. Beauty perception may change with current trends, expectations, and surrounding cultures. However, there is still a lack of information regarding beauty perception among the Malay population.
Objective: To determine the perception of young Malay female attractiveness as well as the relation of facial attractiveness to the golden proportion, neoclassical canons, 'ideal' ratios, and 'ideal' angles.
Methods: Fifteen sets of photographs (5 each with skeletal Class I, II and III patterns) were randomly selected among sixty-four eligible photograph models. The attractiveness of the photograph models was rated by 180 juries based on a 7-point Likert scale (1 = extremely attractive; 7 = extremely unattractive). Additionally, the juries have named one key facial part that according to their opinion affected the facial appearance the most.
Result: The nose (23%) was rated as the most important feature while skin colour (1%) was the least important part in determining one's facial attractiveness. There were no statistically significant associations (p=0.08-0.98) found between facial attractiveness and golden proportion (r= - 0.47-0.36), neoclassical canons (r= -0.27-0.43), 'ideal' ratios (r= -0.32-0.47) and 'ideal' angles (r=-0.23-0.28).
Conclusion: The attractive young Malay females did not correlate to golden proportion, neoclassical canons, 'ideal' ratios, and 'ideal' angles.

Keywords: Beauty Perception, Soft Tissue Anthropometry, Golden Proportion, Neoclassical Canon

Paper ID: 7

Does Recommended Facial Parameters Relate to Soft Tissue Anthropometry Norms in Malay Female?

Nurul Fatihah Hussien, Nurhaifa Adlina Mohd Yunos, Michelle Clare Mah, Roger Arthur Zwahlen, Lim Tong Wah, Noraina Hafizan Norman, Tan Su Keng

Introduction: Golden proportion, neoclassical canons, 'ideal' ratios, and 'ideal' angles have been recommended as treatment guides in medical and dental fields. However, their validity and applicability in young Malay females have not been verified.
Objective: Our objectives included determination of the applicability of golden proportion, neoclassical canons, 'ideal' ratios, and 'ideal' angles in young Malay female facial soft tissue anthropometry norms, as well as assessing the association between measured parameters and self-assessed facial appearance and health-related quality of life among them.
Methods: Sixty-four eligible dental students were recruited as photograph models and answered a self-administered questionnaire. Nineteen proportions, twenty-six angles, twenty-four ratios and nine canons were measured on all images and were then compared with recommended ideal values.

Results: The mean FACE Q scores were not significantly different statistically (p=0.063-0.810) between Malay females with different skeletal patterns. Eyes have been identified as the most attractive (38.4%) while nose (23.1%) as the least attractive parts by the participants. Among the seventy-four measured parameters, only three proportions, one canon, four ratios and four angles were not significantly different from the recommended ideal values (p>0.05).
Conclusion: A significant deviation was noted between measured parameters among young Malay females from the recommended gold standards. Therefore, these recommendations shall be referred to with caution in the Malay population.

Keywords: Facial Anthropometry, Golden Ratio, Neoclassical Canon, Ideal Ratio, Ideal Angle

Paper ID: 8

Dental Students' Knowledge on Appropriate Use of Systemic Antibiotics for Endodontic Infections

Adriel Tan, Choong JW, Baharin SA

Introduction: Odontogenic infections including endodontic infections are polymicrobial, and in most cases, the prescription of antibiotics is empirical. Antibiotics overuse and the emergence of antibiotic resistant bacterial strains is currently one of the major health threats globally. **Objective**: The present study aimed to determine the knowledge and practice of Malaysian undergraduate dental students on the appropriate use of systemic antibiotics in the management of endodontic infections.
Methods: Final year undergraduate dental students from 13 Malaysian universities were invited to answer an online questionnaire on antibiotic usage for the treatment of endodontic infections. Data were collected and analysed by IBM SPSS© version 26. Frequency distributions were created to describe the frequency and percentages of responses.
Results: A total of 287 responses were obtained from Malaysian dental schools (43.2% response rate) and the highest representation of participants was from the National University of Malaysia (UKM, 13%). Amoxicillin (85%) was the most prescribed antibiotic either alone or in combination with clavulanic acid, while Clindamycin was the drug of choice in healthy adults with penicillin allergy (53.7%). Endodontic infection cases that had the most prescription of antibiotic were acute apical abscesses with systemic complications (fever, malaise, lymphadenopathy). Approximately two-thirds of the participants prescribed antibiotics for 5 days.
Conclusion: This study demonstrates that it is essential to improve the knowledge of Malaysian undergraduate dental students on the appropriate antibiotic prescription and indications for their use in endodontics.

Keywords: Antibiotics, Endodontic Infections, Knowledge

Paper ID: 11

Hand Hygiene Knowledge and Practice of Generation Z Dental Students in Malaysia

Nor Azlina Ismail, Nusima Binti Mohamed, Nur Hidayah AZ, Nur Haninah AS

Introduction: Hand hygiene is the most effective infection control measure for preventing nosocomial pathogen transmission and illness. Hand hygiene compliance need to be continuously evaluated especially in Generation Z dental students. The objective of this study was to assess hand hygiene knowledge and practice of Generation Z dental students in Malaysia.
Methods: This study was a cross sectional study being carried out from March 2021 to December 2021. A questionnaire was developed and distributed to the sample size of Generation Z final year dental students, from five selected universities. All dental faculties at Klang Valley are listed due to easy location to access by researcher. 3 government and 2 private universities were randomly selected by the computer. The data collected was analysed using the SPSS Version 26.0. A total of 211 respondents were retrieved.
Results: From the questionnaire distributed, a response rate of 91.7% was recorded. Significantly, of all the questions asked, most respondents answered the correct answers except for one question. Only 30 percent of the respondents know the main source of pathogen causing nosocomial infections.
Conclusion: The findings proved that the level of hand hygiene knowledge of Generation Z dental students is up to its level best, in parallel with their practice too. This shows that the particular teaching on the hand hygiene technique in the dentistry syllabus has successfully address the theory of hand hygiene and their practical implementation.

Keywords: Hand Hygiene, Generation Z, Dental Student

Paper ID: 22

An Assessment of Knowledge and Current Clinical Practice on Deep Caries Removal Among Dental Practitioner in Klang Valley, Malaysia

Ahmad Ashraaf Ahmad Badri, Norazlina Mohammad, Siti Hajar Omar

Introduction: The current caries removal practice supports partial caries removal approach to reduce the risks of pulp exposure and to preserve tooth vitality during deep caries management compared to the traditional complete caries removal.
Objective: To investigate the current knowledge and practice of deep caries removal method among general dental practitioner (GDP) in Klang Valley, Malaysia.
Methods: An online questionnaire was distributed to the general dental practitioners in Klang Valley, Malaysia. The questionnaire consists of demographic data, knowledge, and practice on deep caries removal method as well as material preference for vital pulp therapy (VPT) and deep caries restoration.
Results: A total of 305 general dental practitioners responded to the survey. 58.2% were equipped with practice experience of 0-5 years, followed by 30.5% (5-10years), 5.3% (11-20years), and 6.0% (>20years). The preferred carious removal method among GDP is partial carious removal with 66.2% compared to total carious removal of 33.8%. However, 50.4% to 58.5% of the GDP identified the criteria of remaining dentine left as complete caries removal. 99.6% of dental practitioners routinely placed VPT materials over the pulp, with calcium hydroxide (74.1%) as material of choice in indirect pulp capping and 66.7% in direct pulp capping. On the other hand, Mineral Trioxide Aggregate (MTA) is the material of choice in pulpotomy at 36.5%. 61.7%

of the respondents preferred resin composite as the restorative material during deep caries management followed by zinc oxide eugenol (ZnOE) (14.5%) and glass ionomer cement (GIC) (12.4%).
Conclusion: Partial caries removal was the preferred method of caries removal, in line with the current recommendation. Discrepancy between knowledge and practice of deep caries removal was identified. Calcium hydroxide and composite were respectively the preferred VPT material and restorative materials among the GDP in Klang Valley, Malaysia.

Keywords: Deep Caries Removal, Dental Practitioner, Vital Pulp Therapy

Paper ID: 33

Reasons of Attendance among Patients Referred to Periodontology Clinic During Two Different Time Periods

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Introduction: Periodontal disease is one of the oral health burdens in Malaysia. It is known that periodontitis patients often present at late stage of the disease causing more complicated treatments to be offered. The reason of attendance is closely related to the oral disease that the patient may have. During COVID-19 pandemic, attendance of patients to dental clinic was restricted. Patients with mild symptoms may not come to the dental clinic. The reasons of attendance among patient referred to periodontology clinic in Universiti Sains Islam Malaysia (USIM) has never been studied.
Objectives: To compare the reasons of attendance among patient referred to periodontology clinic in USIM before and during COVID-19 pandemic.
Methods: The study was conducted by checking the clinical records of patients referred to periodontal waiting list between January 2019 to December 2020. Data was analysed using the SPSS Version 26.0 and the p-value was set at $p<0.05$.
Results: A total of 303 patients' clinical record were retrieved. It was found that 79.9% of the patients referred were periodontitis cases. The most common reasons of attendance before COVID-19 pandemic was requesting dental check-up which was 33.6%. Referral to periodontology clinic was reduced to only 89 patients during COVID-19 with dental check-up remained as the main reason of attendance with (29.2%). However, there was no association for reasons of attendance before and during COVID-19 pandemic ($p=0.236$). **Conclusion:** The main reason of attendance for patients referred to periodontology clinic was for dental check-up. COVID-19 pandemic did not affect the reasons of periodontal patients' attendance to dental clinic.

Keywords: Attendance, COVID-19, Periodontal Disease, Referral

Paper ID: 38

Setting Time, pH and Push-Out Bond Strength of A Fast-Set Radiopaque Malaysian White Portland Cement

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Introduction: Calcium silicate cements (CSCs) such as White Mineral Trioxide Aggregate (WMTA) remains the gold standard in endodontic therapy, but Malaysian White Portland Cement (MWPC) is emerging as a potential substitute. Calcium chloride dihydrate ($CaCl_2.2H_2O$) has been suggested as a potential additive to CSCs to improve their properties.
Objectives: This study compared the effects of $CaCl_2.2H_2O$ as a setting accelerator on the initial setting time, pH and push-out bond strength of WMTA and RMWPC (MWPC mixed with 20% nano-zirconium oxide).
Methods: Four cements [WMTA, RMWPC, fast set WMTA (FS-WMTA) and fast set-RMPC (FS-RMWPC)] were prepared, and the initial setting time was evaluated using Vicat apparatus. The evaluation of pH was performed by immersing cement capsules in water and measuring at seven-time intervals (day 0 till 90 days) using a pH meter. For the push-out bond strength experiment, 48 root samples of 1 mm thickness were sectioned from the middle third of sound maxillary incisors. After application of cements for 24 hours, the push-out test was performed using a universal testing machine, and the maximum force needed to dislodge the cement from the samples were recorded. Parametric and non-parametric tests were performed for data analysis using SPSS 26, and the level of significance was set at 0.05 ($P=0.05$). Results: The addition of $CaCl_2.2H_2O$ decreased the initial setting time of both RMWPC and WMTA significantly ($P<0.05$). The pH values of FS-WMTA and FS-RMWPC were alkaline at all time intervals and were comparable to their non-accelerated counterparts ($P>0.05$). The fast-set formulations showed an increased push-out bond strength; however, significant difference was only observed with FS-WMTA ($p<0.05$).
Conclusions: The addition of $CaCl_2.2H_2O$ to RMPC and WMTA decreases the setting time, while maintaining the alkaline effect of both cements and increasing the push-out bond strength. The locally produced formulation is a potential substitute to WMTA.

Keywords: Calcium Chloride Dihydrate, Mineral Trioxide Aggregate, Zirconium Oxide, Bond Strength, Setting Time

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