MSA Postgraduate Dental Symposium 2024 towards Sustainable Dentistry

Book of abstracts

MSA Postgraduate Dental Symposium 2024 towards Sustainable Dentistry

Book of abstracts

Effect of Rosemary Endophytic Fungal Extract on Microhardness of Enamel and Its Inhibitory Effect on Glucosyltransferase Enzyme- An In Vitro Study.

Mona Tarek Balbaa[1*], Heba Mohamed Taher[2], Nermeen Kamal Hamza[3], Bassem Ayman Balbool[4]

[1] Assistant lecturer of Conservative Dentistry, Conservative dentistry department, Faculty of Dentistry, October University for Modern Sciences and Arts, Egypt.

[2] Professor of Conservative Dentistry, Conservative dentistry department, Faculty of Dentistry, October University for Modern Sciences and Arts, Egypt.

[3] Assistant professor of Conservative Dentistry, Conservative dentistry department, Faculty of Dentistry, October University for Modern Sciences and Arts, Egypt.

[4] Lecturer of Microbiology, Faculty of Biotechnology, October University for Modern Sciences and Arts, Egypt.

Introduction: Dental caries is a widespread multifactorial disease caused by acid producing bacteria, as *Streptococcus mutans*. *Streptococcus mutans* participate in the formation of biofilm polysaccharides through their glucosyltransferase enzymes (gtfs). The production of glucosyltransferase and bacterial activity can be inhibited by natural products. Bioactive compounds similar to those produced by their host plants can be produced by endophytic fungi living inside plant tissues

Aim: To test the inhibitory effect of rosemary endophytic fungal extract on S. mutans glucosyltransferase in comparison to rosemary and chlorhexidine, estimating their effect on enamel microhardness.

Methods: Glucosyltransferase was purified from Streptococcus mutans using ion-exchange chromatography. Endophytic fungi were extracted from rosemary plant. The total metabolites were extracted from rosemary and its associated endophytes and it were tested to inhibit the purified glucosyltransferase in comparison to chlorhexidine and artificial saliva. 13 crown human molars were subdivided into 4 equal parts giving 4 groups. The microhardness was evaluated after treating the four subgroups using the rosemary extract, chlorhexidine, artificial saliva and endophytic fungal extract as baseline time (T0), 24h (T1) and 72h (T2). SEM was used to test biofilm inhibition after 24 h and 72 h.

Results: Nine endophytic fungal strains were recovered from rosemary. *Chaetomium globosum*, *Alternaria alternata* and *Aspergillus niger* extracts showed positive inhibitory effect on glucosyltransferase with 96.25 %, 90.9% and 81.74% respectively. While, the inhibitory effects of rosemary extract and artificial saliva were; 36.19 and 0.27% respectively. *Chaetomium globosum* extract showed highest inhibitory effect on biofilm formation in comparison to chlorhexidine and rosemary extract after 24 and 72 h. Regarding the microhardness, *Chaetomium globosum* extract highest value was at baseline (262.56±41.83), while rosemary extract, the highest value was at T0 (265.52±36.05), followed by T2 (240.60±13.96), then T1 (188.10±48.26). As for chlorhexidine, the highest value was at T0 (268.66±31.55), followed by

T1 (193.60±35.03), then T2 (187.29±48.89), while artificial saliva, the highest value was at T0 (261.93±30.16), followed by T1 (201.06±28.65), then T2 (152.15±19.64). The highest pH value was found in rosemary extract (6.47±0.04), followed by chlorhexidine (5.98±0.08) and *Chaetomium globosum* extract (5.98±0.02), then artificial saliva (5.62±0.03).

Conclusion: S.mutans glucosyltransferase and its biofilm formation can be inhibited by endophytic fungal extract of rosemary which can also remineralize initial carious lesions.

Keywords: *Streptococcus mutans*, natural products, remineralization, preventive dentistry, endophytic fungi

*Corresponding author: mthamid@msa.edu.eg

The Effect of Two Types of Erbium Laser and Light Cure Fluoride Varnish on Enamel Demineralization and Surface Microhardness around Metal Orthodontic Brackets: An in-Vitro study

Amaal Mohamed Hawas[1*], Youssef Sedkey[2], Hanady Mohamed Samih[3], Abbadi Adel Elkadi[4]

[1]Post graduate orthodontic department, faculty of dentistry, Suez Canal University.

[2]Lecturer of Orthodontic department, Faculty of Dentistry, Misr International University.

[3]Assistant Professor of Orthodontics, Faculty of Dentistry, Suez Canal University.

[4]Professor of Orthodontic, Faculty of Dentistry , Suez Canal University And King Salman International University (KSIU).

Introduction: Development of white spot lesions on enamel is a significant and common problem during the fixed orthodontic treatment.

Aim: This study was to assess the effect of two types of erbium lasers (Er: YAG) laser, (Er, Cr: YSGG) laser and light cure fluoride on the enamel demineralization and surface microhardness around metal orthodontic brackets.

Material and methods: 90 freshly extracted human premolars were randomly allocated to six groups (n =15) of control (neither fluoride nor laser was used), light cure fluoride varnish (Clinpro XT) on the enamel surfaces, Er: YAG laser (2.94 µm Er: YAG irradiation of the teeth), Er: YAG laser then varnish™ XT, Er Cr:YSGG laser (2.78 µm Er Cr: YSGG irradiation of the teeth) , Er Cr: YSGG laser then varnish ™ XT. PH cycling for 14 days through a daily procedure of demineralization and remineralization for 6 h and 18 h, respectively. Microhardness values of enamel were evaluated with Vickers test. Two sample of each group was prepared for SEM (scanning electron microscopy) and the data from the remaining teeth were analyzed with F-test (ANOVA).

Results: Microhardness mean values from high to low were as follow: varnish ™ XT, Er Cr: YSGG laser then varnish ™ XT, Er:YAG laser then varnish ™ XT, control, Er Cr: YSGG laser,Er :YAG laser.

Conclusion: Fluoride varnish alone showed the best preventive measure against enamel demineralization. There was no significant difference between the two types of erbium laser on the effect of enamel surface microhardness.

Keywords: Demineralization, white spot lesion, Er:YAG laser, Er Cr: YSGG laser, light curable fluoride.

*Corresponding author: amaalhawas2017@yahoo.com

Assessment of Stability and Marginal Bone Loss of Early Loaded Nano Coated Hydroxyapatite Implants in Posterior Maxilla.

Ola Abdelsamad Amin[1]*, Ingy Mohamed Chehata[2], Heba Mohamed Kamel[3], And Nader Nabil Elbokle[4].

[1] Assistant lecturer of Oral and Maxillofacial Surgery, Faculty Dentistry, October University for Modern Sciences and Arts.

[2] Assistant professor of Oral and Maxillofacial Surgery, Faculty of Dentistry, Modern Science and Arts University.

[3] Assistant professor of Oral and Maxillofacial Surgery, Faculty of Dentistry, Cairo University.

[4] Professor of Oral and Maxillofacial Surgery, Faculty of Dentistry, Cairo University- Dean of Faculty of Dentistry, MSA University.

Aim: The aim of the study was to assess the stability and marginal bone loss after early loading of nano coated hydroxyapatite implants in posterior maxilla.

Methodology: This study was conducted on nine patients with at least a missing one maxillary posterior tooth. Ten nano-coated hydroxyapatite implants (ETIII NH implant by Hiossen) were inserted in nine patients, and then subjected to early loading according to the secondary stability readings taken by Osstell®. Implant stability was measured at time of implant insertion (T0), 4 weeks (T1), 6 weeks (T1 modified), and 4 months (T2) post-operative. Marginal bone height was measured 4 weeks (T0), and 4 month (T1) post-operatively by CBCT. Cone-beam computed tomography (CBCT) was performed in all patients before starting the treatment. 9 implants healed well except for one implant that failed due to infection.

Results: Secondary stability results after 6 weeks of implant incretion were sufficient enough for implant loading, there was a significant difference (F= 12.642, DF 3, P value <0.001) between T0, T1, T1 modified, and T2. There was no effect on implant's marginal bone, the difference between marginal bone level at H0 and H1 was non-significant, (P value 0.45).

Conclusion: Nano-coated hydroxyapatite implants are a good choice in posterior maxilla. They can be early loaded, and maintained marginal bone height at 4 months (No bone loss).

Keywords: Dental Implants, Implant stability, Implants surface treatment, Implants surface coating, Nano-coating.

*Corresponding author: oabdelsamad@msa.edu.eg

3D Printed Surgical Guides In The Management of Excessive Gingival Display

E. Borham[1], H. Abuel-Ela[2], I. Shawky[3], Y. Fouad[4]

[1]Assistant Lecturer of Oral Medicine and Periodontology, Faculty of Dentistry, Misr International University.

[2]Professor of Oral Medicine and Periodontology, Faculty of Dentistry, Ain Shams University.

[3]Lecturer of Oral and Maxillofacial Radiology, Faculty of Dentistry, Misr International University.

[4]Lecturer of Oral Medicine and Periodontology, Faculty of Dentistry, Ain Shams University.

Introduction: In contemporary society, the pursuit of beauty and aesthetic has become a primary concern, surpassing many other needs. Consequently, there has been a push for the development of surgical guides to ensure more consistent outcomes in esthetic crown lengthening (ECL) procedures. This study sought to examine the effectiveness of ECL procedures facilitated by 3D printed surgical guides in managing cases of excessive gingival display resulting from altered passive eruption type 1B. The aim was to highlight the relevance and practicality of digital dentistry in enhancing esthetic outcomes in periodontal surgery.

Methods: Sixteen patients diagnosed with altered passive eruption type 1B were enrolled in this randomized clinical trial. The participants were divided into two groups; the control group (n=8) where surgical planning relied on manual measurements, and the study group (n=8) in which planning was digitally assisted and the procedure was executed using a dual guide. Clinical evaluations were conducted at 1 week, 2 weeks, 3 months, and 6 months after the surgery.

Results: There was no statistically significant difference observed in wound healing, pain scores, and gingival margin stability between the two groups at various time points (P=1). However, a statistically significant difference was found in terms of operating time, with the study group demonstrating significantly reduced duration (P<0.001).

Conclusion: Utilizing digital assistance for ECL procedures contributes to a reduction in operating time and minimizes the likelihood of measurement errors. This advancement will deem valuable for practitioners aiming to attain superior outcomes in their practice.

Keywords: Gummy Smile, Surgical Guide, Esthetic Crown Lengthening.

*Corresponding author: eborham4@gmail.com

Effect of Different CAD/CAM manufacturing Techniques; subtractive versus additive technique on the Accuracy of Working Models and the vertical marginal Fit of Dental Prosthesis

M. Sidhom[1], H. Zaghloul[2]*

[1] Fixed Prosthodontics Department, Faculty of Oral and Dental Medicine, Misr International University, Cairo, Egypt.

[2] Clinical Dentistry Department (prosthodontic division), College of Dentistry, Princess Noura Bint Abdulrahman University, Saudi Arabia.

Introduction: The innovation of additive manufacturing (AM) digital technology by three-dimensional printing that utilizes the layering technique, allowed for overcoming some of the drawbacks of the subtractive technique; milling. It allows for the reduction of material waste up to 40% and reproduction of details finer than the milling burs can achieve. However, limited evidence is available regarding the efficacy of these digital manufacturing techniques on creating precise dental working models and provisional prostheses.

Aim: The objective was to evaluate the effect of these two digital fabrication techniques on the accuracy of working models and marginal fit of provisional prosthesis.

Material and methods: Two abutment teeth of modified typodont were prepared. A reference stone model was fabricated, and an optical impression was performed to obtain a CAD reference model. Four subtractively manufactured working models; group A (n=4) and other four additively manufactured working models; group B (n=4) were fabricated. Exocad software was used to design the provisional prostheses. Group A tested four subtractively manufactured provisional prosthesis, and group B tested four additively manufactured prosthesis. The 3D accuracy of working models was assessed by superimposition of the control reference working model on the CAD test working model STL of each group. A stereo-optical microscope was used to assess vertical marginal fit of the provisional dental prosthesis. Student's t and Mann–Whitney U tests were utilized to compare the two groups.

Results: There were no significant differences between the two groups in terms of accuracy or marginal fit.

Conclusion: Both digital fabrication methods showed comparable accuracy.

Keywords: working dental model; tooth supported FDPs; digital techniques; milling method; three-dimensional printing method.

*Corresponding author: marina.fayek@miuegypt.edu.eg

Failure modes of different endocrown designs versus overlay of two different materials.

Mohamed Ali El-Agwany[1*], Amina Mohamed Hamdi[2], Maged Mohamed Zohdy[2], Aliaa Ibrahim Mahrous[3], Soha Osama Nabih[4]

[1]Assistant lecturer, Fixed prosthodontics department, Faculty of dentistry, Fayoum university

[2]Professor of Fixed Prosthodontics, Faculty of Dentistry, Ain Shams University

[3]Professor of Fixed Prosthodontics, Faculty of Dentistry, Fayoum University

[4]Associate Professor of Fixed Prosthodontics, Faculty of Dentistry, Ain Shams University

Aim: This study investigated the failure behavior of endocrown with different intrapulpal depths (0, 2 and 4mm.) made of lithium disilicate and polyetheretherketone.

Methodology: 60 samples was divided into 3 groups (0, 2 and 4) 20 samples for each intrapulpal depth. Each group was subdivided into two subgroups (L and P); 10 samples for each material. Cemented samples were subjected to universal testing machine and failure modes of all samples were investigated under stereomicroscope. Intergroup comparisons, frequencies and percentage values for mode of fracture were presented.

Results and conclusion: Modes of failure of restorations made of lithium disilicate were more catastrophic than those made of Poletheretherketone.

Keywords: Endocrown, lithium disilicate, polyetheretherketone.

[*]Corresponding author: mam42@fayoum.edu.eg

Assessment of decision support system software in extraction and anchorage planning among adult patients using computer algorithm

W. Gadallah[1*], M. El-Dawlatly[2]

[1] Orthodontic Department, Faculty of Oral and Dental Medicine, Cairo University, Cairo, Egypt.

[2] Associate Professor in Orthodontic Department, Faculty of Oral and Dental Medicine, Cairo University, Cairo, Egypt.

Introduction: Artificial Intelligence has emerged in different assessments in the orthodontic field in the past years. The extraction versus non extraction decision in particular is one of the highly debatable decisions due to its irreversible effect. As a result, we are building a program to enable orthodontists make good final decisions by accumulating all of the contributing multifactorial elements accurately and in a methodical manner.

Aim: The objective of this study was to evaluate the efficiency of a newly formulated decision support system in extraction and anchorage planning with the help of artificial intelligence technology.

Materials and Methods: With artificial neural network technology, a software was developed to aid in extraction decision specially for cases showing crowding in addition to anchorage planning. The input data used by the program was typically to that used by the orthodontic experts in deciding extraction cases. The output data of the program were non-extraction or extraction decisions in addition to anchorage plan for each arch. A total of 276 well-treated cases records were used to test the software accuracy by comparing them to actual decision of expert orthodontist.

Results: The Software decisions were in agreement with actual orthodontist decisions by 92.75% determined by using Cohen's kappa coefficient.

Conclusion: The newly formulated software decisions were in concurrence with experts' opinions and therefore serves as a beneficial tool in proper diagnosis of orthodontic cases that require extraction.

*Corresponding Author: walaagadallah28@gmail.com

Artificial intelligence - enabled analysis of dental diet: a breakthrough in oral health

Fahme Liyakath PK[1*]

[1]BDS, Kerala university of Health science, India, Professional Diploma in pediatric dentistry, Oxford Academy (ADA C.E.R.P), UK, M.Sc. Student – Restorative and Esthetic dentistry, Cairo University, Egypt

Introduction: This innovative approach aims to optimize oral health by integrating dentistry's expertise with AI's capabilities. Traditional dental care primarily focuses on oral hygiene practices. Recent studies have highlighted the significant impact of diet on oral health. The traditional method of dietary analysis has been limited by its subjective and time-consuming nature, however with the advent of AI technology there has been a significant paradigm shift in how dental diet analysis is conducted. It can provide valuable insights for personalized dietary recommendation and preventive strategies this can lead to improved patient outcomes and preventive care in dentistry.

Methods: An AI model analyzed various data inputs, including personal health data, dental records and dietary patterns. AI algorithms can provide personalized dental diet recommendations, recommendations may include guidelines on nutrient and water intake, food choice, mealtime, and avoidance of harmful substances that impact dental health negatively.

Benefits: Evidence-based guidance, personalized recommendation, improved accuracy, faster analysis.

Limitation: Data validity, mindset of practitioners towards modern technology.

Future Perspective: Advancement in AI technology for personalized dietary recommendations and integration of AI into dental practice for preventive care. Expanding the potential of this approach to other aspects of oral health and promoting oral health. Collaboration between AI experts and dental professionals to further refine and develop those methods for wide spread applications.

Conclusion: Further collaborations and research are needed to refine and validate the groundbreaking idea, implementation and effectiveness in the real-world dental setting.

Keywords: Artificial Intelligence (AI), Dental Diet, Oral Health, Personalized Recommendations, Preventive Care

*Corresponding author: pkfahme03@gmail.com

Introduction of "qpdb" teeth numbering system

Rami R. Shehabeldin[1]*, Hamdi H. Hamama[2]

[1]Oral Biology Department, Faculty of Oral and Dental Medicine, Alsalam University, Tanta, Egypt

[2]Conservative Dentistry Department, Faculty of Dentistry, Mansoura University, Mansoura, Egypt

Introduction: Dental charting is an essential step for dental treatment. There are a lot of teeth numbering systems that have been used from more than 130 years. The most commonly used systems are universal system, FDI and Palmer/Zsigmondy system. Each system exhibits some advantages and disadvantages. This paper introduce a new method for teeth numbering that based on solving the previous systems drawbacks and at the same time keep up simplicity and ease of reading and recording. The new system divided the oral cavity into four quadrants, each quadrant represented by alphabetical english letter (q, p, d & b).

Aim: The objective of this study is to introduce a new system that makes dental charting more simple, easy, less confusion and overcomes the drawbacks of currently used systems.

Methods: A questionnaire was conducted to 66 dental professions to assess their knowledge about the commonly used teeth numbering systems, The survey explored that the system used in the questionnaire (FDI system) had confusion with other used teeth numbering systems.

Results: The results of an online questionnaire formed of six questions to show the knowledge of dental professions about the currently used teeth numbering systems and the confusion present between these systems. The average of correct answers was 3.52/6 points while the range of answers was from 0 to 6 points, only 56% of the respondents recognize correctly the used system in the questionnaire.

Conclusion: qpdb is a new teeth numbering system that takes the advantages of currently used systems and avoiding their drawbacks.