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CALCIUM PRE-TREATMENT OF ENAMEL IMPROVES FLUORIDE REACTIVITY

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Aim: The aim of this study was to evaluate the contribution of enamel topical pretreatment with calcium lactate in combination with sodium fluoride on the uptake of alkali-soluble (KOH-soluble) fluoride.

Materials and methods: In a blind and randomized in vitro study, 10 extracted non-carious human teeth were cut into 4 enamel slabs and randomly allocated into one of the four following treatments groups (4x10): calcium lactate (150mM) followed by sodium fluoride (500ppm) (A); sodium fluoride only (B); calcium lactate only (C); deionized water (negative control) (D). Fluoride was extracted from enamel slabs using 1M KOH solution for 24h and under agitation of the shaker at the room temperature, by method of Caslawka. The extracts were analyzed using fluoride ion-specific electrode (Orion Research EA 940) by ISO 19448:2018 standard method. Wilcoxon matched pairs test and Friedman ANOVA were used to analyze the effect of substrate and treatments.

Results: Pretreatment with a calcium lactate solution prior to sodium fluoride solution exhibited significantly greater enamel uptake of KOH-soluble fluoride, compared to other tested substrates including calcium lactate or sodium fluoride alone ($p < 0.05$). No significant difference was observed among calcium lactate and sodium fluoride substrates, also no difference compared from these two groups with the negative control group ($p > 0.05$). **Conclusion:** Pretreatment with calcium lactate solution enhances the enamel uptake of alkali-soluble fluoride. The results show the possibility of calcium lactate pretreatment to amplify the anticaries effect of fluoride mouthrinses.

Key words: Dental enamel; Sodium fluoride; Calcium lactate

INTERPROFESSIONAL COOPERATION BETWEEN DOCTORS OF MEDICINE AND DENTISTS- OBSTACLES AND LIMITATIONS

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Aim: In Croatia, doctors of dental medicine and doctors of medicine obtain their diplomas at two autonomous schools.

Materials and Methods: The two professions continue to operate autonomously later on. The goal of this research is to search for the most frequent reasons for insufficient interprofessional cooperation between these two professions. A literature search was conducted on the PubMed website (US National Library of Medicine, National Institutes of Health) in February 2023 using the keywords "interprofessional cooperation, dentist, medical doctor/MD/general practitioner" and included studies on humans published in the last 10 years. After the literature search process, 18 published papers were reviewed.

Results: According to the search results, interprofessional cooperation is rare, related to patient treatment (almost never to disease prevention), occurs only through personal engagement, on a voluntary and informal level, mostly with private acquaintances. The

exception here is the cooperation of certain surgical specializations in the face and jaws area (maxillofacial surgery, oral surgery, otorhinolaryngology), which complement each other in certain institutions. The absence of unique, joint protocols in the treatment of certain diseases also leads to poor coordination and cooperation between medical doctors and dental medicine. As an example, there is a tendency of general practitioners, who often encounter acute toothaches, to prescribe antibiotics for such conditions. From that example, it can be seen that besides insufficient communication, there is also deficient knowledge of the other profession that contributes to the development of bacterial resistance and the consequent increase in morbidity.

Conclusion: There is a need for future research on the relationship and cooperation of these two professions in order to lay the foundations for a targeted improvement of inter-professional cooperation. This would indirectly be manifested in a positive effect on the health of both individuals and society as a whole, which would have a beneficial effect on the financial burden of the healthcare system and contribute to the economic improvement of the state.

Key words: Interprofessional Cooperation; Dentist; Medical Doctor/MD

TWELVE-YEAR EXPERIENCE WITH RECONSTRUCTION OF THE ORAL CAVITY WITH FREE MICROVASCULAR FLAPS

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Aim: Objective of this study is to demonstrate the results of free flap reconstruction after oral cavity tumours resection in one institution with low volume of annually raised free flaps.

Materials and Methods: Data from all the patients who underwent free tissue transfer for head and neck cancer between 2011 and 2022 at Head and Neck Department of University Hospital for Tumours, University Hospital Centre Sestre Milosrdnice in Zagreb were retrospectively analysed. Patients with oral tumours were identified for statistical analysis, to measure the failure rate of free flaps, and to determine complications associated with free flaps.

Results: From May 17. 2011. to June 30. 2022. 64 patients underwent free flap transfer after resection of oral cavity carcinoma. This represents 62.7% of the total 102 patients who underwent free flap transfer after resection of a head and neck tumour at our institution. The male-to-female ratio was 50 to 14, and the mean age was 60 years. There were 2 cases of flap necrosis and no cases of partial flap necrosis, resulting in an overall success rate of 96.9%. The most common complication after surgery was neck hematoma, which occurred in 4 patients. All patients underwent revision surgery, and only one case required reanastomosis of the vein because of venous thrombosis. The radial forearm flap was used for free flap reconstruction in 49 cases, representing 76.6%, followed by the fibular flap in 8 cases (12.5%) and the anterolateral femoral flap in 7 cases or 10.9%.

Conclusion: This presentation concludes that institutions with a single microvascular team and a low volume of free flaps harvested annually for oral cavity reconstruction can achieve positive outcomes that correlate with those of high-volume centers in terms of success rate and complications.

Key words: Free Tissue Flaps; Oral Cavity; Microsurgery; Head And Neck Neoplasms

AWARENESS OF PARENTS/CAREGIVERS ABOUT KNOWLEDGE AND APPROACH TO DENTAL TRAUMAS

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Aim: Dental traumas are a public health problem and one of the most common reasons for a paediatric patient to visit a dental office. The purpose of this paper is to examine the sociodemographic and clinical characteristics of children who have experienced dental trauma, the level of their oral hygiene, and the knowledge of parents/caregivers about procedures in the event of such trauma.

Materials and Methods: After signing the informed consent, parents/caregivers of children who came to the Department of Paediatric Dentistry of School of Dental Medicine, University of Zagreb and suffered dental trauma (N=110) were included in the research. The survey consisted of 5 parts (general information, opinion on the condition of the child's oral cavity, oral hygiene and frequency of visits to the dentist, child's nutrition and knowledge of procedures in case of dental trauma).

Results: The knowledge of parents/caregivers about approach to dental trauma in 61.82% of respondents was not satisfactory. In 32.7% of cases, the most frequently recorded dental traumas were lateral luxation and complicated enamel and dentin fracture. Furthermore, 42% of respondents answered that children brush their teeth less than twice a day, while 43% of them were not aware of the fact about the composition of the toothpaste that the child uses. As many as 69% of children at the age of two visited the dentist for the first time.

Conclusion: The results of this survey indicate the devastating knowledge of parents/caregivers in most of the examined parameters. Because of the above, all providers of dental health care should strive to educate parents/caregivers in order to reduce the prevalence of dental traumas and to improve oral hygiene in the future.

Key words: Child; Dental Trauma; Oral Hygiene

RADIOLOGICAL REVIEW OF THE SINONASAL MUCOSAL MELANOMA - CASE REPORT

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Aim: Sinonasal mucosal melanoma (SNMM) accounts for 2% of all melanomas and 55% of head and neck melanomas. Origin of the tumor is most often at the nasal septum, lateral walls of the nasal cavity and lower nasal concha. The tumor has a propensity for intraorbital and intracranial spread. The average age of onset is 65 years and the five-year survival rate is 30%. The aim of this paper is to emphasize pathognomonic features of tumor on magnetic resonance imaging (MRI) in order to distinguish SNMM from other pathological processes of the sinonasal region more reliably.

Materials and Methods: A 60-year-old male patient reported swelling on the right side of the nose accompanied by nasal congestion, epistaxis and decreased visual acuity in the right eye for the past three months. MRI of the oromaxillofacial region was performed using a 1.5 T MRI machine in different sequences with additional application of contrast agent. Extensive tumor is seen in the nasal cavity spreading into paranasal cavities, epipharynx, both orbits and anterior cranial fossa. On T1WI the tumor is mostly hypointense with small areas of high signal intensity that may correspond to melanin. On T2WI the tumor has a heterogeneous appearance with hyperintense areas representing intratumoral necrosis. Parts of the tumor show restricted diffusion.

Results: Contrast-enhanced T1WI shows heterogeneous imbibition of tumor tissue and imbibition of the dura and subarachnoid space frontobasally. Immunohistochemical analysis of the biopsied sample found tumor cells positive for melanoma-specific markers HMB-45 and Melan A.

Conclusion: Paramagnetic properties of melanin responsible for high signal intensity on T1WI and low signal intensity on T2WI and diffusion restriction caused by a high-cellularity process along with clinical examination and immunohistochemical analysis with high reliability confirm the diagnosis of SNMM.

Key words: Melanoma; MRI; Nasal Cavity

THE IMPACT OF GENOTYPE ON TREATMENT OUTCOMES IN TEMPOROMANDIBULAR DISORDERS PATIENTS

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Aim: To investigate the potential impact of genetic background on treatment outcomes in patients with temporomandibular disorders (TMD).

Materials and Methods: Sixty TMD patients diagnosed with painful TMD (according to DC/TMD) were treated with stabilization splints. Genomic DNA was extracted from buccal swabs and analyzed for polymorphisms: rs4818, rs6269 in the catechol-O-methyltransferase (COMT) gene, and rs1387964 in the opiorphin (OPRPN) gene. Treatment outcomes, assessed at baseline and after 6 months of treatment, included a range of mouth opening, level of jaw limitation, pain intensity (measured with Graded Chronic Pain Scale_GCPS and Visual Analogue Scale_VAS), anxiety, and depression. Mann-Whitney U test was used to compare changes in treatment outcomes between different genotypes. **Results:** Dominant and recessive genetic models were used in the assessment. In both models, the minor allele represented the risk allele. A recessive model estimated the effect of being homozygous with the minor allele and the dominant model estimated the effect of carrying one or both minor alleles. Patients carrying two copies of the minor allele of rs1387964 (CC genotype) reported significantly less pain reduction than patients carrying the other two genotypes (GCPS: p=0.02; VAS: p=0.04). Patients carrying one or two copies of the minor allele of rs4818 (CG+GG) exhibited less reduction of jaw functional limitation (mastication, p=0.03) and less improvement of mouth opening (p<0.01) than those carrying the CC genotype. In patients carrying genotypes containing one or two copies of the minor allele of rs6269 (AG+GG) weaker improvement of mouth opening was observed (p=0.03) in comparison with the AA genotype. Interestingly, in those carrying two copies of the minor allele (GG), a significantly greater reduction of pain intensity, measured with GCPS, was observed (p<0.05).

Conclusion: Treatment outcomes improvement in patients with TMD might be genotype-dependent. These findings have potential implications for precision medicine. Further research with larger sample sizes is necessary to confirm these results. Support: Croatian Science Foundation Project IP-2019-04-6211 (PI: Iva Alajbeg) ClinicalTrials.gov NCT04694274. Registered on 01/04/2021

Key words: Temporomandibular Disorders; Genotyping; Pain; Single Nucleotide Polymorphism; Stabilization Splint

3-DIMENSIONAL PLANNING – CAD/CAM MANUFACTURED INSERTION GUIDE FOR PALATAL TADS

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Aim: The midpalatal suture as well the anterior lateral palate seem to be the most suitable for the insertion of orthodontic implants. Distal movement of maxillary molars is a reasonable but often challenging treatment alternative. The Beneslider is a distalization appliance anchored to one or two coupled mini-implants in the anterior palate. This temporary anchorage device can be placed either directly or using an insertion guide. The aim of this study was to investigate the accuracy of surgical guide for the insertion of orthodontic mini-implants in the anterior palate.

Materials and Methods: The objective of this paper was to describe step by step computer-guided technique for insertion of palatal TADs. The use of virtual insertion planning allows for insertion in areas of ideal bone, while avoiding roots and vital structures. An STL file of the upper jaw is obtained via an intraoral scan (Sirona Prime Scan) and is superimposed onto lateral cephalogram, using Onyx Ceph software, to identify the best antero-posterior mini screw placement sites based on the width and thickness of the palatal vault. The same software was used for positioning of mini-implants and also to design a virtual insertion guide that will fit around the mini-implants position and the teeth in the buccal segment of the upper arch, then printed from biocompatible Surgical Guide resin (MDR, UKCA, TGA, Health Canada) using a 3D printer. Mini Implants are inserted through the surgical guide using a contra-angle screwdriver.

Results: At the same appointment, the prefabricated Beneslider is placed to the two paramedian mini-implants using two fixation screw. The surgical guide allowed precise placement of palatal mini-implants preventing path-of-insertion angulation errors that might interfere with accurate placement.

Conclusion: Digital planning of mini-implant insertion, with the help of surgical guide, enables their easier, safer and precise placement

Key words: CAD-CAM; Surgical guide; Mini implant; 3D-printing; Noncompliance treatment

EVALUATION OF COLOR STABILITY OF MATERIALS FOR TEMPORARY FIXED PROSTHETIC RESTORATIONS

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Aim: The aim of this in vitro study was to examine the color stability of materials for temporary restorations in fixed prosthodontics produced by conventional techniques compared to modern CAD/CAM technologies, i.e. milling and 3D printing.

Materials and Methods: A total of 50 specimens (15 x 2 mm) of each temporary material were produced: conventional hand-mixed PMMA (Unifast TRAD), hand-mixed bis-acrylic composite (Protemp 2), two types of bis-acrylic composite from automix systems (Protemp 4 and Telio CS C&B), three types of CAD/CAM milled polymers (Ceramill Temp, Telio CAD, HUGE DENT) and two types of 3D printed polymers (Freeprint Temp, Nextdent C&B). The samples were immersed in 5 different solutions (red wine, coffee, Coca Cola, black tea, distilled water) for 30 days. T

Results: The color of the samples was measured instrumentally with a spectrophotometer (VITA Easyshade Advance 4.0) at the beginning and after 7, 14, and 30 days of storage in the solutions, and color changes (ΔE) were calculated. Data within groups were compared statistically using analysis of variance ($p < 0.05$). The biggest color changes on all materials were caused by red wine and these changes for all materials and all time periods were statistically significant and visible, except for Ceramill Temp after 7 days. The highest color stability was recorded for the CAD/CAM milled material Ceramill Temp. The most statically unstable material turned out to be the 3D printed material Freeprint Temp. Although statistically significant, the color changes for most materials were not visible to the human eye.

Conclusion: CAD/CAM milled materials showed higher color stability than conventional and 3D printed materials. 3D printed materials in this research showed the least color stability. The research was financed from funds for dedicated institutional financing of scientific activities of the University of Zagreb.

Key words: Temporary Restorations; PMMA, Bis-Acrylic Composite; CAD/CAM; 3D Printing

STIMULATED WHOLE SALIVA IN THE DIAGNOSIS OF PRIMARY SJÖGREN'S DISEASE

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Aim: The aim of this cross-sectional study was to determine the accuracy of minor labial salivary gland (MLSG) biopsy in the diagnosis of primary Sjögren's disease (pSB). The specific objectives of the study were: to determine if there is a correlation between the focus score (FS) and anti-SSA/Ro, anti-SSB/La, anti-SSA and -SSB antibodies, total unstimulated (UWS) and stimulated (SWS) saliva; to determine and compare the values of UWS and SWS in both groups of subjects; and to compare the utility of UWS and SWS in patients diagnosed with pSB.

Materials and Methods: A total of 37 subjects participated in the study, divided into two groups. The test group consisted of 15 patients diagnosed with pSB. The control group consisted of 22 patients who had sicca symptoms but did not meet the 2016 American College of Rheumatology (ACR) and European League Against Rheumatism (EULAR) diagnostic criteria.

Results: The median of FS is 1.0 (IQR=1.0-1.5) in the test group, while it is 0.0 (IQR=0.0-0.0) in the control group ($p < 0.001$, Mann-Whitney U test). The sensitivity, specificity, and accuracy of MLSG biopsy were 86.7%, 100.0%, and 94.6%, respectively. The results showed a statistically significant correlation between FS and antinuclear antibodies (ANA) ($p=0.002$). Pearson's correlation also showed a weak negative correlation without statistical significance between UWS ($r=-0.058$, $p=0.731$) and SWS ($r=-0.022$, $p=0.899$) and FS. In the test group, 11 patients (73.3%) had abnormal UWS values, while 13 patients (86.7%) had abnormal SWS values.

Conclusion: Although MLSG biopsy has great diagnostic value and accuracy in diagnosing pSB, it is not always accurate. Moreover, this study demonstrates the association of anti-SSA autoantibodies with the diagnosis of pSB, the statistically significant association of FS and ANA, and the greater utility of SWS in the diagnosis of pSB.

Key words: Saliva; Minor Salivary Glands; Biopsy

ANTIBIOTIC PRESCRIBING IN THE CLINIC OF ORAL SURGERY OF THE UNIVERSITY CLINICAL DENTISTRY CENTRE OF KOSOVA IN THE PERIOD 2019 -2021

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Aim: The Ministry of Health in Kosovo, by national decision (2020), has suspended dental services from March 20, 2020, to June 18, 2020. The suspension has complicated the situation of patients due to the lack of provision of these health services. Based on this, the aim of this research was to analyze the results of the administration of different classes of antibiotics to patients at the University Dental Clinical Center of Kosovo for the treatment of dental patients, compared to the time before the imposition of suspension measures.

Materials and Methods: Antibiotic prescribing was monitored for three years (2019-2021) in the clinic of oral surgery of the University Clinical Dentistry Centre of Kosovo. The analysis included the number of prescriptions and the type of antibiotic prescribed. The World Health Organization's INN and ATC codes are used for the classification of antibiotics. Data were processed using MS Office Excel.

Results: During the time studied, there were 552 patients who received antibiotic therapy, 44% were males and 56% were females. In addition, to these, 552 patients, a total of 662 different antibiotics have been prescribed. The most prescribed antibiotic was Amoxicillin with enzyme inhibitor (J01CR01), with 408 prescriptions or 62% of all prescriptions. However, this study noted a decrease during the observed period in Amoxicillin and enzyme inhibitors (J01CR01) from 65% to 60% of all prescribing. In comparison, there is an increase in Clindamycin (J01FF01) from 1-5%, Metronidazole (J01XD01) and Azithromycin (J01FA10) 19-23% respectively 0-2% of all prescribing.

Conclusion: The results of the study provide a clear situation on antibiotic prescribing during health emergencies such as epidemics/pandemics and provide an opportunity to establish clear models of approach to epidemic/pandemic problems for patients and dental practitioners, especially in the design and approval of therapeutic protocols for specific indications in dentistry.

Key words: Antibiotics; Dentistry; Epidemics/Pandemics; Utilization; Rational Prescribing

EVALUATION OF ANTIMICROBIAL EFFICACY OF SWEEPS AGAINST ENTEROCOCCUS FAECALIS BIOFILM

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Aim: Objective of this study was to examine the efficacy of novel Er:YAG laser activated irrigation mode, Shock Wave Enhanced Emission Photoacoustic Streaming (SWEEPS), against Enterococcus faecalis (Ef) bacterial biofilm grown on dental discs in comparison to ultrasonically activated irrigation (UAI) and conventional syringe-needle irrigation (SNI).

Materials and Methods: Sixty (60) standardized dental discs (5x5 mm), made out of human extracted teeth using Isomet saw (Isomet 1000, Buehler, Illinois, USA), were polished, sterilized in plasma and used as medium for the development of two weeks old Enterococcus faecalis biofilm (ATCC 29212, American Type Culture Collection, Manassas, VA, USA). After the incubation period, the growth of the Ef biofilm was confirmed on scanning electron microscopy (SEM) and confocal laser scanning microscopy (CLSM). The samples were randomly divided into three experimental groups (n=20/each) according to the disinfection technique used: Group 1. SWEEPS (Er:YAG laser), Group 2. UAI, Group 3. SNI. In all groups, 3% sodium hypochlorite was used. In the positive control group, no treatment was performed. Following treatment protocol, microbiological samples were collected, serially diluted and plated on Columbia agar plates. The number of colony forming units (CFUs) was counted after 48h and transformed into exact value based on the dilution factor.

Results: The results were statistically analysed using Mann-Whitney U test with p value set at 5%. SWEEPS and UAI groups both showed statistically significant reduction of CFUs (colony forming unit) compared to control group ($p < 0.001$). Intergroup analysis showed that the SWEEPS was the most successful ($p < 0.001$) in reducing Ef CFUs with 12 of 20 samples without CFUs growth.

Conclusion: Although both SWEEPS and UAI were efficient in the elimination of Ef biofilm, the SWEEPS was the most efficient in complete eradication of bacteria. Croatian Science Foundation project No. 5303

Key words: Enterococcus Faecalis; Bacterial Biofilm; SWEEPS; Laser Activated Irrigation

CLINICAL EVALUATION OF ANTIMICROBIAL EFFICACY OF TWO INSTRUMENTATION TECHNIQUE IN NECROTIC ROOT CANALS

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Aim: Identify bacterial species in necrotic root canals of teeth with chronic apical periodontitis, and to evaluate the antimicrobial effectiveness of rotary and reciprocating instrumentation techniques in the elimination of bacterial species from necrotic canals of teeth with chronic apical periodontitis.

Materials and Methods: Forty patients with necrotic teeth with chronic apical periodontitis were selected for this study based on previously defined inclusion and exclusion criteria. After they had signed an informed consent, the participants were included in this clinical study and randomly assigned to one of two experimental groups depending on the root canal instrumentation technique used: Group 1. Wave One Gold technique; Group 2. ProTaper Next instrumentation technique. In both groups, root canals were irrigated with 2.5% sodium hypochlorite (NaOCl) solution during the instrumentation, and then the final irrigation protocol was applied in both groups: 3 ml NaOCl, 2 ml ethylenediaminetetraacetic acid (EDTA) and 2 ml NaOCl. A single visit root canal treatment was performed by one doctor of dental medicine, who finished intracanal procedures by the cold lateral condensation technique using an epoxy resin based sealer and gutta-percha. Microbiological samples from the root canal were collected for three times using a paper point technique: before instrumentation (sample 1.), after chemo-mechanical treatment (sample 2.) and after the final irrigation protocol (sample 3.). Microbiological analysis was carried out by identification of bacteria using MALDI-TOF mass spectrometry and colony forming units (CFUs) counting by the culture method. The Wilcoxon test was used for statistical analysis with a significance level of 0.05. **Results:** The first sample showed the presence of 55 aerobic and anaerobic bacterial species in the patients. After chemo-mechanical treatment of root canals with Wave One Gold and ProTaper Next technique, the number of bacteria was significantly reduced in both groups ($p < 0.001$). The final irrigation protocol also further reduced the number of bacterial species in both groups ($p < 0.001$). The ProTaper Next technique proved to be more successful in reducing the number of bacterial colonies than the Wave One Gold technique ($p < 0.001$).

Conclusion: Although both root canal instrumentation techniques were effective in removing bacteria from the necrotic canals of teeth with chronic apical periodontitis, the ProTaper Next technique was more effective.

Key words: Apical Periodontitis; Bacteria; Endodontic Treatment; Rotation Instrumentation Technique; Reciprocating Technique

THE EFFECT OF AZITHROMYCIN IN COVID-19 PATIENTS: SYSTEMATIC LITERATURE SEARCH STUDY

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Aim: Azithromycin is a broad-spectrum antibiotic from a group of macrolide antibiotics that has an enormous potential for immunomodulatory effect, primarily in the pathology of various acute and chronic respiratory disorders and infections. The global COVID-19 pandemic has led to a race to find medications that can improve the prognosis of the disease. Azithromycin, in association with hydroxychloroquine or chloroquine, has been proposed as one such medication. The aim of this study was to assess the efficacy and safety of azithromycin for treatment of COVID-19 patients.

Materials and Methods: A systematic literature search was conducted from November 2022 to January 2023. Databases included were Cochrane, Proquest, Serial solutions, DOAJ, PubMed and Lancet. The keywords were „azithromycin“, „COVID“, „coronavirus“ and „immunomodulating“ without timespan limits. Two researchers were looking for recommendations, assessment, development and evaluations of published studies. **Results:** Systematic search identified 34 relevant trials, where half of those studied the effect of azithromycin by itself in COVID-19 patients and the other half studied effect of azithromycin in combination with other drugs. First group of trials included five clinical and twelve non-clinical trials and second group included seven clinical and ten non-clinical trials. Six of those twelve clinical trials were randomised.

Conclusion: The use of azithromycin with or without hydroxychloroquine was not associated with a significant effect on the mortality or mechanical ventilation rates in hospitalized patients with COVID-19. While some of the studies do show a better general condition of the patients using azithromycin, most of them find no correlation between using azithromycin and improving clinical outcomes. In addition, the majority of studies report azithromycin side effects with QTc prolongation as the main concern as well as the increasing the risk of bacterial resistance that is not justified with the evidence of benefit. Although, the main purpose of azithromycin use in COVID-19 disease was related to its

immunomodulatory effects rather than antimicrobial ones.

Key words: Azithromycin; COVID-19; Coronavirus; Immunomodulating

PRELIMINARY RESULTS OF A RETROSPECTIVE DENTAL TRAUMA STUDY

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Aim: This retrospective study was intended as an analysis of dental traumas that were treated at the School of Dental Medicine, University of Zagreb as the Reference Center for Dental Traumatology. The research aim is to see the changes in the incidence of dental trauma over the years, the most common environmental factors and the lost time to receiving therapy, and the most common therapy choices and outcomes.

Materials and Methods: The research was conducted at the Department for Pediatric and Preventive Dentistry. Data was collected from March 30th to November 4th. 520 trauma and dental records from 2013 to 2021 were collected and analyzed using descriptive statistics methods.

Results: The number of patients with dental trauma coming to the Department of Pediatric and Preventive Dental Medicine has been constantly increasing, apart from 2020 and 2021, when a lower incidence of dental trauma was recorded. The most common dental traumas occur at the age of 8 to 10, followed by the period from 2-4 years and 6-8 years of age. By far the largest number of dental trauma occurs in the spring and in the afternoon, most often at home or while playing. The incidence of uncomplicated enamel and dentin fractures and lateral luxation is the highest among dental trauma.

Conclusion: In this research, a reduced incidence of dental trauma was noted during the period of the global pandemic and quarantine when children spent more time at home and under increased adult supervision. Also, the highest incidence of dental trauma is observed in children starting school who are just beginning to engage in various activities and are not yet motorically skilled like older children, when the incidence decreases. The following risk periods are when children begin to walk independently and become more active, as well as preschool children.

Key words: Trauma; Prevention; Pediatric Dentistry; Luxation; Tooth Fractures

ASSOCIATION OF CATECHOL-O-METHYLTRANSFERASE AND OPIORPHIN GENE POLYMORPHISMS WITH TEMPOROMANDIBULAR DISORDERS

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Aim: The aim of this study was to assess the association between single nucleotide polymorphisms (SNPs) in COMT (catechol-O-methyltransferase) and OPRPN (opiorphin) genes with temporomandibular disorders.

Materials and Methods: The case-control study included 170 subjects: 85 patients diagnosed with pain-related temporomandibular disorders (TMDp) (according to Diagnostic Criteria for TMD) and 85 healthy controls (CTR). Characteristic Pain Intensity, assessed using the Graded Chronic Pain Scale, divided TMDp patients into high (HPI) and low intensity pain (LPI) groups. Genomic DNA was extracted from buccal mucosa swabs and used in the analysis of SNPs in COMT (rs4680, rs4818) and OPRPN (rs1387964) genes. SNP analysis was performed by qPCR using the TaqMan SNP Genotyping assays. Genotype distribution between studied groups was analyzed with respect to dominant and recessive genetic models. In both models, the minor allele represented the risk allele. The recessive model estimated the frequency of carriers of both minor alleles while the dominant model estimated the frequency of carriers of one or both minor alleles.

Results: We didn't find any significant difference in genotype frequencies of COMT rs4680 and rs4818 SNPs between TMDp and CTR groups. Two minor allele carriers (CC genotype) of rs1387964 polymorphism were significantly more frequent in TMDp than in CTR group (12.9% vs. 3.5%, $p = 0.025$). When comparing HPI to LPI groups, we did not observe any significant difference in the genotype distribution of rs1387964 SNP. Two minor allele carriers (GG genotype) of rs4680 and rs4818 SNPs were significantly more represented in HPI compared to the LPI group (40% vs. 11.4%; 24% vs. 7.5%, respectively).

Conclusion: This study provides evidence that CC genotype of rs1387964 SNP in OPRPN gene might be associated with painful TMD, while GG genotypes of rs4680 and rs4818 SNPs in COMT gene appear to be associated with pain intensity. If confirmed in further research, determining the genetic predisposition for TMD could contribute to the development of a genetic test that could assess the risk of developing the disease. Croatian Science Foundation Project IP-2019-04-6211 (PI: Iva Alajbeg) and "Young Researchers' Career Development Project - Training of Doctoral Students" (DOK-2020-01) (PhD

student: Marko Zlendić)

Key words: Temporomandibular Disorders; Genotyping; Pain; Single Nucleotide Polymorphism

POSSIBILITIES FOR RESEARCHING THE STRENGTH OF CONVENTIONAL AND INLAY BRIDGES

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Aim: Modern dentistry strives for a minimally invasive approach to the preparation of teeth and the fabrication of fixed prostheses. The aim of this research is to present a digital method for analyzing the strength of conventional and inlay-retained bridges in a computer program.

Materials and Methods: The research is conducted in collaboration with the School of Dental Medicine and the Faculty of Mechanical Engineering and Naval Architecture at the University of Zagreb. Using the computer program Mimics (Materialize, Belgium), the geometries of the second premolar and the first and second molars of the mandible are created based on the CBCT scan of the edentulous jaw. Subsequently, a three-dimensional fixed prosthesis is designed using the SolidWorks computer program (Dassault Systèmes, France) - a conventional bridge and an inlay bridge (both anchored on the second premolar and second molar) to perform simulations using the Abaqus computer program (Dassault Systèmes, France).

Results: Four loading simulations are performed for the two geometries of the conventional and inlay bridge, in which the force is changed in an interval from 200 to 700 N with increments of 100 N, which includes the amounts of the average and maximum masticatory forces. The amounts of the maximum stresses that occur in these two types of bridges are compared.

Conclusion: The research findings would make a major scientific contribution by adding to the existing literature on the potential of using inlay-supported bridges as less invasive restorations compared to conventional restorations in the area of high masticatory loading.

Key words: Dental Medicine; Fixed Prosthodontics; Inlay; Fixed Bridge; Dental Materials

KNOWLEDGE, EXPERIENCE AND ATTITUDES OF FINAL YEAR DENTAL STUDENTS TOWARDS ORAL POTENTIALLY MALIGNANT DISORDERS

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Aim: To assess knowledge, clinical experience and attitudes of final year dental students from six European countries towards oral potentially malignant disorders (OPMD).

Materials and Methods: The study was performed by online questionnaire which was sent to email addresses of all final year dental students from six European universities. Data on sex, country of study, knowledge, clinical experience and self-assessed competence in the management of OPMD patients were collected. 260 students from six European dental schools (Croatia, France, Italy, Portugal, Spain, United Kingdom) participated in the study. Significant differences in knowledge and clinical experience between students from different countries were found. Students with greater clinical experience assessed their knowledge and competence to manage OPMD patients significantly higher than students with less clinical experience. Most of the students were interested for further education on OPMD.

Results: Majority of the students had theoretical knowledge on OPMD, but some of them lacked clinical experience. Clinical experience positively affected knowledge and self-confidence for the management of these patients.

Conclusion: This study identified gaps in students' knowledge and provided guidelines for modifications of students' clinical practice in order to increase their clinical exposure to OPMD patients. The study was a part of the Erasmus+ project "Oral Potentially Malignant Disorders: Training of Healthcare Professionals" (Grant No: 2020-1-UK01-KA202-078917).

Key words: Dental Students; Education; Malignant Transformation; Oral Cancer; Oral Potentially Malignant Disorders

DO THERMOCYCLING AND BRUSHING AFFECT STABILITY OF PETG ORTHODONTIC RETAINERS?

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Aim: To evaluate changes of surface roughness and mass of orthodontic retainer materials after exposure to thermocycling and brushing.

Materials and Methods: A total number of 96 samples of polyethylene terephthalate glycol (PETG) material from four different manufacturers (Biolon- Dreve; Erkodur A1- Erkodent; Track A- Forestadent; Essix C+ -Raintree Essix) were exposed to thermocycling and simulated brushing. Thermocycling was performed on Thermocycler- SD Mechatronik machine for a total number of 1500 cycles, 5-55 °C, and dwell time 13 seconds. Samples were then exposed to simulated brushing for 30 minutes with 3 different types of toothbrushes according to the number and thickness of filaments (CS 5460, CS 3960, CS 1560). Both surface roughness and mass of the samples were evaluated three times: initial, after thermocycling and after brushing. Since the data followed normal distribution, t-test and one-way ANOVA were used.

Results: In all four brands, both thermocycling and brushing increased surface roughness significantly ($p < 0.001$). Surface roughness values after thermocycling did not vary significantly between brands, with Biolon having the lowest and Track A having the highest. In terms of brushing, only Biolon samples showed statistically significant increased roughness after brushing with all three types of brushes (CS 5460: $p = 0.046$; CS 3960: $p = 0.027$; CS 1560: $p = 0.027$), in comparison to Erkodur A1 where differences were not statistically significant. Thermocycling increased the mass of all samples, but a statistically significant difference was found only in Biolon ($p = 0.0203$), while after brushing, decreased mass was found in all specimens, statistically significant only in Essix C+ (CS 1560: $p = 0.016$).

Conclusion: Thermocycling and brushing have an impact on the change in surface roughness and mass of all investigated materials. Of all brands, Erkodur A1 demonstrated the most stability under external influence, whereas Biolon demonstrated the lowest.

Key words: Orthodontic Retainers; Toothbrushing; PETG

CORRELATION OF SHEAR BOND STRENGTH AND DEGREE OF CONVERSION IN ORTHODONTIC BONDING MATERIALS

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Aim: To investigate a correlation between shear bond strength (SBS) and degree of conversion (DC) of a three components bonding system and self-adhesive bonding system used for orthodontic brackets' bonding procedure.

Materials and Methods: Sample consisted of 32 extracted intact permanent premolars (no cavities, fillings or white spot lesions) randomly divided into two groups ($n = 16$). Teeth were fixed in cubic plastic molds with cold-curing methacrylate resin. Acid etching was performed using 37% phosphoric acid for 15 s, rinsed for 20 s and then dried for 10 s. In Group I the metal brackets were bonded with Transbond XT Primer and Transbond XT Paste (3M Unitek, Monrovia, CA, USA). In Group II metal brackets were bonded with GC Ortho connect (GC America, Alsip, Illinois, USA). Resin was polymerised for 20 s from two directions (mesial and occlusal) using a Bluephase light-curing unit. SBS was measured using Universal testing machine- crosshead speed of 1 mm/ min with an occlusal-gingival load applied parallel to the bracket's surface. For each sample, immediately after SBS testing, Raman microspectrometry was performed as well as Adhesive Remnant Index - ARI.

Results: No statistically significant differences were observed among the experimental groups in terms of the SBS values. No statistically significant differences were observed among the experimental groups in terms of the ARI values. A significantly higher DC ($p < .001$) value was recorded in Group I, in which the brackets were bonded with GC. Very weak or no correlation (0.01) has been recorded between SBS and DC in Group 1 and moderate positive correlation has been recorded in Groups 2 (0.33).

Conclusion: No difference was found in SBS between conventional and two step systems used in orthodontics. Two-step system demonstrated greater DC compared to conventional system. There is very weak or moderate correlation between DC and SBS. DC has minimal effect on SBS.

Key words: Adhesive Dentistry; Shear Bond Strength; Degree Of Conversion

AESTHETICS AND FUNCTION - THE ESSENCE OF DENTAL MEDICINE

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Aim: Therapy of traumatized teeth involves restoring function and aesthetics and often involves several specialist branches and implies different challenges during the implementation of therapy.

Materials and Methods: A patient (21) with symptoms of a vertical fracture comes to the clinic for examination and treatment. Based on the clinical examination and analysis of the radiological findings, inadequate endodontic treatment of tooth 11, which previously had trauma, was established. Extensive periapical radiolucency, tooth mobility, palpation sensitivity, compromised periodontium, fistula in the projection of the apex of the tooth, and an extremely widened root canal (#80) pointed to a vertical fracture in the differential diagnosis. The entire vestibular surface of the tooth was discolored with an impressively dark tone, especially in the cervical part of the tooth.

Results: In accordance with the standards of modern dental medicine and a minimally invasive approach, a one-visit revision of the endodontic treatment with the Procodile Q system (Komet, Lemgo) and a bioceramic sealer was performed, after which regression of clinical symptoms occurred. Then, the vestibular surface was restored using the light-curing nanohybrid composite material IPS Empress Direct (Ivoclar Vivadent, Liechtenstein) using the finger tip technique, creating a composite veneer.

Conclusion: Based on the control findings and the patient's satisfaction with the results of the endodontic and restorative therapy, tooth loss was avoided and the traumatized tooth was retained, which was the initial plan of the therapy.

Key words: Aesthetics; Function; Trauma; Composite Veneer

CALCIUM-SILICATE FORMULATION FOR NON-SURGICAL TREATMENT

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Aim: The purpose of endodontic treatment is aesthetic and functional rehabilitation in order to preserve the integrity of the teeth. Errors during the creation of the access opening can affect the implementation, but also the final outcome of endodontic therapy.

Materials and Methods: A patient (47) with painful sensations, loss of epithelial attachment and perforation of tooth crown 21 was referred for examination and surgical treatment due to the impossibility of finding the entrance to the root canal. The clinical findings revealed an overextended access cavity with perforation into the periodontal tissue and a fistula in the projection of the apical third of the root. After the clinical examination and analysis of the X-ray image, a one-visit endodontic treatment was performed using the Procodile Q instrumentation (Komet, Lemgo) and the canal was filled with bioceramic filler Ceraseal (Meta Biomed, Korea). The perforation was closed with the calcium-silicate material Biodentin (Septodont, Canada) and glassionomer cement.

Results: Three months after the therapy was performed, the radiological and clinical findings indicate a regression of clinical symptoms and an normal finding of the mucous membrane and periodontium.

Conclusion: Iatrogenic perforations of the tooth crown are a frequent and undesirable complication when creating an access opening and exploring the endodontic space. Non-surgical therapy using calcium-silicate materials results in good adhesion of the material to dental tissues, effective bioactive dentine replacement and antimicrobial and reparative effect.

Key words: Tooth Crown Perforation; Calcium Silicates

CORRELATION BETWEEN SLEEP AND POSTOPERATIVE PAIN AFTER ALVEOTOMY

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Aim: Sleep quality affects cognitive functions which in turn affect our perception of pain, and sense of pain control. Complete, partial, or selective sleep deprivation dysregulates the endogenous opioid, dopamine, and serotonin systems. Also, it lowers the patient's pain tolerance threshold. It is necessary to make the alveotomy's postoperative pain tolerable since it affects majority of patients.

Materials and Methods: This study determines the association between the perception of pain after the third mandibular molar's extraction, and the quality of sleep in relation to subjects' sex and age. Zagreb Dental Medicine School's Oral Surgery Clinical Department's 33 patients participated in the research. 62.5% of the respondents were women, 37.5% men. Patients were 22 to 73 years old. Deep caries or pericoronitis of the semi-impacted, mesioangular, horizontally laid mandibular third molar indicated the need for alveotomy. The Standard Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality 6 days after the experiment. During those 6 days, the Numerical Scale (NRS) was used to assess the pain.

Results: Men's results show a correlation between pain and PSQI, statistically significant value ($p < 0.05$). Women's results show a correlation between age and PSQI ($p < 0.05$). However, combined results show no statistically significant correlation between

parameters. Pain can be the cause of sleep disorder in men. There is a need for effective postoperative analgesic therapy.

Conclusion: Sleep disorder occurs more often in older women. Taking into account that sleep disorder can amplify pain, it is advisable to analyse patients' sleep quality in order to improve the effectiveness of analgesic therapy and improve their overall sleep hygiene.

Key words: PSQI, Pain; Alveotomy; Oral Surgery; NRS

STABLE ISOTOPES ANALYSIS IN AN ARCHAEOLOGICAL SAMPLE FROM THE KOPILA SITE ON THE ISLAND OF KORČULA

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Aim: The aim of the research is to determine the type of diet and geographical origin of the individuals of the Illyrian population from the Late Iron Age, exhumed from the Kopila necropolis on the island of Korčula, by analyzing stable isotopes of carbon (13C), nitrogen (15N), and strontium (86Sr).

Materials and Methods: Skeletal remains of teeth and jaw bones from tombs 3 and 4 of the western nucleus and tomb 1 of the eastern nucleus of the necropolis were used in the analysis. From a total of 49 adult individuals with 495 permanent teeth, 32 teeth and 4 jaw bone samples were taken for the analysis of stable isotopes 13C, 15N and 86Sr, which were sent to the Isotopech laboratory, Debrecen, Hungary, where the isotope level in enamel and dentin and bone collagen was determined by mass spectrometry. Results: The value of $\delta^{13}C$ is -19.5‰ ($\pm 0.1\text{‰}$), while $\delta^{15}N$ is 8.6‰ ($\pm 0.1\text{‰}$). The 13C/15N ratio is 3.4. The value of 87Sr/86Sr in tooth enamel is 0.708400-0.708433, and in bones 0.708149-0.708471 ($\pm 1\sigma$ 0.000016-0.000034). Stable isotopes of carbon and nitrogen in the collagen of dentin and bones are used for the identification and quantification of food items with different isotropic profiles that a person ate. They primarily indicate the protein component of the diet, and are suitable for distinguishing food of sea and land origin. The $\delta^{13}C$ isotope is also used to distinguish between C3 (Calvin cycle of photosynthesis) and C4 (Hatch-Stack cycle of photosynthesis) plants. The level of strontium isotopes in tooth enamel leaves a trace of the place of birth and early childhood, which, when compared to the place of burial, can indicate whether a person is of local origin or a migrant from another area. The values of $\delta^{13}C$ and $\delta^{15}N$ in the sample from the Kopila necropolis indicate a diet rich in plants of the C3 photosynthetic pathway (cereals- wheat, oats, rye; green vegetables; fruits, etc.), and proteins of terrestrial origin.

Conclusion: Marine resources were hardly used. The levels of strontium isotopes from tooth enamel and bones indicate the local origin and autochthonousness of the inhabitants of the area around Kopila hillfort in the Late Iron Age. This research was funded by the Croatian Science Foundation, project number IP-2020-02-9423, Tooth Analysis in Forensic and Archaeological Research.

Key words: Teeth; Paleodiet; Stable isotopes; Kopila; Illyrians

PATHOLOGICAL CHANGES ON ORAL MUCOSA OF THE CROATIAN WAR INVALIDS

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Aim: The main objective of this study was to investigate the frequency and nature of subjective symptoms and pathological changes of the oral mucosa in Croatian Homeland War invalids.

Materials and Methods: A total of 102 disabled Croatian war veterans participated in the study. Based on medical history, data on the presence of subjective symptoms in the oral cavity were collected and a detailed clinical examination was performed. Potentially malignant lesions were biopsied and sent for pathohistological analysis. The study included 88 (86.3%) men and 14 (13.7%) women with a mean age of 54.3 years. In the study sample, 46 respondents (45.1%) reported being smokers, while 56 of them (54.9%) denied the habit of smoking cigarettes daily.

Results: Only 33 (32.4%) of the participants reported that a dentist had performed a thorough examination of their oral cavity, and seven of them (6.9%) a general practitioner. The majority of respondents, 77 (75.5%), denied the presence of subjective symptoms in the oral cavity. In-depth clinical examination revealed lesions in 35 (34.3%) participants, and 14 (13.7%) of these were pathological changes representing potentially malignant lesions. Histopathologic findings confirmed the diagnosis of a potentially malignant lesion in ten individuals (four leukoplakia, four erosive lichen planus, and two actinic cheilitis). In the remaining four participants, histopathologic findings indicated moderate dysplasia in two, carcinoma in situ in one, and invasive squamous cell carcinoma in one.

Conclusion: Clinical examination revealed 14 potentially malignant changes in the oral mucosa. According to participants, most dentists and general practitioners did not thoroughly examine the entire oral mucosa of their patients. Both physicians and the general population need additional regular education.

Key words: Oral Carcinoma; Potentially Malignant Oral Lesions; Croatian Homeland War Invalids; Leukoplakia; Oral Lichen Planus

VALUES OF DENTAL ARCH WIDTHS MEASURED ON DIFFERENT TYPES OF ORTHODONTIC MODELS

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Aim: Intraoral scanners and their use in everyday clinical procedures are more and more common in dentistry. Virtual models and 3D printed models obtained by the intraoral scanning are used in clinical work. Plaster models used in orthodontics for diagnostic purposes and for making orthodontics appliances are progressively substituted by these types of models. The aim of this work is to determine if there is a difference in the width of the dental arch measured on plaster, 3D printed and virtual models.

Materials and Methods: 20 patients were selected who have plaster, virtual and printed models of both jaws. All patients had permanent dentition and all teeth between molars in both jaws. The mentioned models were measured twice with a time interval of one month due to the reliability of the measurements. Specific points were marked on all models on the upper and lower jaw, for easier and more precise measurement of the width of the dental arch. Jaws impressions were taken to all patients by alginate (Cavex Holland BV) and models were made by plaster type III (Kulzer). Intraoral scans were taken by intraoral scanner Omnicam Ac (Dentsply Sirona), then they were converted in STL format. STL models were printed in Draft Resin (Formlabs) by 3D printer (Formlabs, 3B). The plaster and printed models were measured by digital caliper (YATO), the virtual models were measured in orthodontics software OnyxCeph.

Results: Statistically significant correlations of a high degree were found between the first and repeated measurements and a very high, statistically significant degree of agreement between the different measurements were found.

Conclusion: Plaster, printed and virtual models are equally precise regarding dental arch width in all models.

Key words: Orthodontic Models; Plaster Models; Printed Models; Virtual Models; Width Of Dental Arch

COVID-19, ORTHODONTICS, ADOLESCENTS, SELF-QUARANTINE PREDICTORS OF ADOLESCENTS' ORTHODONTIC TREATMENT CONCERN DURING THE COVID-19 PANDEMIC

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Aim: Previous studies of adolescent orthodontic patients' perceptions of the COVID-19 pandemic were conducted during the initial phase of the pandemic, when health services were limited. We aimed to examine the impact of in-person school attendance, self-quarantine, and general anxiety about the pandemic on adolescents' concerns about their orthodontic treatment during the normalization of health services.

Materials and Methods: Participants aged 10 to 18 years who were undergoing orthodontic treatment with the fixed appliance were given a self-administered questionnaire that included demographic information and items about their concerns about orthodontic treatment and its outcome and about the risk of coronavirus infection. These questions were answered on a Likert scale from 1 to 5. Latent structure was assessed using exploratory factor analysis (EFA). The predictors of the latent constructs were tested using hierarchical multiple regression analysis. Statistical analysis was performed using SPSS (version 22.0; IBM, Armonk, USA). In the pilot study, 153 participants (60.1% female, median age 15, IQR 13-16) completed the questionnaire. The EFA revealed a two-factor structure, Treatment Concern (TC) and Awareness of Measures (AC).

Results: Missed appointments due to self-quarantine, self-perceived negative psychological impact, and anxiety due to the pandemic were significant predictors of TC ($p < 0.045$), accounting for 2-5% of the variance, but not of AM. In-person vs. online school attendance was not a predictor of either TC or AM.

Conclusion: When addressing adolescents' concerns about their orthodontic treatment, special attention should be given to those patients who report more distress and anxiety due to the pandemic and those who missed one or more orthodontic appointments due to self-quarantine. This research was supported by the University of Rijeka (grant uniri-mladi-biomed-22-13 to MTZ).

Key words: COVID-19; Orthodontics; Adolescents; Self-Quarantine

CHANGE IN OPIORHIN LEVELS IN SALIVA AFTER CAPSAICIN STIMULATION - COMPARISON OF OROFACIAL PAIN PATIENTS AND THE CONTROLS

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Aim: The aim of the study was to compare the intensity of burning pain sensation and salivary opiorphin levels after stimulation with capsaicin in burning mouth syndrome (BMS) patients, temporomandibular disorders (TMD) patients and healthy subjects. Opiorphin is an endogenous peptide isolated from saliva that has an exceptional analgesic effect, and its concentration is expected to be higher in subjects with chronic pain disorders.

Materials and Methods: The study involved 48 subjects (16 BMS patients, 16 TMD patients and 16 controls). The burning pain sensation was induced by a capsaicin solution applied to a set of 10 discs during five minute time period. Subjects recorded the intensity of the stimulus using the Numerical Pain Rating Scale (NPRS) at precisely determined time points (every minute during 5 minutes of stimulation and next 20 minutes after the end of disc application). Saliva was collected three times, before capsaicin stimulation (1st sampling), immediately after the end of stimulation (2nd sampling) and 20 minutes after the end of stimulation (3rd sampling). Opiorphin levels were quantified by HPLC-MS/MS. Friedman ANOVA, Kruskal Wallis ANOVA and Mann Whitney U Test were used for statistical analysis.

Results: From 9th minute until the end of the measurement, the values of the experimentally induced burning pain sensation were significantly higher in BMS group compared to healthy subjects and TMD patients ($p < 0.05$). TMD patients showed statistically higher levels of opiorphin compared to control group in 1st ($p = 0.002$) and 3rd sampling ($p = 0.022$). BMS patients showed statistically higher levels of opiorphin compared to control group in 2nd ($p = 0.021$) and 3rd sampling ($p = 0.004$). In addition, a statistically significant increase in opiorphin levels was observed in BMS group between the 1st and 3rd sampling ($p = 0.011$). In patients with orofacial pain conditions opiorphin levels were generally higher compared to healthy subjects. In addition, a more intense reaction to the experimental stimulus with capsaicin was observed in BMS group.

Conclusion: These results indicate a specific regulation of opiorphin release and possibly an altered response pattern to painful stimuli in patients with orofacial pain conditions. Croatian Science Foundation research project IP-2019-04-6211 (Principal Investigator: Iva Alajbeg)

Key words: Burning Mouth Syndrome (BMS); Temporomandibular Disorders (TMD); Capsaicin; Opiorphin

INFLUENCE OF DIFFERENT IRRIGATION PROTOCOLS ON ADHESION OF SELF-ADHESIVE CEMENT

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Aim: The aim was to examine the shear bond strength of self-adhering composite cement to radicular dentin with respect to different irrigation solutions preceding adhesion - sodium hypochlorite (HIPO), ethylene-diamine-tetraacetic acid (EDTA), etidronic acid with HIPO (HEDP) and chlorhexidine (CHX).

Materials and Methods: In this study, 41 radicular dentin slabs were sectioned from extracted intact third molars, embedded in acrylic, polished and randomly divided into three experimental groups (N=9-12) and one control group (N=8). In each experimental group, dentin samples were treated with a different irrigation protocol for two minutes: 1) HIPO/EDTA/HIPO 2) HEDP 3) HIPO/EDTA/CHX. The control samples were not exposed to any disinfectant solution mentioned and remained stored in distilled water. After drying the samples, dual-curing self-adhering composite cement (GC G-CEM LinkForce, GC Tokyo, Japan) was applied to the radicular dentin using the corresponding Ultra Tester cutter molds (Ultradent Products, SAS Institute Inc., Cary, NC, USA). The samples were stored at 100% humidity at 37°C for 10 days. The shear bond strength of the self-adhering cement to radicular dentin was determined according to ISO standard 29022 using an Ultra Tester at a constant speed of 1 mm/min until the cement separated from the dentin. The results for the shear bond strength in MPa were analyzed by the ANOVA statistical test and Tukey HSD post hoc test. The level of statistical significance was =0.05.

Results: HIPO/EDTA/HIPO and HIPO/EDTA/CHX groups showed significantly lower shear bond strength compared to the control group ($p < 0.05$). Dentin irrigation with HEDP did not significantly reduce the shear bond strength of the self-adhering composite cement to radicular dentin ($p > 0.05$).

Conclusion: Within the limits of this in vitro study, it can be concluded that standard irrigation solutions reduce the bond strength of composite cement to radicular dentin. Irrigation with etidronic acid before adhesive cementation is the most favorable protocol because the decrease in bond strength is not statistically significant.

Key words: Root Canal; Etidronic Acid; Shear Strength; Self Curing Of Dental Resins

COMPLEX ORAL SENSITIVITY DISORDER - PROFILE OF A TYPICAL PATIENT WITH ATYPICAL SYMPTOMS

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Aim: Complex oral sensitivity disorder (COSD) or oral cenesthopathy is a proposed clinical entity within the framework of oral disesthesia, which combines disturbed oral sensations. It occurs on its own or in patients suffering from burning mouth syndrome (BMS). COSD is characterised by symptoms such as „swollen or numb“ tongue or mucosa, „thick, sticky“ saliva, „granularity, roughness or peeling“ of mucosa, „fever“ of mucosa, etc. The aim of the paper is to describe the clinical characteristics of a series of patients with COSD and to evaluate the possibility of relieving the discomfort with a masticatory and/or gustatory stimulation.

Materials and Methods: 10 subjects (M:2, F:8, 42-77 years old) who come for the first time for examination due to non-specific disturbances of the oral cavity, in which there is a regular clinical finding at the site of the disturbance, are included. Each patient's symptomatic characteristics have been documented. The time taken by the subjects to begin improvement and complete remission of symptoms (expressed by a numerical scale of the severity of the discomfort 0-10) was measured after the beginning of a) chewing pieces of paraffin and b) dissolving candy in the mouth. After achieving a complete (or maximum) improvement, the time of return of symptoms was measured. The procedure was repeated once. If the effect was completely absent after 5 minutes, that part of the experiment was over.

Results: Of the 10 respondents included, 8 indicate improvement of symptoms on some medical interventions (antimycotic (N = 3), proton pump inhibitor (N = 2), saliva (N = 2), mallow (N = 1), propolis (N = 1)), but the (placebo) effect has worn off. Xerostomia (N = 9), cancerophobia (N = 5), dysgeusia (N = 4), dysphagia (N = 1) and halitophobia (N = 1) are present. Four of them use xerogenic drugs with effects on the central nervous system. Four consider the symptom to be a consequence of an organic local or systemic disease, and three to be a consequence of stress. Most commonly, they report disturbances in the tongue (N = 5) and the entire oral cavity (N = 3). The common discomfort in the largest number of subjects (N = 7) was described as a feeling of „oversized, swollen and irritated“ tongue and „sticky, thick“ saliva (N = 3). In four subjects there was a temporary complete remission to at least one of the stimulants, and in another four to at least a slight improvement after our intervention. The improvement begins in 75 ± 35 seconds. The maximum effect is achieved after 200 ± 126 seconds. The return of symptoms after the end of stimulation begins after 80 ± 62 seconds, and the complete return to the level of the initial symptom after 227 ± 121 seconds.

Conclusion: Although there are similarities and overlaps with BMS, the effect on reducing discomfort in COSD is less pronounced, and most of the respondents did not have a full response.

Key words: Complex Oral Sensitivity Disorder; Orofacial Pain; Pain Management

DENTAL INJURIES AND MOUTHGUARD USE AMONG WATER POLO PLAYERS

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Aim: The purpose of this study was to determine the knowledge and experience of dental trauma among water polo players in Croatia.

Materials and Methods: This cross-sectional survey was conducted among 114 water polo players. The questionnaire consisted of 25 questions divided into four parts. The first part was related to sociodemographic data, the second and third parts were related to personal experience with dental trauma and knowledge of emergency therapeutic procedures for traumatic dental injuries. The last part of the questionnaire was related to mouthguards and their use among the respondents.

Results: The results of the survey show that 30% of the respondents consider their knowledge about dental trauma to be low. 28% of respondents have suffered dental trauma during training or games, most commonly to the upper anterior teeth (71%). Regarding mouthguards, 59% of respondents think that mouthguards help prevent dental injuries, but only 7% of them use them during training or competition. The main reason given by

the respondents for not wearing it was the inconvenience of the guard.

Conclusion: The results of this study indicate that additional education is needed on procedures to protect and prevent dental injuries in water polo players. Knowledge and habits could best be acquired if education of water polo players began in the earliest categories.

Key words: Dental Trauma; Dental Guards; Knowledge; Water Polo Players

ORAL HEALTH OF THE POPULATION OF CROATIA, BIH AND MONTENEGRO - RESULTS OF THE MADE PROJECT

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Aim: One of the goals of the MADE (Mobile Access Dental Clinic) project was to collect data on the oral health of the population of Croatia, Bosnia and Herzegovina and Montenegro.

Materials and Methods: For the purposes of the project, a questionnaire based on the World Health Organization (WHO) questionnaire was created and consisted of 19 questions. The DigiDent application specially designed for the MADE project served as a platform for filling out the questionnaire. Residents of Croatia, Bosnia and Herzegovina and Montenegro fulfilled the questionnaire.

Results: The most significant difference in the answers between the three countries occurred in the question „How often do you brush your teeth“, where respondents from Croatia and Bosnia and Herzegovina in 81% and 84% stated that they brush their teeth two or more times a day, while respondents from Montenegro stated that in only 68% of cases. A significant difference was also observed in the answers to the question related to the use of toothpaste, the amount of soda consumed and the absence of shame about one's appearance. The subjective assessment of the state of their own teeth is rated by more than 60% of respondents in all three countries as very good/good, while 6% of respondents rate it as bad/very bad. The situation is similar with the evaluation of the condition of the gingiva. From the answer to the question about the distance to the nearest dentist, information about the availability of dental health care was obtained; the most available is in Croatia, and the least available in Montenegro. Chi-square test was used in statistical processing. Based on the answers received, it is evident that in the territory of all three states, there is a need for increased and continuous education of the population and the establishment of better and more accessible dental care.

Conclusion: As a result, a detailed Action Plan for the development of preventive oral health protection programs was created. The project is co-financed by ERDF and IPA II funds of European Union.

Key words: Oral Health; DMFT Index

KNOWLEDGE AND PRACTICE OF DENTISTS ABOUT LOCAL ANESTHESIA

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Aim: The aim of this study was to assess knowledge, experience and confidence level in the use of local anesthesia among dentists.

Materials and Methods: Dentists practicing in the Republic of Croatia were included in this cross-sectional study. The questionnaire consisted of six sections (demographic and professional characteristics, knowledge of local anesthetics, experience in the use of local anesthetics, anesthetics and instruments used by dentists, self confidence level in the different techniques of local anesthesia, and frequency of complications).

Results: 441 dentists participated in the research with median of age of 35. Respondents of the youngest age group (≤ 30 years) had a statistically significantly higher level of knowledge (p<0.001) compared to respondents of the oldest age group (≥50 years). Specialists in endodontics and oral surgery had statistically significantly (p<0.001) higher level of knowledge compared to specialists in prosthodontics, pediatric dentistry, oral medicine, family dentistry and periodontics. No statistically significant difference was confirmed in relation to gender, academic level of education and number of patients per day.

Conclusion: The dentists who participated in the study showed insufficient knowledge about the use and complications of local anesthesia. Based on the obtained results, it can be concluded that additional education on this topic is needed.

Key words: Dentists; Local Anesthesia; Complications Of Local Anesthesia; Knowledge

ORAL HYGIENE HABITS OF PEOPLE WITH DEVELOPMENTAL DISABILITIES

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Aim: The main objective of this research was to investigate the oral hygiene habits of people with developmental disabilities.

Materials and Methods: This study included 43 people with developmental disabilities who underwent dental treatment under general anesthesia. Parents/caregivers filled out a questionnaire that, in addition to sociodemographic data, also contained questions about the oral hygiene habits of people with developmental disabilities. The obtained data were analyzed with descriptive statistics.

Results: A total of 15 women and 28 men with an average age of 17.49±9.57 years participated in the research. Out of a total of 43 participants, 32 (74.42%) maintain oral hygiene with the help of parent/caregiver. The largest number (N=16) of respondents brush their teeth once a day, three once a week and three never brush their teeth. When asked about the use of fluoride toothpaste, most of them answered that they use them sometimes (37.21%). The majority of respondents (72.09 %) do not use additional products for protection of oral health at all, including xylitol (88.37 %).

Conclusion: The obtained data suggest that additional education of parents/caregivers on oral hygiene maintenance and the use of additional oral health preservation products is needed in individuals with developmental disabilities.

Key words: Oral Hygiene Habits; People With Developmental Disabilities; General Anesthesia

ASSESSMENT OF GENERAL PRACTITIONERS' AND PAEDIATRICIANS' KNOWLEDGE ABOUT DENTAL CARIES AND ITS PREVENTION

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Aim: The aim of this study was to determine the knowledge of dental caries and prevention methods among family physicians and pediatricians.

Materials and Methods: 446 family physicians (general practitioners) and pediatric specialists participated in the cross-sectional study. The questionnaire consisted of three parts (demographic and professional characteristics, recognition of various pathological changes in the oral cavity detected during the examination, and knowledge of dental health in children).

Results: Examination of the oral cavity of patients was performed by 376 (84.3%) physicians. The self-assessment of knowledge about the oral cavity was considered almost satisfactory by 186 respondents (41.7%), insufficient by 158 respondents (35.4%), and satisfactory by 102 respondents (22.9%). 355 respondents (79.6%) considered caries to be a chronic disease. When asked about the knowledge of the caries-preventive effect of fissure sealants, just as many people answered positively as negatively.

Conclusion: The physicians participating in the study demonstrated with their answers to the survey questions that they have insufficient knowledge about caries prevention procedures and planning for the occurrence of irreversible changes. The results suggest that better education of physicians about oral health is needed.

Key words: Pediphysicians; Pediatricians, Caries, Caries Prevention, Knowledge

ENDODONTICS AND RESTORATIVE REHABILITATION VS. EXTRACTION IN A PATIENT WITH DIFFICULTIES

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Aim: 1. Raise the level of awareness of parents/guardians about the importance of regular examinations and controls of patients with difficulties 2. Demonstrate a trend of increasing restorative and endodontic procedures in relation to extraction, which was imperative for a long time due to the aforementioned difficulties.

Materials and Methods: Data were used that were systematically collected from 1 January 2005 to 31 December 2018 about persons with disabilities, who were enabled to undergo dental restoration treatment under general anesthesia, and who gravitate to the area of Mostar, Bosnia and Herzegovina. During data collection, the following data were recorded: Date and place of birth, Sex, Urgency of intervention, Duration of the procedure, Preoperative dental examination, Date of treatment, Medical condition, Performed dental treatments.

Results: From January 2005 to December 2018, there were 7,085 patients with difficulties and 1,220 patients requiring urgent dental treatment. Dental treatment was performed on 2,636 teeth in total, given this number of patients. A total of 1,013 restorative procedures were performed, with 179 teeth requiring endodontic treatment. Out of a total of 2636 teeth, 711 teeth were extracted. The rest of the dental procedures included preventive procedures and prosthetic rehabilitation. A significant increase in the frequency of

endodontic procedures and restorative procedures rather than tooth extraction was observed in the stated period of time.

Conclusion: In addition to all the factors that led to the stated parameters, we believe that the greatest effect was produced owing to dialogue with parents/caregivers, in which they clearly explained all the advantages/benefits of these two therapies. We have no data that similar research was conducted in the same area

Key words: Patients With Difficulties; Tooth Extraction; Restorative Treatment; Endodontic Treatment; Extraction

ANTIBIOTICS CONSUMPTION IN REPUBLIC OF CROATIA DURING THE FIVE YEAR PERIOD

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Aim: The aim of this research was to investigate consumption of most prescribed antibiotics in public health system's dental offices from 2015. to 2020. in Croatia.

Materials and Methods: This retrospective study collected data from all public health system's dental offices in Croatia. 1.535.139 data were collected from the Central Information Health System of Croatia (CEZIH) in the period of five years. Sample contained data about types of prescribed antibiotics, number of antibiotics' prescription, number of prescribers and geological locations of dental practices.

Results: The consumption of antibiotics is expressed in Defined Daily Dose per 1000 inhabitants per day (DID), which is calculated using this formula: Utilization in DDDs x 1000/ No. of inhabitants x No. of days in the period of data collections. In 2015. DID for amoxicillin with clavulanic acid was 1.4 and in 2019. 2.0, in 2015. DID for amoxicillin was 0.3 and in 2019. 0.4 DID, in 2015. DID for Clindamycine was 0.1 and in 2019. 0.1, in 2015. DID for metronidazole was 0.1 and in 2019. 0.1. The highest increase in five year time period (119%) was for metronidazole.

Conclusion: In the observed period the most prescribed antibiotic was Amoxicillin with clavulanic acid followed by Amoxicillin, Clindamycin, and Metronidazole. with significant increased consumption in 2019 for all of antibiotics, but especially metronidazole.

Key words: Antibiotics consumption; Defined Daily Dose

TRUE COMBINED ENDODONTIC – PERIODONTAL LESION THERAPY: A TWO CASE REPORT

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Aim: Pulpal-periodontal disease is defined as a simultaneous inflammation of the pulp and periodontal tissues, in which bacterial infection spreads through mutual communication in these closely related anatomical regions. There are 3 types of lesions: primary endodontic, primary periodontal, and true combined endodontic-periodontal. The most clinically complex type is the combined lesion, in which both the pulp and periodontal tissues are inflamed. Therefore, for a successful outcome, it is necessary to perform both root canal treatment and periodontal therapy.

Materials and Methods: This report shows two similar cases treated at the Department of Dental Medicine, University Hospital of Split. After a thorough diagnosis, following the recommended therapeutic protocol, the first treatment step was mechanical and chemical root canal treatment with three-dimensional canal obturation and postendodontic restoration. This was followed by the initial periodontal therapy. The Guided Biofilm Therapy® (GBT) protocol (EMS, Vallée de Joux, Switzerland) for root planing and scaling was used to remove all bacteria and calculus from the tooth surface.

Results: At the first follow-up after 6 months, the need for additional interventions, i.e., periodontal reconstructive surgical therapy, was assessed. The first case proved to be sufficiently healed. On the other hand, full thickness flap surgery with Emdogain® - enamel matrix derivative (Straumann, Villeret, Switzerland) placement in the intrabony periodontal defect was performed in the other case. Further follow-up at 6, 12 and 24 months showed adequate healing of the lesion in both cases.

Conclusion: The success of combined endodontic-periodontal lesion therapy depends largely on the correct diagnosis and consequently on the choice of the appropriate treatment protocol. Sequential treatment with root canal treatment as the first step, periodontal treatment as the second step and regular follow-up examinations to assess the need for further interventions is a crucial aspect for long-term tooth preservation.

Key words: Endo-Perio Lesion; Endodontic Treatment; Causal Periodontal Treatment; Regenerative Periodontal Surgery; Emdogain

KNOWLEDGE ABOUT ORAL HEALTH AND ORAL HYGIENE HABITS IN THE ADULT POPULATION: CROSS-SECTIONAL STUDY

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Aim: This questionnaire-based cross-sectional survey aimed to determine oral health knowledge and assess oral hygiene habits and oral hygiene product use among the adult population in Croatia.

Materials and Methods: The survey was conducted using a self-administered online questionnaire among 2126 respondents. Questions addressed respondents' demographic characteristics, oral health and hygiene knowledge, oral hygiene habits, oral hygiene product use, and factors influencing oral hygiene product choice. The results of the study showed that toothbrush and toothpaste were the most commonly used oral hygiene products.

Results: Only 34.1 % and 19.1 % of participants used floss and interdental brushes daily, respectively. The feeling of freshness and cleanliness (72.8 %) and the recommendation of the dentist' (69.3 %) have the greatest influence on the choice of oral hygiene products. Employees in dental professionals and higher than average socioeconomic status were significant predictors of higher overall oral health knowledge. Data were analyzed using descriptive statistics and generalized linear regression analysis.

Conclusion: The results showed good oral health knowledge among respondents. Most respondents regularly maintain oral hygiene with toothpaste and a toothbrush, but do not pay enough attention to the hygiene of the interdental spaces

Key words: Oral Health; Oral Hygiene Habits; Knowledge; Demography; Socioeconomic Status

NEURAL NETWORKS IN AGE AND SEX ESTIMATION FROM ORTHOPANTOMOGRAMS IN CHILDREN

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Aim: The goal of the research was to develop a convolutional neural network (CNN) that will be able to distinguish the age and sex of children from orthopantomographic x-rays. Such a system does not yet exist, and could improve modern dental medicine, specifically forensic dentistry, many times over, because it is extremely difficult to determine sex manually using only orthopantomogram X-rays.

Materials and Methods: The research used 598 orthopantomogram images from the database of the Department of Dental Anthropology, Faculty of Dentistry, University of Zagreb. Within the orthopantomographic images, 20122 tooth marks were marked in the form of a square (bounding box) that framed each individual tooth so that they resembled intraoral X-ray images of individual teeth. Furthermore, both the orthopantomographic images and the bounding boxes were divided into three groups: a training group 407/13742, a validation group 96/3181, and a test group 95/3199. The training group was presented to the CNN with all the data, the exact age and sex of the patient. The results were tested on the validation group and the CNN was fine-tuned in relation to the obtained results. The test model had no influence on the CNN training process and these results are presented as final.

Results: We conducted 16 experiments with parameter changes. When estimating age, the CNN obtained the result of estimation accuracy in the test group with an average of 1.41 years of error, the median is 1.11 years. In the validation group, the accuracy is slightly higher, with an average of 1.34 years and a median of 1.04 years. When estimating gender, the CNN obtained an estimation accuracy of 63.01% in the test group. In the validation group, the accuracy is slightly lower, 62.43%. The developed CNN model successfully determined age and sex from orthopantomograms with some error. According to previous research, it is concluded that a larger number of samples would bring better results. Also, compared to the results obtained from the 2022 study, in which X-rays of individual teeth were observed, which are comparable to the frames used in this study, the precision of our model is higher because it includes all patient's teeth. This information tells us that for a more complete estimation of age, it is necessary to include more teeth of the same person. The next phase of research will include precise segmentation of all teeth individually where all surrounding structures will be ignored.

Conclusion: Considering the nature of CNNs, an even more accurate prediction result from artificial intelligence can be expected. This research was funded by the Croatian Science Foundation, project number IP-2020-02-9423, Tooth Analysis in Forensic and Archaeological Research.

Key words: Forensic Dentistry; Neural Network Models; Pediatric Dentistry; Radiography

KNOWLEDGE, HABITS AND ATTITUDES OF PARENTS ABOUT THE ORAL HEALTH OF THEIR KINDERGARTEN CHILDREN IN THE TERRITORY OF THE REPUBLIC OF CROATIA

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Aim: This study aimed to assess the knowledge, habits and attitudes of parents of kindergarten children about their children's oral health. 805 parents of children of kindergarten age from different parts of the Republic of Croatia participated in this research.

Materials and Methods: The research was conducted via Google form questionnaire. In addition to demographic data, the questionnaire contained questions about parents' attitudes to the impact of certain foods on a child's oral health and maintaining children's oral health.

Results: 66.9% of respondents believe that caries is a disease that cannot be transmitted, and 66.3% of respondents taste food from the same spoon with which they will feed the child. 37.31% of children eat sweets or snacks every day. Only four parents (0.5%) knew how old the child should be at the first dentist visit, while 46% of parents believed that the child should be 4-6 years old at the first visit. It was observed that children who have a greater fear of dentists also have more caries-affected teeth ($R = 0.172$; $P < 0.001$) or have previously experienced toothache ($R = 0.187$, $P < 0.001$) or some other type of trauma in the oral cavity ($R = 0.086$; $P < 0.001$). 46.6% of parents stated they needed to be sufficiently informed about preventive measures to protect their child's oral health.

Conclusion: Most parents of children of kindergarten age in the Republic of Croatia do not have adequate knowledge about preventive methods for preserving their children's oral health.

Key words: Children; Kindergarten; Caries

POLYMERIZATION EFFECTIVENESS OF A DUAL-CURE BULK-FIL MATERIAL UNDER DIFFERENT CURING CONDITIONS

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Aim: The aim of this study was to investigate Vickers microhardness of a dual-cured bulk-fill „alkasite” material under variable light-curing and self-curing conditions.

Materials and Methods: The „alkasite” material Cention (Ivoclar Vivadent, Schaan, Liechtenstein) was prepared in cylindrical molds of 2 and 4 mm thickness and cured according to three protocols: (I) immediate light-curing at 1100 mW/cm² for 20 s, (II) delayed (5 min) light-curing at 1100 mW/cm² for 20 s, and (III) self-curing in the dark for 20 min. Before measurements, specimens were stored in distilled water at 37 °C in the dark for 24 h to complete post-cure polymerization. Vickers microhardness was measured with a load of 100 g and 15 s dwell time on the specimen surfaces (0 mm), 2 mm, and 4 mm. Eight specimens were fabricated per experimental group (n=8).

Results: The values of microhardness ranged from 44.3-69.8 VHN. The microhardness measured at 4 mm (44.3-52.9 VHN) was significantly lower than the values measured at 0 mm and 2 mm (51.8-69.8). When comparing the three curing protocols, 0-mm and 2-mm layers showed significantly higher microhardness for light-cured specimens compared to self-cured specimens, while the comparison between immediate light-curing and delayed light-curing showed no statistical significance. At 4 mm depth, all three curing protocols achieved statistically similar microhardness values.

Conclusion: While a 5-minute delay in light-curing had no significant effect on Vickers microhardness, self-curing resulted in significantly lower microhardness values. These results suggest that chemically initiated polymerization cannot fully compensate for the lack of light irradiation in the lower regions of thick layers. This study was supported by Croatian Science Foundation (IP-2019-04-6183).

Key words: Composite Resins; Dental Materials; Self-Curing Of Dental Resins

APATITE PRECIPITATION ON SURFACES OF EXPERIMENTAL COMPOSITES: A FOURIER-TRANSFORM INFRARED SPECTROSCOPY STUDY

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Aim: To investigate the potential of experimental resin composites functionalized with bioactive glasses for the precipitation of apatite on the material surface.

Materials and Methods: Experimental composites were prepared by mixing 5-40 wt% of bioactive glass 45S5 or a low-sodium bioactive glass in a photocurable resin system. All composites contained a total filler content of 70 wt%. One composite containing only 70 wt% of inert fillers served as a negative control. The composites were light-cured ($n = 3$ per experimental group) and stored in phosphate-buffered saline at 37 °C for 3 months. After immersion, the composite samples were dried and their surfaces were analyzed using a Fourier-transform infrared spectrometer with an attenuated total reflectance diamond accessory. Thirty scans per spectrum were acquired in absorbance mode in a spectral range of 3500-400 cm⁻¹ and a resolution of 4 cm⁻¹.

Results: The Fourier-transform infrared spectra of the experimental composite surfaces showed spectral bands recognized as vibrations of functional groups of the resin system (C=O, C=C, C-H, C-O-C) or inorganic fillers (Si-O-Si). Apatite was identified from spectral bands at 560 and 600 cm⁻¹ assigned to PO₄ bending, which were clearly visible for the materials with 20 and 40 wt% of the conventional bioactive glass 45S5 or the low-sodium bioactive glass. For the materials with 10 wt% of bioactive glass, an inconclusive result was obtained because the low signal intensity at 560 and 600 cm⁻¹ could not be distinguished with certainty from the spectrum of the control composite. For the composites with the lowest amount of bioactive glass (5 wt%), no traces of apatite were detected in the infrared spectra.

Conclusion: The experimental composites containing 20-40 wt% of two types of bioactive glass were shown to precipitate apatite on their surface, which may be beneficial for sealing the marginal gap and preventing secondary caries. This study was supported by Croatian Science Foundation (IP-2019-04-6183).

Key words: Composite Resins; Dental Materials; Spectroscopy, Fourier Transform Infrared

CALCIUM RELEASE FROM EXPERIMENTAL COMPOSITE MATERIALS FUNCTIONALIZED WITH COPPER-DOPED MESOPOROUS BIOACTIVE GLASS NANOSPHERES

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Aim: To investigate the release of Ca²⁺ ions from experimental composite materials with the addition of 1-10% copper-doped mesoporous bioactive glass nanospheres (Cu-MBGN).

Materials and Methods: Four experimental composites based on a light-curable Bis-GMA/TEGDMA (60:40) resin matrix with 1, 5, and 10 wt% Cu-MBGN were prepared. A material containing 10% conventional bioactive glass 45S5 was prepared as a reference. All materials contained a total filler load of 70 wt%. The concentrations of Ca²⁺ released from the experimental composites were measured by the Arsenazo III method using a dual-beam UV-Vis spectrophotometer (Genesys 180, Thermo Fisher Scientific, Waltham, MA, USA) calibrated with standard solutions containing 0.05-5 mg/L Ca²⁺. Light-cured specimens of the experimental composites ($d = 6$ mm, $h = 2$ mm) were immersed in 3 mL of distilled water for 24 hours, after which their eluates were analyzed. Subsequently, the samples were again immersed in 3 mL of distilled water for 7 days and the concentration of Ca²⁺ released was measured again.

Results: The highest concentration of Ca²⁺ was measured after one day in the eluate of the material containing 10% conventional bioactive glass (1.41 mg/L), while the concentrations of Ca²⁺ measured after 7 days were lower (0.30 mg/L) and were statistically similar to the values measured for the material with 1% Cu-MBGN after 7 days of immersion (0.17 mg/L). Lower Ca²⁺ values that were statistically similar for the 1-day and 7-day time points were measured for the materials with 1% (0.17-0.24 mg/L) and 5% Cu-MBGN (0.39-0.42 mg/L) Cu-MBGN. The material with 10% Cu-MBGN was the only one that showed an increase in Ca²⁺ release after 7 days (0.71 mg/L) compared to 1 day (0.35 mg/L). Experimental composite materials functionalized with copper-doped mesoporous bioactive glass nanospheres showed the ability to release Ca²⁺, which corresponded to the proportion of bioactive glass in the material.

Conclusion: The materials showed the highest Ca²⁺ release during the first 24 hours, except for the material functionalized with 10% Cu-MBGN. This study was supported by Croatian Science Foundation (IP-2019-04-6183).

Key words: Composite Resin; Dental Materials; Calcium

TEMPERATURE RISE DURING THE POLYMERIZATION OF EXPERIMENTAL COMPOSITE MATERIALS FUNCTIONALIZED WITH COPPER-DOPED MESOPOROUS BIOACTIVE GLASS NANOSPHERES

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Aim: To investigate the temperature rise during light-curing of experimental composite materials with the addition of 1-10% copper-doped mesoporous bioactive glass nanospheres (Cu-MBGN).

Materials and Methods: Four experimental composite materials containing 1 wt%, 5 wt%, and 10 wt% of Cu-MBGN were prepared. An additional reference material was functionalized with 10 wt% of conventional bioactive glass 45S5. For all experimental materials, inert fillers were added up to a total content of 70 wt%. The composite specimens were light-cured in cylindrical Teflon molds with a thickness of 2 mm and a diameter of 6 mm using a Bluephase PowerCure curing unit (Ivoclar Vivadent, Schaan, Liechtenstein) with a radiant exitance of 1100 mW/cm². During light-curing, the temperature rise was measured in real-time using a FLIR ETS320 thermographic camera (FLIR, Wilsonville, OR, USA).

Results: The maximum temperature values and the time to reach the maximum temperature were determined from the temperature rise curves. The highest temperature increase was measured for the material functionalized with 5% Cu-MBGN (48.8 °C), while the materials with 1% and 10% Cu-MBGN had lower values (47.5-48.1 °C), with no statistically significant differences between the three mentioned values. A significantly lower temperature increase was measured for the material with 10% conventional bioactive glass 45S5 (36.0 °C). The material with 10% Cu-MBGN showed the fastest rise to maximum temperature (6.3 s), while the material with 10% conventional bioactive glass 45S5 showed the slowest temperature rise (12.8 s).

Conclusion: Experimental composites functionalized with copper-doped mesoporous bioactive glass nanospheres showed significant temperature rise and reached the maximum temperature during polymerization in a short time. This study was funded by the Croatian Science Foundation (IP-2019-04-6183).

Key words: Composite Resin; Dental Materials; Temperature

SCANNING ELECTRON MICROSCOPY AND ELEMENTAL ANALYSIS OF APATITE FORMED BY EXPERIMENTAL COMPOSITE MATERIALS

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Aim: The aim of this study was to compare the ability of experimental composite materials functionalized with two types of bioactive glass to precipitate apatite on their surface.

Materials and Methods: Two series of experimental composite materials with bioactive glass were prepared. Four experimental composite materials were functionalized with 5, 10, 20, and 40 wt% of conventional bioactive glass 45S5. The other four experimental composite materials were functionalized with the corresponding amounts of a customized low-sodium fluoride-containing bioactive glass. The experimental composite material without bioactive glass (containing only 70 wt% of reinforcing fillers) was used as the negative control. Specimens of experimental composites ($n = 3$; $d = 6$ mm, $h = 2$ mm) were light-cured and immersed in phosphate-buffered saline at 37 °C. After 3 months of immersion, scanning electron microscopy and energy-dispersive x-ray spectroscopy analyses were performed.

Results: Scanning electron microscopy showed the formation of a needle-like crystalline precipitate on the surfaces of the experimental composite materials with 10-40 wt% of the conventional and customized bioactive glass. On some micrographs, the precipitate was formed in cracks on the surface of the resin-rich layer. The materials with the highest amount of bioactive glass (40 wt%) were fully covered with the precipitate of uneven density. The energy-dispersive x-ray spectroscopy analysis identified the main elements of apatite, Ca and P, on the surface of the experimental composite materials with 10-40 wt% of both types of bioactive glass. On the surface of the materials functionalized with the customized bioactive glass, fluorine was additionally identified, indicating the potential for fluorapatite precipitation.

Conclusion: The experimental composite materials functionalized with the customized low-sodium fluoride-containing bioactive glass showed similar ability to form apatite on their surface as the materials with the conventional bioactive glass 45S5. The formation of apatite could be useful in clinical practice for sealing marginal gaps at the tooth/restoration interface. This study was funded by the Croatian Science Foundation (IP-2019-04-6183).

Key words: Composite Resin; Dental Materials; Hydroxyapatite

WHEN ENDODONTICS FAILS – AN AUTOGENOUS TRANSPLANTATION AS A TREATMENT OPTION

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Aim: In autogenous tooth transplantation, the lost tooth is replaced with an impacted or erupted tooth from the same patient.

Materials and Methods: The first molar is most often affected by severe caries or failed endodontic treatment, which may lead to its extraction at a young age. This usually coincides with the development of the wisdom tooth, which is a good candidate for replacing the extracted molar. A 20-year-old female patient was referred to the Department of Endodontics and Restorative Dentistry for treatment of tooth 36. The patient had previously undergone endodontic treatment 5 years ago, but recently experienced severe pain and swelling. Clinical examination revealed sensitivity to percussion and swelling of the left side of the mandible with painful lymph nodes.

Results: Radiographic examination revealed periapical radiolucency around the mesial and distal roots of tooth 36 with the presence of a separated fragment of instrument in the lower third of the mesial root protruding through the apical foramen. The patient underwent multiple endodontic treatments with additional antibiotic therapy, but the symptoms did not resolve. Since there was a wisdom tooth with incomplete root development, it was decided to perform autogenous transplantation to the site of tooth 36. At the four-month follow-up, the patient was symptom-free, the vitality test was positive, and the radiograph showed a well-integrated wisdom tooth.

Conclusion: This case suggests that while the indications for autogenous transplantation may be limited, careful patient selection and the use of suitable techniques can result in positive functional and aesthetic outcomes.

Key words: Autogenous Transplantation; First Lower Molar; Endodontic Retreatment

CAREGIVERS' KNOWLEDGE ABOUT ORAL HEALTH OF THE ELDERLY AND INFIRM

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Aim: To examine the knowledge of caregivers employed in homes for the elderly and infirm about oral health maintenance of their residents.

Materials and Methods: 80 employees of homes for the elderly and infirm from Split and its surroundings participated in this cross-sectional study. The directors of the homes were contacted by e-mail and phone. Caregivers were given a questionnaire that contained general demographic information, questions about oral health maintenance of home residents and caregivers' knowledge of oral health.

Results: Total of 73.75% of respondents received training on oral health care as part of their education. 92.5% of the respondents, once or twice a day help residents, who are unable to do it themselves, with oral hygiene, 72.5% of whom also clean their tongues. 73.75% of respondents use antiseptic-soaked gauze when residents have no teeth or in case of limited mouth opening. 6.25% of them do this when residents have sores in their mouths. Only 55% of respondents clean their residents' dentures every day. 52.5% of residents visit dentist when necessary, while only 11.25% visit them regularly. Almost all respondents believe that non-healing sores in the oral cavity can represent potential malignant lesions (95%), as well as that oral health is related to the quality of taste, chewing and swallowing (96.25%). The level of knowledge related to the impact of oral diseases on systemic disorders is satisfactory (75%), while worse results were observed for questions related to comorbidities of the elderly (50%). 65.5% of respondents don't know that acquired pneumonia can be prevented by mechanical cleaning, the use of antiseptics and regular dental care.

Conclusion: Most of the caregivers know how to properly perform oral hygiene of their residents, but they don't perform it often enough. Caregivers consider oral health important for general health, but they need additional education on methods to preserve oral health.

Key words: Oral Health; Elderly; Experiences Of Caregivers

CONSEQUENCES OF THE ABSENCE OF DENTAL SUPPORT IN CANCER MANAGEMENT – CASE REPORT: METASTASIS UNDERDIAGNOSED AS OSTEONECROSIS

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Aim: Although metastatic tumors in the jaw bones are extremely rare, they can be found in patients with advanced-stage cancer. The most common primary site of metastatic tumors in the jaw bones, with more frequent occurrences in the molar region of the mandible, are lung, breast, and kidney cancer.

Materials and Methods: Variations in the locations of primary cancers were observed among the sexes, wherein breast cancer was the most common primary cancer in women and lung cancer in men. The prognosis for metastatic tumors is poor and depends principally on the primary tumor site and its extent. The estimated survival from the moment of diagnosis of the solid malignant metastases in the jaw bones is around seven months. Clinical findings involve swelling, bleeding, and tooth mobility, while patients' subjective complaints include pain and paresthesia.

Results: We present the case of a patient (78) with advanced prostate cancer in palliative care, whose symptoms of pain, swelling, and increased tooth mobility in the mandibular area had been attributed to suspected osteonecrosis. Given that prostate cancer generally does not metastasize in the jaw bones and that the patient refused dental treatment to confirm the diagnosis due to his poor condition, zoledronate therapy was discontinued on suspicion of osteonecrosis. After six months of intense jaw pain, and treatment with anti-biotics and opioid analgesics, the family finally requested an examination by a house-call dentist. The clinical examination revealed lesions in the right molar region of the mandible that was suggestive of a metastatic tumor. In the hospital dentistry setting, a clinical examination, panoramic radiograph, and biopsy for the immunohistochemical analysis were performed. The immunohistochemical positivity pointed to the pulmonary origin of the primary tumor. The patient was then treated with palliative radiotherapy of the jaw bone metastasis on the right side of the mandible, as a result of which the pain disappeared. Metastatic tumors of the jaw bones are rare, but in oncology patients with unclear exophytic and other changes as well as radiographic lesions in the area of the oral cavity, we must rule out a metastatic tumor of the jaw bones. Discontinuing zoledronate without a definitive dental clinical diagnosis of osteonecrosis is harmful to the patient, because it favors the further progression of the underlying disease, and in the case of metastases, the patient suffers severe pain.

Conclusion: Early recognition, diagnosis, and treatment of metastatic tumors are crucial for the improvement of a patient's quality of life and prognosis.

Key words: Cancer; Mandibular Metastatic Tumor; Osteonecrosis; Palliative Radiotherapy

SECOND LOWER MOLAR'S MESIAL ROOT MORPHOLOGY - PILOT STUDY

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Aim: Endodontic treatment of mandibular second molars is challenging considering its complex morphology. The aim of this study is to analyze variations of root canal systems within mesial root of second mandibular molars and to classify them according to Vertucci.

Materials and Methods: The research was conducted on CBCT scans from the archives of two radiology centers in the city of Zagreb. Out of a total 1,982 CBCT scans, 364 scans were analyzed showing second mandibular molars with completed growth and root development that were not endodontically treated and did not have external or internal root resorption. Also, teeth with anomalies such as radix entomolaris, paramolaris and C-shaped canals were excluded from the analysis. In addition to the age and gender of the patients, the number of root canals in the mesial root was recorded and they were classified according to Vertucci.

Results: Out of total 364 scans, 402 second mandibular molars were found. According to the Vertucci classification, 12.19% of mesial roots of second mandibular molars belonged to type I, type II 39.80%, type III 1.24%, type IV 45.7%, type V 0.75%, type VI 0.50%, type VIII 0.25%. Mesial root morphology in second mandibular molar that would belong to type VII was not found. Morphology of mesial root in second mandibular molars showed considerable diversity, and most commonly found forms are type II and type IV.

Conclusion: Given the numerous morphological features, characteristics and large percentage of roots whose canals merge in apical part, a thorough analysis of the endodontic space itself is required before starting endodontic treatment so that the outcome of the

treatment is as predictable and successful as possible.

Key words: Endodontics; Anatomy; Second Mandibular Molar; Vertucci

ASSESSMENT OF ORAL HEALTH IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Aim: This study aims to describe the perspective of the „average“ patient suffering from chronic obstructive pulmonary disease (COPD) towards oral health and to compare oral health between patients with regard to the stage of the disease according to the recommendations of the Global initiative for obstructive lung disease, GOLD from 2023.

Materials and Methods: The World Health Organization's oral health questionnaire was used as a validated indicator of the condition of the oral cavity, and the results were compared by gender and GOLD. 85 respondents (60% men and 40% women) were included in the research, of which 29 (34.12%) belong to the A category, and 56 (65.88%) to the E category according to GOLD. The questionnaire was conducted at the Special Hospital for Pulmonary Diseases in Zagreb.

Results: „The „average“ patient with COPD in this study is a 69 years old male that has completed elementary or high school (76.47%). According to the stage of COPD, it is most often stage 3 or 4 (28.24% or 41.18%) and substage E (65.88%). They don't have any (29.4%) or have up to 9 of their own teeth (30.58%) and rate the condition of their teeth as bad or very bad (42.35%). The majority (43.53%) state that they maintain adequate hygiene, however as many as 7% of respondents never brush their teeth or prosthetic appliance. They state that it has been more than 2 years since their last visit to the dentist (62.35%), of which 71.7% state that it has been more than 5 years. Participants classified as GOLD A have more teeth than those classified as GOLD E, however not statistically significant. Difficulty biting and chewing occurs more often in clinically advanced COPD ($p=.0057$ and $p=.0014$).

Conclusion: Considering that the „average“ COPD patient has fewer than 9 teeth and that more advanced stages of the disease result in more pronounced difficulties related to the oral cavity, there is a need to educate these patients about the importance of oral health

Key words: Copd; Oral Health; Questionnaire

EDUCATIONAL INTERVENTION EFFECTS ON THE PERCEPTION OF UNPROFESSIONAL CONTENT ON SOCIAL MEDIA OF STUDENTS OF MEDICINE AND DENTAL MEDICINE

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Aim: Social media (SM) is part of everyday communication. Professional behavior of healthcare professionals is more exposed to evaluation through these online services. This research aimed to examine the effects of an educational intervention (one-semester elective course) on the perception of unprofessional content on SM among students of medicine at the Faculty of Medicine and dental medicine at the School of Dental Medicine at the University of Zagreb.

Materials and methods: A „one-group pretest-posttest design“ study design was used. An online questionnaire containing an instrument on the perception of unprofessional

content was distributed at the beginning (T1) and end of the course (T2). McNemar's test with Bonferroni correction was used for statistical analysis of differences in the perception of unprofessional content on SM between T1 and T2.

Results: A total of 68 responses were collected. The questionnaire was filled out just at T1 by eight, just at T2 by seven, and both times by 53 students. The sample was predominantly female (79.2%), with an average age of 20 years, and with more dental medicine students (69.8%). One respondent claimed no SM use. Of the 19 items in the instrument, „minor criminal activities“ (98.1%), „posts that reveal information about patients“ (98.1%), „posts that include explicit sexual content“ (96.2%), and „posts that show drug use“ (96.2%) were finally (T2) rated as the most unprofessional. Although statistically significant differences in increased perception of unprofessional content on SM at the end of the course compared to the beginning were found in the initial analysis, with Bonferroni correction, there were no statistically significant differences.

Conclusion: The perception of unprofessional content among medicine and dental medicine students is high. Although the educational intervention did not lead to statistically significant changes in increasing the perception of professional content, it strengthened the understanding of the concept of professionalism on SM among students.

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Key words: Social Media; Professionalism; Medicine; Dental Medicine, Students

THE EFFECT OF THERMOCYCLING AND ORAL ANTISEPTICS ON FORCE DEGRADATION OF ELASTOMERIC CHAINS: AN IN VITRO STUDY

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Aim: The aim of this study was to evaluate the influence of thermocycling and oral antiseptics on force degradation of elastomeric chains.

Materials and methods: Total sample size of 100 consisted of 5 different elastomeric chains: Clear generation II Power chain (Ormco), GC Ortho chain (GC), F. M. Ringlelet Elastomeric chain (RMO), Happy elastics spool chain (Forestadent), AlastiK Chain (3M Unitek). Initially, they were activated on double length and the force was measured with a dynamometer. Then, they were exposed to three cycles of artificial aging (thermocycling and immersion in oral antiseptic) which simulate 30 days of usage. After each cycle the force was measured. Oral antiseptics used in this study were: Oectenident (Schulke), Vitis Orthodontic (Vitis), Perio Plus (Curaprox), Listerine Total Care (Johnson & Johnson) and distilled water as control.

Results: All specimens showed statistically significant force degradation over the tested period ($p<0.001$). The greatest force decrease was measured after the first cycle. The median value of force degradation in antiseptics was 55.5% (42% in control: distilled water- 84.78% in Listerine). The average value of force reduction was highest in Perio Plus - 58%, while for other solutions was: 57.2% in Oectenident, 56.3% in Vitis, 53.8% in Listerine and 52% in distilled water. In terms of different brands of elastomeric chains, the greatest force degradation was found in Forestadent- 81.1%, followed by: 3M- 62.7%, GC- 56%, Ormco - 49%, and RMO- 48%.

Conclusion: Since the statistically significant force reduction was only found when Forestadent chains were immersed in Listerine, it could be concluded that the usage of oral antiseptics does not influence force delivery of elastomeric orthodontic materials.

Keywords: Orthodontics; Antiseptics; Orthodontic Appliances