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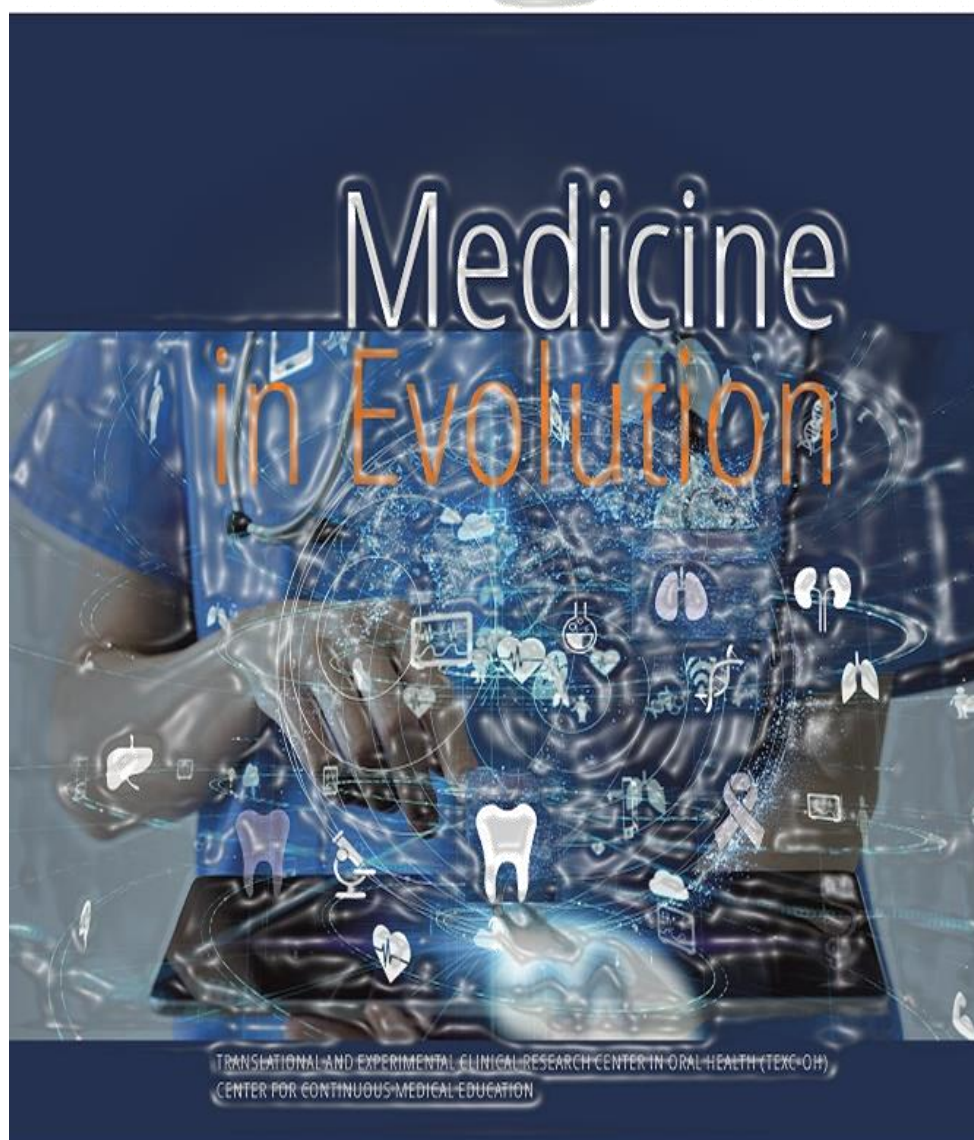
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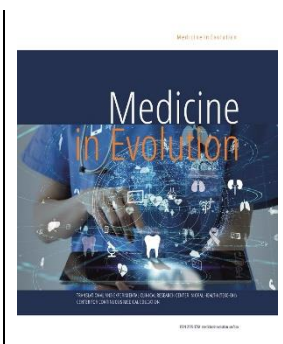
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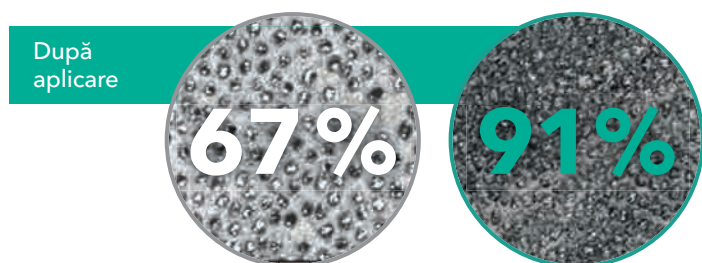
**Doar în legătură cu pasta de dinți

Referințe: 1. Nathoo S, et al. J Clin Dent. 2009;20(Spec Iss):123-130; 2. Docimo R, et al. J Clin Dent. 2009;20(Spec Iss): 17-22.; 3. Report Deon Hines-0003, 2016; 4. Studiu Ipsos cu privire la utilizarea produsului elmex® SENSITIVE PROFESSIONAL Repair & Prevent, efectuat în Polonia, rezultate după 2 săptămâni de utilizare, cu 325 de participanți (2017).

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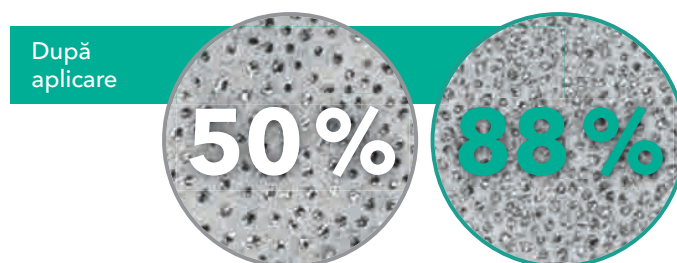
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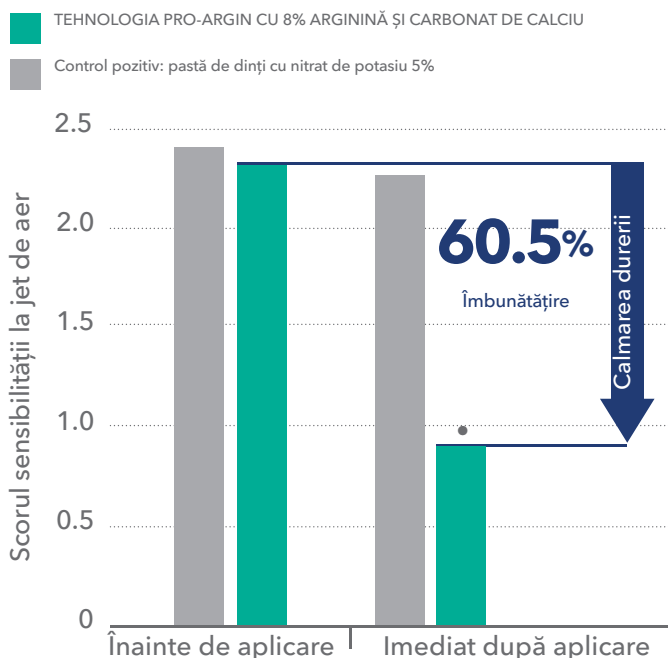
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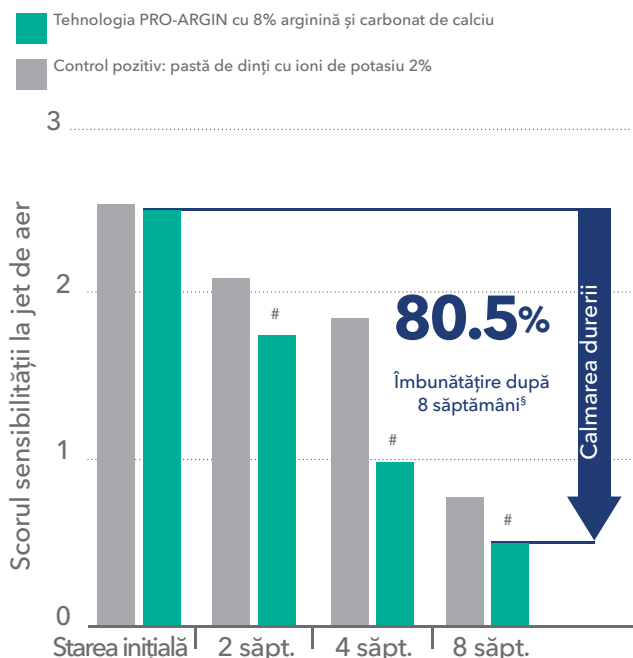
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† În comparație cu starea inițială (sunt prezentate doar datele relevante)
• Semnificativ statistic ($p < 0,001$)

Calmarea semnificativă de lungă durată a durerii din sensibilitatea dentară după 2, 4, și 8 săptămâni de utilizare^{4,§,&}



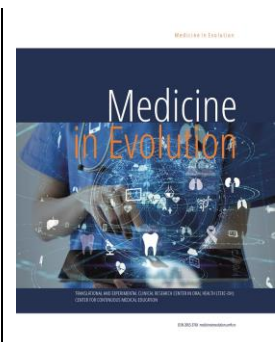
§ În comparație cu starea inițială
& În comparație cu o pastă de dinți comercială desensibilizantă, ce conține 2% ioni de potasiu și 1450 ppm de fluor (NaF)
Semnificativ statistic ($p < 0,05$)

*Studiu in vitro, imagini reale de microscopie confocală după 5 aplicări ($p < 0,05$);
**Pentru calmarea imediată aplicați direct pe suprafața sensibilă și masați ușor cu vârful degetului timp de 1 minut.
Referințe: 1. Hines D, et al. Poster acceptat, July 2018 IADR. Colgate- Palmolive Company 2018.; 2. Hines D, et al. Poster #0742, March 2018 AADR. Colgate-Palmolive Company 2018.; 3. Nathoo S, et al. J Clin Dent. 2009;20(Spec Iss):123 -130;
4. Docimo R, et al. J Clin Dent. 2009; 20(Spec Iss): 17- 22.

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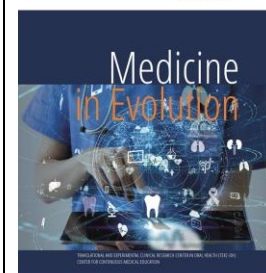
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Effects of physical therapy and CO₂ treatment in patients with hypertension and lumbar pathology in Buziaș resort



Gheorghe L.^{1,8}, Apostol A.³, Vătăman (Tălîngă) A.A.^{2,6,8}, Codreanu A.M.^{2,4,6}, Mederle A.L.⁷, Suciuc O.⁵, Onofrei R.R.^{5*}, Borza C.⁶

¹Department of Finance-Faculty of Economics and Business Administration, Western University, West University of Timisoara, Romania

²Doctoral School, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

³Department of Internal Medicine II, Cardiology I Discipline, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

⁴Department of Medicine, Faculty of Medicine, „Vasile Goldis” Western University, Arad, Romania

⁵Department of Rehabilitation, Physical Medicine and Rheumatology, Research Center for Assessment of Human Motion, Functionality and Disability, "Victor Babeș" University of Medicine and Pharmacy Timisoara, Timisoara, Romania

⁶Department of Functional Sciences – Pathophysiology, Center for Translational Research and Systems Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

⁷"Victor Babeș" University of Medicine and Pharmacy Timisoara, Timisoara, Romania

⁸Buziaș Spa Treatment Company SA, Buziaș, Romania

Correspondence to:

Name: Onofrei Roxana Ramona

Address: Department of Rehabilitation, Physical Medicine and Rheumatology, Research Center for Assessment of Human Motion, Functionality and Disability, "Victor Babeș" University of Medicine and Pharmacy Timisoara, Eftimie Murgu Sq. No. 2, 300041 Timisoara, Romania

Phone: +40 761927990

E-mail address: onofrei.roxana@umft.ro

Abstract

One of the key benefits of carbon dioxide water bath treatment in Buziaș resort is the arterial vasodilatation which will have the effect of lowering blood pressure, relieving the feeling of joint stiffness and promoting muscle relaxation. Cardiac rehabilitation carried out in the Spa Medical Centre of the Parc Hotel Complex aims at restoring the patient's functional capacity, damaged by diseases as well as developing compensatory mechanisms that improve and maintain the quality of life.

Keywords: cardiac rehabilitation, Buziaș spa resort, carbon dioxide treatment, functional capacity

INTRODUCTION

Hypertension is the most important risk factor for stroke and one of the three major risk factors for coronary heart disease. The risk of coronary heart disease or stroke correlates directly with blood pressure across the entire spectrum of blood pressure values, and it is impossible to draw a line between blood pressure levels that do not pose a risk and those that are associated with cardiovascular disease risk. Hypertension is therefore best defined pragmatically, for example as the blood pressure level above which treatment trials have shown that lowering blood pressure values brings benefits [1].

Given that cardiovascular disease is common in the general population and also one of the major public health problems, we thus understand the seriousness and implications for health status. Cardiac rehabilitation is an interdisciplinary approach to patients with functional limitations secondary to cardiac disease and it is concerned with the optimal rehabilitation of patients from medical, physical, psychological, social and vocational perspectives [2].

Balneotherapy is important in cardiovascular rehabilitation because it makes use of the remedies offered by nature, i.e. carbon dioxide waters and climate. Buziaş is a spa resort of national interest, in Timiş county, located in the south-west of Romania, in the Banat Plain, and is known for its beauty, historical importance and, of course, for the main balneological profile represented by the cardiac rehabilitation [3]. The most important natural therapeutic factors of the Buziaş spa resort are CO₂ -water baths, dry CO₂ bathing called mofette and sedative bioclimate.

The carbon dioxide water from Buziaş - Parc Hotel Complex are used in cardiovascular rehabilitation, they are a mixture of bicarbonate, magnesium-calcium, chloride, bromide and calcium waters. Mofettes are free CO₂ emanations, i.e dry CO₂ bathing, used for therapeutic purposes in specially designed rooms in the form of a "Roman circus" that allow the gaseous carbon dioxide to accumulate in a sloping way, as it is heavier than air. The existing mofettes in the Medical Center of the Parc Hotel Complex in Buziaş are characterised by dry gas emanations rich in carbon dioxide in concentrations of about 98% associated with low amounts of CH₄, O₂ and N₂. Increased carbon dioxide in the blood increases the extensibility of cardiac muscle fibers during diastole and consequently has a favorable effect on heart filling, increasing cardiac output.

Physical activity counseling and individually prescribed and supervised exercise training are core components of a comprehensive cardiac rehabilitation program, comprising 30-50 % up to 70% of all cardiac rehabilitation activities [4].

Aim and objectives

The main aim of this study was to observe changes in cardiac parameters in cases of prehypertension and hypertension associated with lumbar spondylosis and intervertebral disc pathology after CO₂ treatment and specific physical therapy.

In this case, physical therapy can be used for therapeutic and rehabilitation purposes. During the kinetotherapy session, the aim is to restore mobility, increase muscle strength, exercise training, restore balance and proprioception. The intensity and frequency of the exercises should be dosed according to the patient's capacity, taking into account warm-up at the beginning and cool-down or stretching at the end. Hydrokinetic therapy through physical exercises helps to increase muscle strength without loading the joints with body weight [5,6].

Exercises in cardiac rehabilitation are based mostly on aerobic endurance training. Further components such as resistance exercises, coordination exercises, flexibility and strength exercise training are to be added [4].

MATERIALS AND METHODS

Patients

Patients addressing to physical medicine and rehabilitation services with hypertension and prehypertension, lumbar spondylosis and intervertebral disc pathology were recruited to be included in the study. Inclusion criteria were 1) age over 18 years, 2) lumbar spondylosis, 3) intervertebral disc pathology with no clinical neurologic deficit, 4) patients with hypertension stage I and II, 5) patients with prehypertension, 6) no history of cardiac failure.

The study included 32 patients, 13 with prehypertension, and 19 patients with stage I (n=14) and stage II (n=5) hypertension. All patients had history of lumbar spondylosis and intervertebral disc pathology. All patients received gaseous CO₂ bathing, CO₂ water baths and physical therapy.

Study protocol was explained to all participants and those who fulfilled the inclusion criteria and agreed to participate in the study signed an informed consent. The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of „Victor Babes” University of Medicine and Pharmacy Timisoara, Romania.

Assessments

Clinical assessment was performed at the first visit including physical examination (posture and mobility assessment). Demographic data were collected, including age, sex, weight and height. Patients who were included in the study were evaluated at the beginning, on the first day of treatment and then on the fourteenth day of treatment by measuring cardiac parameters using blood pressure monitor and pulseoximeter. The treatment applied to patients consisted in carbon dioxide baths, moffettes associated with physical therapy.

The spa treatment with CO₂ water was made in a rectangular bathtub made of acrylic material (Figure 1) to keep the water at a constant temperature. The recording was performed at room temperature, with patient in relaxed position. The exposure time in the carbon dioxide water bath at 33-34 °C was 15 minutes.



Figure 1. Spa treatment with CO₂ water bath

All patients included in this study underwent the treatment with mofettes, which are gaseous CO₂ baths, used in specially designed rooms in the form of a "Roman circus" (Figure 2) that allow the gas to accumulate in a sloping way, as it is heavier than air. The exposure time was 10 minutes on the second and third step.



Figure 2. Mofettes treatment

After finishing the CO₂ water bath and mofettes, we evaluated blood pressure and heart rate with a blood pressure monitor and peripheral oxygen saturation with a pulseoximeter. After clinical evaluation and balneotherapy treatment every subject received back-friendly cardiovascular exercise and lumbar stabilization exercises organized in group therapy sessions (Figure 3). The program included: gymnastic exercises such as analytical mobilization of body segments at a slow pace, associated with breathing, with a warm-up role, exercises to intensify muscle group metabolism to achieve vasodilation and decrease peripheral resistance, aerobic endurance training using cycle ergometer up to 75% of maximum heart rate. The kinetotherapy program included also several lumbar stabilization exercise in order to improve the strength, endurance and motor control of the abdominal and lumbar trunk musculature and back school education. The exercise program was conducted carefully taking into consideration patients' cardiac pathology.



Figure 3. Group exercise training

Pain intensity was quantified on the visual analogue scale (VAS) from 0 (no pain) to 100 (maximal pain). Patients also completed the EQ-5D-5L questionnaire, a standardized measure of health status [7]. The five dimensions assessed by EQ-5D-5L questionnaire are mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The answers are ranked on 5 levels, from 1 indicating no problem, to 5 indicating unable/ extreme problems.

Statistical analysis was performed with MedCalc software. All normal distributed data are presented as mean and standard deviation. Paired student t tests were performed to compare cardio-vascular parameters, pain and quality of life parameters before and after

therapy. One way Anova analysis was performed to identify differences between groups. Statistical significance was set at $p < 0.05$.

RESULTS

Thirty-two patients (mean age 62.1 ± 7.14 years; 53.13% males) met the inclusion criteria and were included in the study. 13 of these patients had prehypertension, 14 had stage I hypertension and 5 stage II hypertension [8]. Patients characteristics are presented in Table 1.

Table 1. Characteristics of patients with prehypertension

	Prehypertension patients (n=13)	Stage I hypertension patients (n=14)	Stage II hypertension patients (n=5)
Age (years) mean \pm SD	60.1 \pm 8.40	61.71 \pm 6.17	66.8 \pm 4.97
Weight (kg) mean \pm SD	75 \pm 10.27	85.65 \pm 7.35	99.6 \pm 9.15
Height (cm) mean \pm SD	166.23 \pm 9.35	173.36 \pm 8.30	174.8 \pm 8.93
BMI (kg/m ²) mean \pm SD	27.07 \pm 2.11	28.48 \pm 1.33	32.60 \pm 1.84
Lumbar spondylosis , %	61.54	50	80
Intervertebral disc pathology , %	38.46	50	20

In the group of patients with prehypertension kinetotherapy was performed by 61.54% of patients, the rest of 38.46% had physiotherapy. Kinetotherapy was performed by 64.29% of patients with stage I hypertension, and by 40% of patients with stage II hypertension. The rest performed physiotherapy. The cardio-vascular parameters before and after CO₂ therapy are presented in Table 2. A significant decrease of both systolic and diastolic blood pressure was observed after therapy.

Table 2. Cardio-vascular parameters before and after therapy, for all patients

	Before therapy	After therapy	p
Systolic blood pressure (mmHg)	138.91 \pm 16.64	120.06 \pm 14.68	<0.0001
Diastolic blood pressure (mmHg)	82.25 \pm 9.43	69.81 \pm 6.85	<0.0001
Heart rate (b/min)	72.09 \pm 10.65	73 \pm 7.64	>0.05
SpO2 (%)	96.5 \pm 2.04	97.03 \pm 2.04	>0.05

data are presented as mean \pm SD

A significant decrease in systolic and diastolic blood pressure was observed after therapy in patients with prehypertension, as well as in those with stage I hypertension ($p < 0.0001$). In patients with stage II hypertension, only the systolic blood pressure had significantly decreased after treatment ($p < 0.0001$). A significant increase in SpO₂ was observed only in stage II hypertension patients ($p = 0.04$). All parameters are presented in Table 3.

Table 3. Cardio-vascular parameters before and after therapy, according to hypertension stages

	Prehypertension patients (n=13)		Stage I hypertension patients (n=14)		Stage II hypertension patients (n=5)	
	Before	After	Before	After	Before	After
Systolic blood pressure (mmHg)	123.46 \pm 9.19	105.46 \pm 9.31	146.42 \pm 6.61	126.21 \pm 5.02	162 \pm 4.47	136.8 \pm 7.32
Diastolic blood pressure (mmHg)	76.3 \pm 8.07	65.92 \pm 6.42	86.78 \pm 8.27	73.28 \pm 5.99	85 \pm 9.66	70.2 \pm 5.63
Heart rate (b/min)	68.3 \pm 8.17	70.07 \pm 6.22	75.28 \pm 11.8	74.71 \pm 8.03	73 \pm 11.91	75.8 \pm 8.89
SpO2 (%)	97.23 \pm 1.69	97 \pm 1.82	95.64 \pm 2.37	96.57 \pm 1.65	97 \pm 1	98.4 \pm 0.89

data are presented as mean \pm SD

Pain was significantly improved, with a decrease of VAS score from 6.5 ± 1.16 to 3.37 ± 0.83 ($p < 0.0001$), and a decrease in the pain dimension of the EQ-5D-5L questionnaire ($p < 0.0001$). All EQ-5d-5L questionnaire dimensions were significantly lower after CO₂ therapy and physical therapy (Table 4).

Table 4. Pain and EQ-5D-5L scores before and after therapy, for all patients

	Before therapy	After therapy	p
VAS	6.5 ± 1.16	3.37 ± 0.83	<0.0001
EQ-5D-5L Mobility	2.87 ± 0.7	2.12 ± 0.33	<0.0001
EQ-5D-5L Self- care	2.62 ± 0.49	1.62 ± 0.49	<0.0001
EQ-5D-5L Usual activities	3.53 ± 0.5	2	<0.0001
EQ-5D-5L Pain/ Discomfort	3.56 ± 0.5	2.4 ± 0.49	<0.0001
EQ-5D-5L Anxiety/ depression	3.65 ± 0.48	2.21 ± 0.42	<0.0001

data are presented as mean±SD

Pain, as well as all dimensions of EQ-5d-5L questionnaire significantly decreased, except for EQ-5d-5L Mobility in stage II hypertension patients where no significant difference was noted. All pain and EQ-5D-5L scores before and after therapy, according to hypertension stages, are presented in Table 5.

Table 5. Pain and EQ-5D-5L scores before and after therapy, according to hypertension stages

	Prehypertension patients (n=13)		Stage I hypertension patients (n=14)		Stage II hypertension patients (n=5)	
	Before	After	Before	After	Before	After
VAS	6.69 ± 1.43	3.46 ± 0.96	6.42 ± 0.93	3.42 ± 0.64	6.2 ± 1.09	3 ± 1
EQ-5D-5L Mobility	3 ± 0.91	2.23 ± 0.43	2.78 ± 0.42	2	2.8 ± 0.83	2.2 ± 0.44
EQ-5D-5L Self- care	2.61 ± 0.5	1.61 ± 0.5	2.64 ± 0.49	1.64 ± 0.49	2.6 ± 0.54	1.6 ± 0.54
EQ-5D-5L Usual activities	3.61 ± 0.5	2	3.42 ± 0.51	2	3.6 ± 0.54	2
EQ-5D-5L Pain/ Discomfort	3.61 ± 0.5	2.53 ± 0.51	3.42 ± 0.51	2.28 ± 0.46	3.8 ± 0.44	2.4 ± 0.54
EQ-5D-5L Anxiety/ depression	3.61 ± 0.5	2.23 ± 0.43	3.71 ± 0.46	2.28 ± 0.46	3.6 ± 0.54	2

data are presented as mean±SD

DISCUSSIONS

This study aimed to evaluate the dynamics of cardiac parameters, e.g. blood pressure (BP), heart rate (HR) and peripheral oxygen saturation (SpO₂) before and after treatment with mofettes, carbon dioxide water baths and physical therapy treatment in patients diagnosed with prehypertension and stage I and II hypertension associated with lumbar spondylosis and intervertebral disc pathology. We found a significant decrease of both systolic and diastolic blood pressure after CO₂ therapy.

The CO₂ water from Parc Hotel Complex in Buziaş spa resort is used for therapeutic purposes for cardiovascular rehabilitation, being the main profile of the resort. They are a mixture of bicarbonate, magnesium-calcium, chloride, bromide and calcium waters. The composition of the mineral water is as follows: CO₂ 1443.2 mg/l, Cl 579.9 mg/l, Bicarbonate 2025.2 mg/l, Mg 110.2 mg/l, Fe 3 mg/l, Na 685.5 mg/l, K 19 mg/l, Ca 206.8 mg/l, Bromine 0.3 mg/l, Iodine 0.1 mg/l, mineralization 3743.7 mg/l [9].

Elimban et al. [10] observed in their study that CO₂ water bath temperature influences blood flow and vascular density in a group of rat hind limb ischemia. In their study CO₂ water bath therapy at 34°C increased maximum, minimum and mean blood flow by 190%-

600% in the ischemic rat limb. In our study we applied carbon dioxide water baths to patients at 33°C to 34°C for 15 minutes over a period of two weeks.

In this study we found a significant decrease of both systolic and diastolic blood pressure after CO₂ therapy, from 120.06±14.68 for systolic blood pressure and 69.81±6.85 for diastolic blood pressure. When comparing the systolic and diastolic blood pressure values before and after therapy, we observed a significant decrease for both types of blood pressure, except of the diastolic blood pressure in patients with stage II hypertension.

Finzgar et al. [11] studied one lower limb of 33 subjects exposed to gaseous CO₂ to improve the perfusion and oxygenation of tissues. During CO₂ therapy the flux in cutaneous microcirculation in the studied extremity increased, thus results confirm a local vasodilatory effect of applied CO₂ therapy. In our study we found an increase in both parameters, respectively heart rate (b/min) from 72.09±10.65 to 73±7.64 (p>0.05) and peripheral oxygen saturation (SpO₂) from 96.5±2.04 % to 97.03±2.04 (p>0.05), although the differences were not statistically significant.

In this study, we also evaluated the percentage of physical exercises represented by kinetotherapy. We observed that the stage I Hypertension group had the best percentage of kinetotherapy performance, which was 64.29% compared to 40% of stage II Hypertension patients. Meng et al, in 2015 studied the effect of aerobic exercise in patients with chronic low back pain concluding that aerobic exercises decrease pain, increase fitness [12].

Aerobic exercise can reduce disability and improve the functional status of patients with CLBP by increasing fitness levels, helping patients conduct activities of daily living. Gordon and Bloxham in 2016 studied the effects of aerobic exercises on patients with chronic low back pain. A general exercise programme which combines muscular strength, flexibility and aerobic fitness would be beneficial for rehabilitation of non-specific chronic low back pain [13].

Ronai P. in 2019 made some exercise recommendations for cardiac patients with chronic nonspecific low back pain indicating an individualized approach to developing exercise program with a constant monitoring patient for new or worsening symptoms [14]. Our patients had an individualized exercise program though they had a group session. Some authors studied the combined effect of carbon dioxide baths and physical exercise on EKG parameters and cardiac rhythm variability in postmyocardial infarction patients noticing less number and duration of episodes of ST -segment ischemic depressions and the trend to normalization of heart rhythm [15].

Our study has some limitations, like the relatively small sample size. Larger studies are needed to have a more specific insights on the beneficial effects of balneotherapy in conjunction with physical therapy based on hypertension stages.

CONCLUSIONS

Cardiovascular diseases are one of the most common forms of disease globally, which is why we believe it is important to apply balneotherapy and physical therapy to these patients. The present study started from the desire to find out whether the treatment with carbonated mineral water baths and mofettes associated with kinetotherapy, applied in the Medical Centre of the Parc Hotel Complex in Buziaş spa resort, influences the dynamics of the cardiovascular parameters. Considering the small group studied, we can admit that this preliminary result influences the dynamics of blood pressure, heart rate and SpO₂ values, supporting the necessity to perform balneotherapy and physical therapy together.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of „Victor Babes” University of Medicine and Pharmacy Timisoara, Romania (protocol nr. 28/10.01.2022).

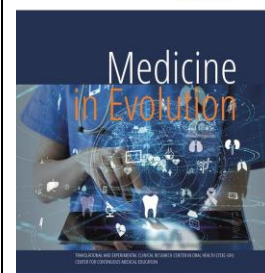
Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

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The influence of Entropy in general consumption of anesthetics regarding sex and age



Timar C.^{1,2}, Negrău M.^{1,2}, Pantiș C.^{1,2}, Juncar M.²

¹*Emergency County Hospital Oradea (Romania), Department of Anaesthesia and Intensive Care (ATI1), Oradea, Romania*

²*University of Oradea, Department of Dental Medicine, Faculty of Medicine and Pharmacy, Oradea, Romania*

Correspondence to:

Name: Timar Călin

Address: Gh. Doja 65, Oradea, Romania

Phone: +40 745135488

E-mail address: calin_bh@yahoo.com

Abstract

The study that we conducted highlights the role of entropy monitoring in general anesthesia, with a focus on its potential benefits for both patients and hospitals. The study aimed to investigate how entropy monitoring during general anesthesia can reduce the need for sevoflurane, as well as hypnotic and opioid medications. The study was conducted over half a year in 2019 and involved 30 patients who required general anesthesia within institution. The 30 patients were divided into three groups: Group1: Patients with metabolic disorders; Group2: Patients without metabolic disorders; Group3: Control group.

The study found that entropy monitoring resulted in a nearly 20% reduction in the need for intrasurgical anesthetics in patients with metabolic disorders (Group 1) compared to the control group (Group 3). This reduction could lead to faster postoperative awakening and potentially fewer complications related to anesthesia.

The study also examined sevoflurane consumption patterns based on age and gender.

Keywords: entropy, metabolic disorders, sevoflurane, age, sex

INTRODUCTION

Commonly used anaesthetic drugs can be dosed according to total body weight or ideal body weight based on lipid solubility. The volume of distribution is changed in obese patients with regard to lipophilic drugs. This is especially true of benzodiazepines and barbiturates, among the commonly used anaesthetic drugs [1-6].

The choice of volatile agents is based on the physical characteristics of tissue solubility, expressed as blood-gas partition coefficients and fat-blood partition coefficients. Some evidence suggests that desflurane may be the anaesthetic of choice because of a more consistent and rapid recovery profile that is seen with sevoflurane and propofol [7-9,10]. However, a more recent study has suggested that the difference in immediate recovery between sevoflurane and desflurane is not clinically significant [11]. Even though nitrous oxide provides some analgesic effect and is eliminated rapidly, we prefer to avoid it because of the high oxygen demand in the obese [12].

Aim and objectives

The ability to monitor the levels of patient consciousness while undergoing general anaesthesia is clinically important because an inadequate level of anaesthesia can result in patient intra-operative awareness, an overdose of anaesthesia can result in a prolonged recovery and an increased risk of postoperative complications [13-18]. The use of depth of anaesthesia monitors is claimed to provide a more accurate assessment of the level of anaesthesia and aid the tailoring of the anaesthetic dose to the individual patient. Tailored dosing potentially reduces drug consumption and the number of adverse effects, with possibly faster emergence from anaesthesia with an earlier patient discharge from the recovery room [19].

Entropy is one of the most important steps in the complex management of patients is the modulation of anaesthesia for every patient needs. We also believe that by individualizing the anaesthesia by monitoring the entropy it is possible to obtain an appropriate management for hemodynamic complications during anaesthesia including tachycardia, bradycardia, hypotension and hypertension. [31]

MATERIAL AND METHODS

We conducted a study over half a year (2019) for 30 patients who need general anaesthesia from a total of 1626 patients available within the host institution, and meet the inclusion criteria for monitoring the entropy. Patients were subsequently divided into 3 groups of 10 patients: in group A patients with metabolic disorders obesity and/or diabetes mellitus, the group B patients without metabolic disorders and control group C patients without monitoring entropy. [31 32]

Inclusion Criteria: age limit: between 18 years to 80 years; gender: male and female; ASA physical status I, II, III. [31,32]

Exclusion Criteria: cardiac pacemaker; atrial fibrillation at the time of presentation in the operation theatre; any subject with an epidural catheter, placed pre-operatively; allergy to Propofol or another anaesthetic drugs; pregnancy; the presence of neuromuscular disease; the presence of neurologic disease. [31,32]

We employed in the three groups of patients undergoing general anesthesia a number of variables such as: age, sex, anesthetic duration (in minutes), change of heart rate baseline at 10 min, change of systolic blood pressure baseline at 10 minutes, the use of sevoflurane (mL),

fentanyl (mg) rocuronium (mg) and propofol (mg) and a flow of fresh gases amounting to 2 L/min (50% oxygen and 50% air). [31,32]

At the end of anaesthesia, we calculate the total consumption of intrasurgical anaesthetics for each patient and for patient groups.

Evaluating the impact of general anaesthesia guided with Entropy on the hemodynamic instability represented and characterized by high blood pressure episodes (hypertension), or low blood pressure (hypotension) and by high cardiac rate (tachycardia), or low cardiac rate (bradycardia). [31,32]

Data were centralized using Microsoft Excel, and statistical validation was performed using the MedCalc v18.11.3 program.

RESULTS

The minimum age of patients included in the study with diabetes and obesity in the first study group was 18 years, and the maximum age was 78 with a mean of 50.3 years, and the characteristics of the variables followed are presented in table 1.

Table 1. Clinical and intraoperative characteristics under general anaesthesia of patients with metabolic disorders and entropy monitoring (Group 1)

Sex/Age (years)	HR before intubation	TAS before intubation	Entropy RE/SE before IOT	OR time (min)	Sevofluran (mL)	Rocuroniu (mg)	Fentanyl (mg)	Propofol (mg)
F/39	94	131	94/89	85	18	60	0.40	150
M/78	92	163	99/89	225	104	110	0.40	150
M/18	91	141	99/91	50	17	50	0.60	150
M/49	83	150	97/89	240	56	200	0.65	300
F/58	71	122	97/87	50	16	50	0.20	160
F/31	81	131	98/90	50	18	50	0.20	170
M/66	63	130	96/85	45	13	40	0.35	100
M/56	60	116	95/88	60	13	50	0.30	180
F/46	130	180	95/88	60	16	50	0.30	150
F/62	87	171	96/85	240	73	100	0.65	150
Average years 50,3	Total			1105	344	760	4.05	1660

State Entropy (SE), Response Entropy (RE), HR (heart rate), TAS (systolic blood pressure), OR (operation time), IOT (oro-tracheal intubation)

Patients without comorbidities, from the second group studied, had a minimum age of 18 years and a maximum of 80 years with an average of 53.2 years, and the characteristics of the monitored variables can be seen in table 2.

Table 2. Clinical and intraoperative characteristics of patients under general anaesthesia without metabolic disorders and entropy monitoring (Group 2)

Sex/Age	HR before intubation	TAS before intubation	Entropy RE/SE before IOT	OR time (min)	Sevofluran (mL)	Rocuroniu (mg)	Fentanyl (mg)	Propofol (mg)
F/34	130	127	100/91	60	18	40	0.30	120
M/31	75	134	97/91	70	20	50	0.35	150
M/64	47	128	96/88	105	17	110	0.40	120
F/70	70	189	100/89	150	20	80	0.60	60
M/48	65	133	99/90	120	19	70	0.30	170
F/18	107	124	100/89	45	12	40	0.30	80

Sex/Age	HR before intubation	TAS before intubation	Entropy RE/SE before IOT	OR time (min)	Sevofluran (mL)	Rocuroniu (mg)	Fentanyl (mg)	Propofol (mg)
M/68	73	148	97/88	60	14	40	0.25	150
M/45	75	129	99/89	45	16	35	0.25	150
M/74	75	140	97/91	60	22	50	0.30	180
F/80	95	150	99/98	230	78	50	0.45	150
Average Years 53,2	Total			945	236	565	3.5	1330

The patients in the control group are noticeable in table 3, the minimum age being 18 years and the maximum age 79 years, with an average of 51,4 years (table 3).

Table 3. Clinical and intraoperative characteristics under general anaesthesia of patients without entropy monitoring (Group 3)

Sex/Age	HR before intubation	TAS before intubation	Entropy RE/SE before IOT	OR time (min)	Sevofluran (mL)	Rocuroniu (mg)	Fentanyl (mg)	Propofol (mg)
F/60	78	119	No monitor	180	33	110	0.40	150
M/67	88	158	No monitor	105	44	60	0.35	150
F/18	109	167	No monitor	200	40	50	0.40	120
M/62	85	190	No monitor	98	16	70	0.30	150
M/64	85	130	No monitor	110	30	60	0.35	200
F/36	73	130	No monitor	230	45	200	0.50	250
F/45	109	167	No monitor	200	40	180	0.40	150
M/35	95	142	No monitor	230	84	120	0.50	200
M/48	88	158	No monitor	100	44	60	0.35	150
F/79	78	119	No monitor	180	33	110	0.40	180
Average Years 51,4	Total			1633	409	1020	3.95	1700

The monitored characteristics were significantly different between the three groups of patients $P < 0.0001$ (MedCalc v18.11.3).

At the end of anaesthesia, we calculate the total consumption of intrasurgical anaesthetics for each patient and for patient groups according to the figure 1. The average age distribution is shown in Table 4

Sevoflurane Consumption by Age:

Age-Related Trends: The data continues to show that there are variations in sevoflurane consumption based on age. Patients in their 30s, 60s, and 80s tend to have higher sevoflurane consumption compared to other age groups. Patients in their 30s have notably higher sevoflurane consumption.

Reduced Consumption in Some Age Groups: It's notable that some patients, such as those in their 60s and 80s, also have relatively high sevoflurane consumption, while others, such as those in their 40s and 50s, have lower consumption.

Sevoflurane Consumption by Gender:

Gender Differences: Gender differences in sevoflurane consumption remain apparent in the updated data. On average, male patients still tend to require more sevoflurane than female patients.

Consistency with Previous Data: These findings align with the previous data, indicating that the gender difference in sevoflurane consumption is consistent.

Importance of Monitoring (No Monitor Group):

It's interesting to note that there is a group of patients labeled "No monitor" for Entropy monitoring. These patients appear to have relatively high sevoflurane consumption compared to those in previous data with Entropy monitoring. This observation suggests that the use of Entropy monitoring may influence sevoflurane consumption, as patients without monitoring tend to consume more sevoflurane. [31,32]

Table 4. Average age distribution

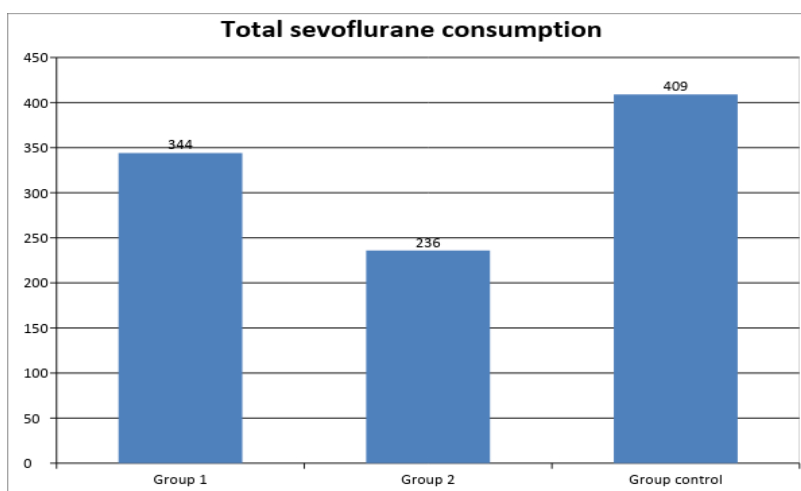
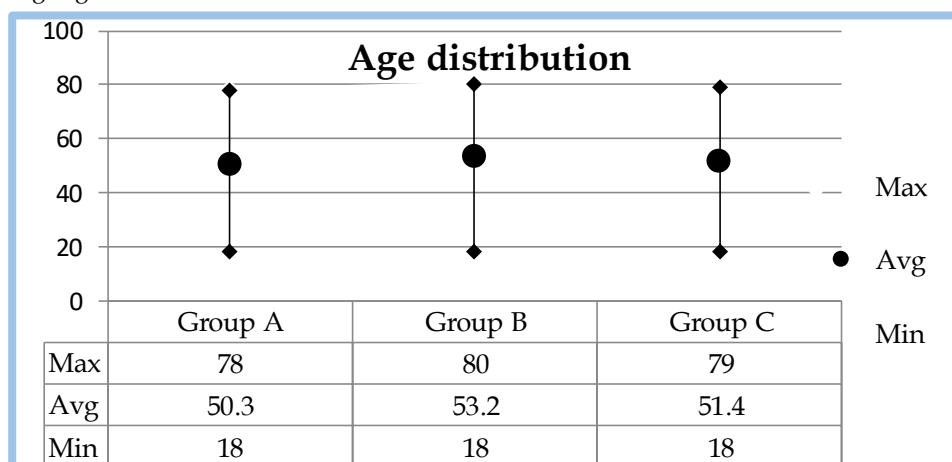


Figure 1. Total sevoflurane consumption (mL) in the three patient groups monitored

DISCUSSIONS

Entropy is a device which helps in analyzing electroencephalogram (EEG) and contains state entropy (SE) and response entropy (RE). SE is computed from the electroencephalogram in the 0.8- to 32-Hz range and should encompass mainly the hypnotic elements of the electroencephalogram, whereas response entropy is computed from 0.8 to 47 Hz, which includes a significant amount of the facial EMG. Thus when EMG activity is low, state entropy and response entropy should be the same, but with arousal and an increase in facial EMG, response entropy should increase. The initial clinical studies with this device showed that it produced results comparable to those of the BIS when tested with intravenous and inhaled hypnotic anaesthetics [20].

The GE Entropy Module uses the same unilateral self-adhesive fronto-temporal sensor as the BIS but specifically made for the GE product (i.e., they are not interchangeable). The module works only with GE monitoring systems with the appropriate software loaded. The

SE, RE, and a single channel of the raw electroencephalogram are displayed on the same screen as the other monitored variables. The displayed state entropy range is 0 (isoelectric EEG) to 91 (fully awake), and the response entropy range is 0 to 100. The anaesthetic range is 40 to 60, and the manufacturer recommends that state entropy outside this range may require a change in hypnotic dosing, whereas if the state entropy is in this range but the response entropy is more than 10 above the state entropy, more analgesic may be required [21, 22].

The GE Entropy™ Module is indicated for adult and pediatric patients older than 2 years within a hospital for monitoring the state of the brain by data acquisition of electroencephalograph (EEG) and frontal electromyograph (FEMG) signals. The spectral entropies, response entropy (RE) and state entropy (SE), are processed EEG and FEMG variables. In adult patients, response entropy and state entropy may be used as an aid in monitoring the effects of certain anaesthetic agents, which may help the user to titrate anaesthetic drugs according to the individual needs of adult patients. Furthermore, in adults the use of entropy parameters may be associated with a reduction of anaesthetic use and faster emergence from anaesthesia. The entropy measurement is to be used as an adjunct to other physiological parameters. Entropy is a measure of irregularity in any signal [23-28].

The results obtained in our study are clinically meaningful, with RE-SE difference of less than 10. Sevoflurane requirements are reduced with 16% and rocuronium with 25.5% at the patients with metabolic disorders and entropy monitor than the control groups without entropy, while maintaining hemodynamic stability. Complete blockade in the morbidly obese is necessary not just for surgeons, convenience but also to facilitate mechanical ventilation. The drug chosen is not as important as the state of paralysis [29, 30, 31,32].

This study shows the role of entropy in general anaesthesia for the patient and the hospital in order to reduce the need for volatile gases (sevoflurane) but also of hypnotic and opioids, bringing major benefits to the patient, and the economy of the hospital significantly reducing the costs of anaesthesia and reducing the number days spent in hospital, also avoiding postoperative complications related to anaesthesia.

With this study we demonstrate that the role of entropy in general anaesthesia for the patient safety is mandatory. The ability to monitor the levels of patient consciousness reduces the risk of an inadequate level of anaesthesia and intra-operative awareness which can cause significant suffering followed by post-traumatic stress disorder in some patients. Conversely, an overdose of anaesthesia can result in a prolonged recovery and an increased risk of postoperative complications and costs including permanent cognitive dysfunction for some patients. [31,32].

Clinical Significance: The study found that the differences between RE (response entropy) and SE (state entropy) were less than 10, indicating that the results obtained are clinically meaningful. Sevoflurane Consumption by Age:

Age-Related Trends: Looking at sevoflurane consumption, there appears to be a trend where younger patients (age <40) have higher average sevoflurane consumption, especially in the male group. This could be indicative of different anesthesia requirements based on age.

Reduced Consumption in Older Patients: In general, as patients get older (age 50-59, 60-69, and 70-79), the average sevoflurane consumption decreases. This suggests that older patients may require less sevoflurane during anesthesia, although the sample size for some of these age groups may be limited.

Sevoflurane Consumption by Gender:

Gender Differences: In the data presented, there seems to be a notable gender difference in sevoflurane consumption. On average, male patients appear to require significantly more sevoflurane than female patients, regardless of age.

Possible Gender-Specific Factors: These differences in sevoflurane consumption could be due to various factors, including physiological differences between genders, differences in

body composition, or variations in the types of surgeries performed on male and female patients.

Reduced Anesthetic Requirements: Patients with metabolic disorders who were monitored with entropy required 16% less sevoflurane and 25.5% less rocuronium compared to the control groups without entropy monitoring. Importantly, this reduction in anesthetic requirements did not compromise hemodynamic stability.

Individualized Anesthesia: The study suggests that, based on patient weight and individual responses, larger amounts of benzodiazepines, fentanyl, or sufentanil can be used. Conversely, smaller amounts of propofol are needed when considering real body weight. Vecuronium or rocuronium dosing should be based on ideal body weight initially and adjusted based on the neuromuscular blockade status.

Role of Paralysis: Complete neuromuscular blockade is emphasized in morbidly obese patients to facilitate mechanical ventilation during surgery. The choice of neuromuscular blocking agent is noted to be less important than achieving the desired state of paralysis.

Reduced Costs and Complications: The study highlights the potential benefits of entropy monitoring in terms of reducing the need for volatile gases and anesthetics. This, in turn, can lead to significant cost savings for the hospital and reduce the number of days patients spend in the hospital. It may also help prevent postoperative complications related to anesthesia.

CONCLUSIONS

Reduction in Anesthetic Use: The study concludes that entropy monitoring can lead to a nearly 20% reduction in the use of intrasurgical anesthetics in patients with metabolic disorders (diabetes and/or obesity) compared to the control group.

Faster Postoperative Awakening: Patients monitored with entropy experienced a faster postoperative awakening, which resulted in fewer hospitalization days for these patients.

Cost Savings: The use of entropy monitoring was associated with reduced postoperative costs and complications, particularly in patients with comorbidities.

Safety and Individualization: The study underscores the importance of entropy monitoring for patient safety. It reduces the risk of inadequate anesthesia levels and intra-operative awareness, which can lead to significant patient suffering and post-traumatic stress disorder. Conversely, it helps prevent anesthesia overdose, which can result in prolonged recovery and cognitive dysfunction.

Need for Further Studies: The study suggests that there is a need for wider and more comprehensive studies on entropy monitoring in anesthesia, given its potential benefits to the field of medicine. In conclusion, the updated data reinforces previous observations regarding sevoflurane consumption based on age and gender. Additionally, the presence of a "No monitor" group suggests the potential influence of monitoring on anesthetic consumption. Further analysis and consideration of clinical relevance and confounding factors are essential for a comprehensive understanding of the findings. Larger sample sizes and additional research may help validate these preliminary conclusions and explore contributing factors in more detail.

In conclusion, while these preliminary observations suggest some trends in sevoflurane consumption based on age and gender, a more in-depth analysis and consideration of clinical implications are necessary. Additionally, it's essential to interpret these findings in the context of the specific patient population and clinical practice guidelines. Further research and statistical testing may be needed to validate these initial conclusions and explore potential contributing factors.

In summary, the study indicates that entropy monitoring during general anesthesia can lead to significant benefits for both patients and hospitals, including reduced anesthetic requirements, faster recovery, cost savings, and improved safety. These findings highlight the potential of entropy monitoring as a valuable tool in the field of anesthesiology.

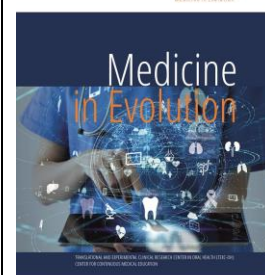
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Prevention of malpractice in dentistry



**Tănase A.^{1,3}, Timar B.⁴, Bojoga D.E.⁵, Negruțiu M.L.^{2,3}, Miok K.⁶,
Crăciunescu E.L.^{2,3}, Pop D.M.^{2,3}**

¹Department of Professional Legislation in Dental Medicine, Faculty of Dental Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

²Department of Prosthesis Technology and Dental Materials, Faculty of Dental Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

³Research Centre in Dental Medicine Using Conventional and Alternative Technologies, Faculty of Dental Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

⁴Department of Internal Medicine: Diabetes, Nutrition, Metabolic Diseases, and Systemic Rheumatology, Faculty of Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

⁵Department of Oral Rehabilitation and Emergencies in Dentistry, Faculty of Dental Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania

⁶Institution of Advanced environmental Research-ICAM, Vest University, Timișoara, Romania

Correspondence to:

Name: Emanuela Lidia Crăciunescu

Address: Eftimie Murgu square, no 2, Timișoara, Romania

Phone: +40 744616009

E-mail address: emanuela.craciunescu@umft.ro

Abstract

Aim and objectives; Prevention of medical malpractice is a current topic for both doctors and lawyers. Considering the consequences, proof of errors in medical practice becomes an issue that need to be considered in daily practice.

Material and method; Regarding the malpractice prevention in dental medicine, a 10 questions questionnaire was drawn up and had the role to highlight the dentist's legal knowledge and legal framework of their profession. After completing the questionnaires the answers were centralized and analyzed statistically.

Results; Dentist's from urban environment are more aware about malpractice and legal framework.

Conclusions; The main conclusion resulting from this study takes into account the importance of dentists knowing the legal consequences to which they are exposed when they are found to have committed malpractice. By adopting a diligent and prudent behavior in their relationship with patients, dentists are preventing a series of complaints that require specialized assistance.

Keywords: Medical malpractice, dentist, patient, medical legislation, complaint

INTRODUCTION

With the emergence of the era of globalization, access to information on internet, forums, groups and social networks, but also the increased demand for specialized medical services, dentists face the increased risk of a large number of relevant and less relevant complaints from patients regarding medical malpractice [1].

The legal liability of the dentist, as a result of finding and proving the commission of medical malpractice generates a series of medical and social consequences [2]. From a medical perspective, a series of damages can be caused to the patient his state of health as a result of the negligence, imprudence or insufficient medical knowledge of the dentist [3, 4]. On a social level, committing medical malpractice causes a decrease in patients' trust in the healthcare system, which will implicitly lead to the risk of destabilizing the number of those who require a certain medical service provider [5]. The management of the quality of dental services and dentist professional activity will also be strongly influenced by the stress induced as a result of accusations of medical malpractice from patients [6, 7]. An accusation of medical malpractice will generate a continuous state of stress for the doctor in question, which will manifest itself through anxiety, irritability, public disparagement and even an excessive fear of continuing to practice [8, 9].

Certainly, errors can occur in any profession, and even more in the medical field. It is the duty of professionals within the health system to foresee the risk of these errors and to adopt a diligent behaviour in the relationship with patients [10, 11].

In this context, it is necessary for dentists to resort to those methods, which prevent the occurrence of complaints determined by committing a case of medical malpractice [12].

Aim and objectives

The purpose and objectives of this research study is to analyze the level of awareness of dentists in Timiș County regarding the importance of knowing the ways to prevent malpractice in dental practice.

MATERIALS AND METHODS

To carry out this study, was chosen, as material and method, a questionnaire consisting of ten closed questions, which were focused on identifying the ways on which the dentists must relay in order to prevent medical malpractice. The questionnaire was addressed to a group of 51 dentists. Before distributing the questionnaire, the consent was requested from the dentists in order to participate in this conducted study. The purpose of this study was explained to all the participants and before completing the questionnaire, the dentists were invited to ask any question they considered necessary regarding this study. The questionnaires were distributed in different dental offices in Timiș County and the dentists had at their disposal one week to complete them. The questionnaire also included a series of general information regarding the participants like: demographic data that concerned the sex, age and the environment origin (urban/rural). The questionnaire was distributed for completion only to those who are working in private dental practices. Each of the 10 questions contained three answer options.

The first question analyzed the effects determined by the existence of effective communication between dentist and patient from the perspective of malpractice allegations. It was analyzed to what extent, effective communication between the dentist and patients can be considered a way to reduce the degree of dissatisfaction with regard to the medical procedure. Another concern was related to the percentage in which complaints regarding

possible cases of malpractices end up reaching a downward slope as a result of the diplomatic and professional interaction between doctors and patients.

The second question had the role of analyzing to what extent dentists are better protected in terms of potential malpractice charges if they have an increased level of education in currently legislation of medical practice. Starting from the consequences that occur on the profession of the dentist, once a possible accusation of malpractice looms over, we wanted to observe if the medical staff's has a minimum of legal knowledge that can prevent possible professional errors in medical care. Not infrequently there have been cases where doctors did not feel safe during the exercise of the profession, not knowing what decision to adopt, so that they will not later be accused of violating the medical legislation.

The third question, aimed to analyze the usefulness of training courses for dentists by specialized lawyers in malpractice litigation regarding the consequences to which practitioners are exposed once their guilt is proven. Knowing the sanctions that can be applied, once a dentist is found guilty in a case of malpractice, has a preventive character and a diligent behavior will be adopted from the beginning of the treatment by taking decisions regarding the risks and health status of patients. Finding that medical malpractice has been committed will lead to several forms of legal liability (civil, disciplinary, criminal), each of them produce different consequences on the life and profession of the dentist. Another aim was to analyze to what extent the participation in these courses helps dentists to adopt a prudent and diligent behavior in the relationship with patients, in order not to end up having to bear negative consequences.

One of the major problems faced by both medical specialists and patients refers to the lack of precision in certain situations of the legislation, which leaves room for interpretations in different cases. Starting from this argument, but also taking into account the large volume of normative applicable actions in the medical field, we analyzed in the fourth question the opinion of dentists regarding the possible improvements that should be made to the legislation, so that they feel protected in the relationship with patients and also against possible complaints regarding medical malpractice. Through this question, wants to observe the number of dentists who have identified or had to face some existing gaps in the legislation and to what extent these inconsistencies affected them during the exercise of the profession.

With the fifth question, we aimed to evaluate the degree to which the information transmitted through the media, distorts a series of aspects related to the quality of medical care provided by specialists can influence the opinion and attitude of patients, often encouraging them to make some unfounded accusations against doctors.

In the context of the sixth question, we wanted to evaluate the opinion of dentists regarding the collaboration between them and various specialists in the legal field. This collaboration would come to the support of medical service providers, in an attempt to make doctors to know which are the main rules that should be taken into account in the relationship with patients during the specialized care, to protect themselves as much as possible from the risk of committing various professional errors. We considered including this question, because in the medical field there are more and more rules that dentists risk not knowing, precisely because of their large volume of work, but also because most have no legal knowledge and are not preoccupied to update the existing information related to legislation.

The seventh question is addressed to the level of professional training of dentists, analyzing to what extent this aspect influences the prevention of malpractice accusations in all situations. This question was included in the questionnaire, starting from the premise that the high level of professional training of doctors is necessary but not a sufficient condition for guaranteeing a success treatment. Therefore, we wanted to analyze the opinion of dentists on this subject, in an attempt to see to what extent they believe that in all cases of medical

practice complaints from patients can be prevented. The high degree of professional training represents a guarantee in this sense.

The eighth question, aims to analyze the degree of prevention of malpractice situations of the dentists' that know the legal consequences to which they are exposed by committing various professional errors. We want to observe if the doctor's knowledge regarding legislation that regulates the forms of legal liability can be imposed upon them when they commit malpractice and can increase their awareness. Moreover, the aim is to analyze to what extent dentists become more diligent and cautious in medical practice when they note the legal and social consequences that have impacted other colleagues accused by patients of having committing malpractice.

The ninth question is addressed to one of the most important and current subjects of the legislation in the medical field, namely the respect of patients' rights. The purpose of this question was to analyze to what extent malpractice cases are prevented in medical practice when medical staff respect patients' rights. We started from the idea that, along with the doctor's failure to comply to patients' rights, the risk of professional errors increases.

The last question analyzes the most important element that the dentist must take into account in practice, namely that of requesting the patient's consent when carrying out the medical intervention. In this context, we wanted to investigate whether compliance with the consent to the medical act constitutes a way to prevent malpractice and also whether there are situations in which dentists are protected by the legal provisions even in the absence of expressing the patients' informed consent to the medical act.

RESULTS

The collected data were analyzed according to the background of the dentists.

Question 1: "Do you think that effective communication between the dentist and patients can contribute to increase the satisfaction degree with regard to medical services, thus decreasing the number of complaints regarding potential malpractice allegations?" The results showed that 7 from the rural area and 42 from the urban area believe that the decrease in the number of complaints regarding possible malpractice accusations is strongly influenced by good communication between the dentist and the patients. Only one from the urban environment believes that only in exceptional cases effective communication between the dentist and patients contributes to the prevention of malpractice, and also only one from the urban environment has the opinion that the decrease in the number of complaints regarding possible allegations of malpractice does not depend on the way the staff communicates with patients.

Question 2: "Do you consider that the increased level of education of dentists regarding the applicability of legislation in medical practice is a positive factor that can contribute to their increased protection against potential malpractice accusations?" The results showed that 5 from the rural and 24 from the urban environment believe that compliance with the legislation in the medical field in the relationship with patients provides greater safety for dentists, thus being able to prevent possible professional errors, 2 from rural areas and 18 from urban areas are of the opinion that the increased level of education of dentists regarding the applicability of legislation in medical practice is a positive factor that can contribute to their protection against accusations of malpractice, but for this it is necessary to better inform dentists about the legislation in the medical field by the competent professional bodies, and only 2 dentists from the urban environment stated that their increased level of legal education is a positive factor that can contribute to their increased protection against potential malpractice accusations.

Question 3: „Do you consider it useful to organize training courses for dentists by lawyers specialized in the field of medical malpractice litigation regarding the legal and social consequences they are exposed to with possible complaints from patients?” The results showed that 6 from rural areas and 33 from urban areas believe that these professional training courses are an indisputable benefit for professionals in the dental medicine and only one from the rural environment and 10 from the urban environment consider that it is not useful in all situations to organize training courses for dentists in the field of medical malpractice litigation, and only one dentist from the environment urban does not consider these courses useful.

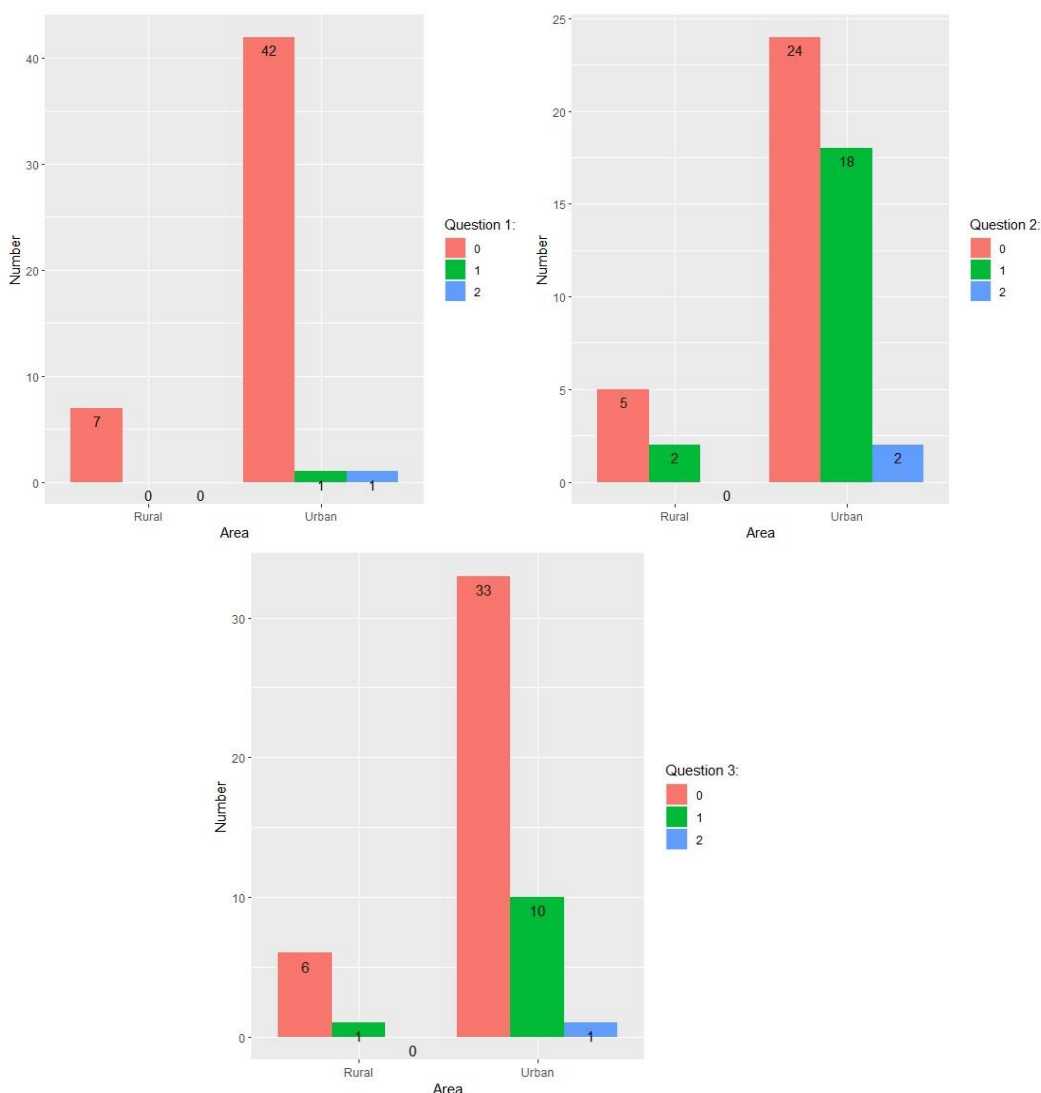


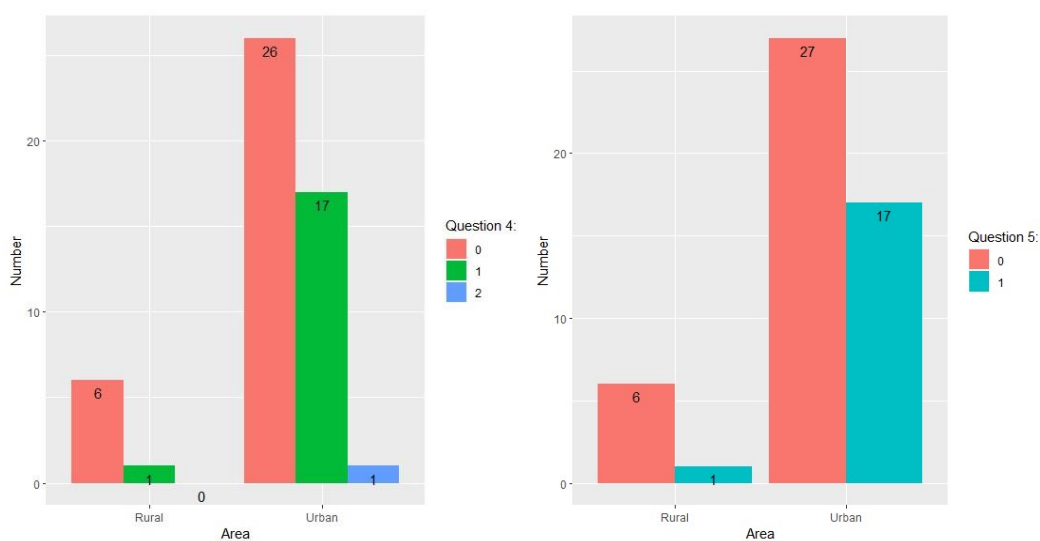
Figure 1. Statistical results for questions 1-3 according to urban and rural environment

Question 4: “Do you think that at the present time in Romania there would be a need to improve the legislation in the field of medical malpractice, so that some ambiguities or inconsistencies are removed from and it that would help dentists to protect themselves in a much more efficient way of complaints from patients?” The results showed that out of 51 dentists, 6 from rural areas and 26 from urban areas believe that there is a need for a reform of the national legislation in Romania, considering that in many situations doctors did not know how to correctly apply some legislative provisions due to the fact that they were incomplete and imprecise, one doctor from the rural environment and 17 from the urban environment do

not know in detail the provisions of the legislation regarding medical malpractice in order to be able to express a relevant point of view in this regard, and only one dentist practicing in the urban environment is of the opinion that the legislation is not lacking of ambiguity.

Question 5: “Do you consider that the information provided in the media, which often misrepresents a number of aspects regarding the quality of medical care provided by professionals in the field, may contribute to encouraging patients to bring a number of malpractice allegations to the doctors, even if their innocence would later be proven?” 51 dentists, 6 from rural areas and 27 from urban areas believe that the mass media contributes to a large extent to influencing the opinion among patients regarding quality management in health services, doctors being exposed to various complaints, only one doctor from the rural environment and 17 from the urban environment stated that not in all situations patients are influenced by the information provided through the media but non of the participants included in the study embraced the third answer option.

Question 6: “As dentist, do you consider a benefit to seek the support of legal specialists when you decide you want to start practicing so that they can provide you with legal advice on the risks that may arise in medical practice and activity regarding possible malpractice allegations and what are the rules you should keep in mind in your relationship with patients in order to succeed in removing any accusations that may arise against you?” The results showed that 4 from the rural and 20 from the urban environment consider appropriate to seek the support of legal specialists when they decide to start practicing, 3 from rural areas and 19 from urban areas have the opinion that this collaboration with legal specialists should be maintained throughout the entire professional activity and only 5 urban dentists did not answer this question affirmatively.



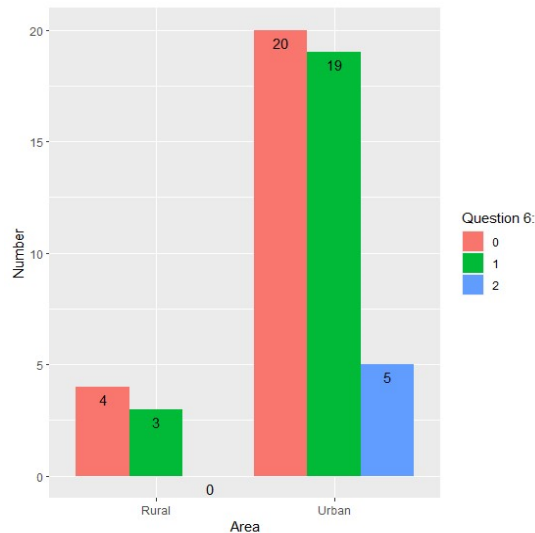


Figure 2. Statistical results for questions 4-6 according to urban and rural environment

Question 7: “Do you think that the prevention of malpractice situations depends exclusively on the level of professional training of dentists?” Four dentists from the rural area and 9 from the urban area consider that in all cases those who have a high level of professional training will be able to prevent possible accusations, 3 from rural areas and 32 from urban areas believe that not in all situations the high level of professional training guarantees the success and absence of malpractice complains and only 3 dentists practicing in the urban environment did not answer this question affirmatively.

Question 8: “Do you think that observing and knowing the consequences of complaints filed by patients against other dentists will cause other dentists to adopt a defensive behavior in medical practice so as to prevent a possible case of malpractice?” 6 dentists from rural areas and 17 from urban areas, consider that observing and knowing the consequences of complaints against other dentists will determine them to adopt a defensive behavior to prevent a possible case of malpractice, one doctor practicing in the rural environment and 24 from the urban environment believe that not in all situations this aspect will lead doctors to adopt a defensive behavior, and 3 urban doctors did not answer this question affirmatively.

Question 9: “Do you consider that the respect of patients' rights by the medical staff contributes to the prevention of cases of medical malpractice?” 5 dentists from the rural and 28 from the urban area stated that respecting patients' rights will increase their trust in the medical staff, thereby reducing the risk of professional errors related to the provision of medical assistance, 2 from the rural and 16 from the urban environment believe that not in all situations the respect of patients' rights contributes to the prevention of medical malpractice cases, considering some medical cases extremely complex that can cause the appearance of professional errors, and no dentist included in the study chose the third answer option.

Question 10: “Do you think that compliance by dentists with the obligation to request patients' consent prior to each medical intervention contributes to reducing complaints from patients?” The results showed that 7 dentists from rural and 36 from urban areas answered affirmatively, motivated by the fact that patients must freely consent to the medical act, they exclusively assume the medical risks regarding who were informed, and not the risks regarding which they were not informed and their consent was not requested, 4 doctors from the urban environment believe that the patients' consent to the medical act is not necessary in all situations, with the exception of emergency cases, and a total of four doctors from the urban environment do not believe that compliance by dentists with the obligation to request

patients' consent prior to each medical intervention contributes to the reduction of complaints from them.

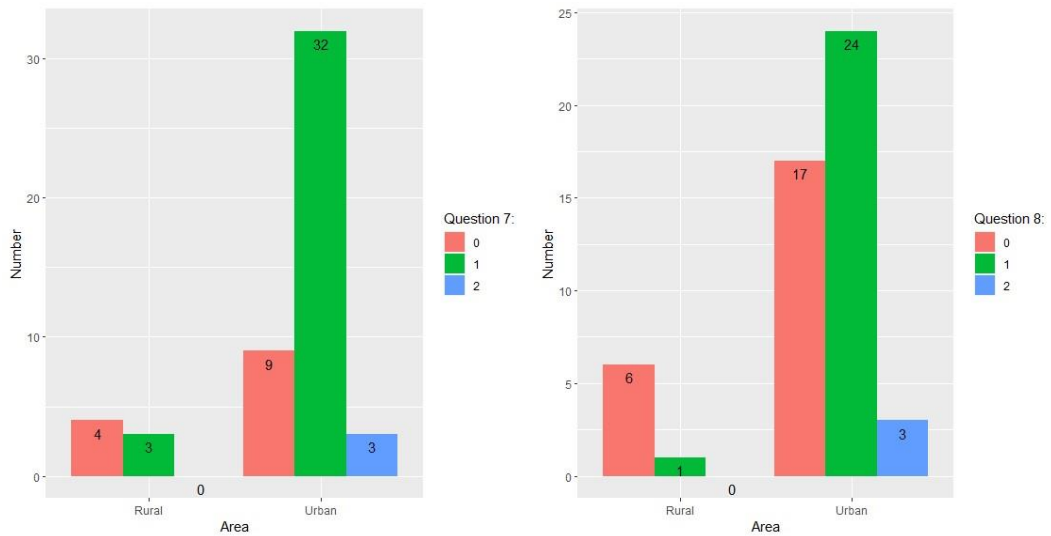


Figure 3. Statistical results for questions 7,8 according to urban and rural environment

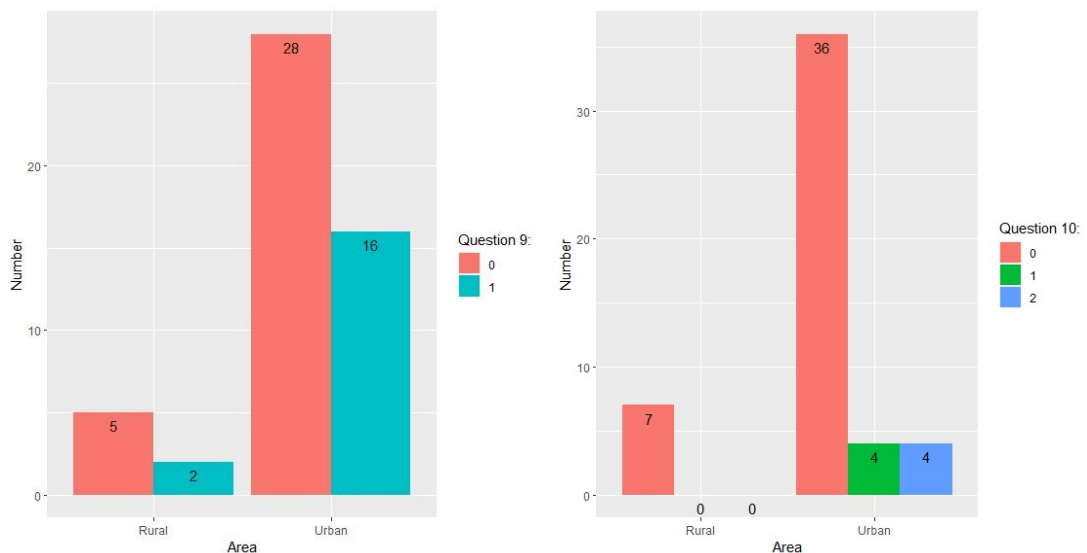


Figure 4. Statistical results for questions 9,10 according to urban and rural environment

DISCUSSIONS

The medical malpractice committed by dentists cause negative consequences that affect not only the patients, but also themselves. In addition to the legal liability of a civil or criminal nature committed by dentists upon finding that malpractice has been committed, their professional prestige is also affected. The damage to the professional prestige of dentists is quantified by the decrease in patients' requests and trust for healthcare, an aspect that will determine a series of negative consequences on the management of the quality of the services provided.

Therefore, we consider that the participation of dentists in continuing medical education courses focused on malpractice is a beneficial element both for them and for patients, increasing the level of awareness regarding the seriousness of the consequences that occur when various professional errors are committed during the provision of medical care.

The accumulation of new knowledge of a legal nature in the medical field by dentists contributes to the prevention of multiple errors in practice and also this aspect will give them greater confidence and safety when they have to perform even the most difficult and complex medical operations. By acquiring a series of legal knowledge, dentists will be able to prevent the occurrence of complaints that may come from patients, knowing what measures to adopt so that the medical act is performed safely and without violating the rights of those who request medical assistance.

CONCLUSIONS

According to the statistical analysis, it was found that the majority of dentists have the opinion that some accusations of medical malpractice can be prevented when the professional relationship with patients is not just restricted to the medical procedure. In order to increase patient satisfaction with regard to the medical services provided, it is necessary for dentists to resort to honest and open communication, being attentive to patients needs and ensuring that the information related to the diagnosis and treatment plan are clearly and correctly understood. The communication of the possible risks need a special attention and detailed explanations when are communicated.

Another aspect that we found with the interpretation of the questionnaires, is the importance of dentists' knowledge regarding the legislation in medical practice and dentist's relationship with patients. It has been found that once dentists know and correctly apply the legislation in the medical field, there is much less risk that malpractice complaints will be proven and lead to the application of sanctions for the specialized staff in the field. Most of the time, professional errors were committed by doctors who did not know the applicable legislation in the field, violating its provisions, also producing a series of negative consequences on the patients' health.

Another conclusion that emerged from the centralization and interpretation of the questionnaires, was that most of them consider it extremely useful to attend professional training courses that have as guest lecturers from legal domain who present issues from medical malpractice and from the perspective of the legal consequences. The doctors are exposed when they violate the law and commit professional errors. In this way, dentists would know from the beginning what legal consequences they are exposed to when committing malpractice. The trainings and conceling with lawyers increase doctors responsibility and they will adopt a diligent and prudent behavior in medical practice.

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Alternative methods in the treatment of white spot lesions



Buzatu B.L.R.¹, Gălușcan A.², Buzatu R.³, Jumanca D.E.²

¹PhD Student, Department of Preventive, Community and Oral Health Dentistry, Faculty of Dental Medicine, University of Medicine and Pharmacy Timișoara "Victor Babeș"

²Department of Preventive, Community and Oral Health Dentistry, Faculty of Dental Medicine, University of Medicine and Pharmacy Timișoara "Victor Babeș", Translational and Experimental Clinical Research Center in Oral Health (TEXCE-OH)

³Department of Dental Aesthetics, Faculty of Dental Medicine, University of Medicine and Pharmacy Timișoara "Victor Babeș"

Correspondence to:

Name: Buzatu Roxana

Address: Department of Dental Aesthetics, Faculty of Dental Medicine, University of Medicine and Pharmacy Timișoara "Victor Babeș" Timisoara, B-dul Revolutiei no.9

Phone: +40 721236147

E-mail address: roxana.buzatu@umft.ro

Abstract

Dental caries are considered to be one of the most most widespread diseases, affecting 90% of world's population. Caries can be classified according to their clinical appearance into non-cavitory lesions and cavitory lesions. In this article will detail the subject of non-cavitating carious lesions. White spot lesions appear as a result of enamel demineralization. Various risk factors such as acid-producing bacteria, fermentable carbohydrates, poor oral hygiene, reduced salivary volume and sugary diet, sustain the development of these early lesions. Dental white spot lesions occur due to enamel hypomineralization. Factors causing hypomineralization such as fluorosis, traumatic hypomineralization, molar-incisor hypomineralization, genetic defects, as well as environmental factors, must be considered during the differential diagnosis. Many technologies can be used to diagnose early caries, including traditional visual inspections, radiographs, transillumination methods, fluorescence methods, electrical conductivity, ultrasound methods and other recently developed technologies. The goal of modern dentistry is to implement a non-invasive management of carious lesions. This can be achieved by both motivating and educating patients in order to have a correct oral hygiene.

Keywords: White spot, demineralization, prevention, enamel, caries

INTRODUCTION

Oral health represents more than healthy teeth (1). Dental caries are considered to be the most widespread disease, affecting 90% of the world's population. It is a reversible, episodic, dynamic and asynchronous pathological process, which in early stages (in the enamel and even in the dentin) can be cured with the help of preventive and therapeutic methods (2). The main cause of dental caries is the presence of bacterial plaque. In the absence of the right treatment, tooth decays evolve progressively and cumulatively. Caries prevention is very important and it is much cheaper from a financial point of view than complex caries treatments. The best way is to prevent and not wait for the lesions to grow to the stage where it is necessary to remove a significant layer of dental tissue (3). Unfortunately, in our country, despite the progress made in the prevention and prophylaxis of dental caries, children and adolescents do not give great importance to this (4). Parents are not aware of the specific methods of preventing dental caries, and dentists do not apply them enough. As a rule, the prophylactic approach is neglected because it takes time to explain its methods and we are often more concerned with the restorative means of treatment. Presenting, to periodic check-ups, in the absence of symptoms, is the key to the success of any preventive program. Dental caries can be classified according to clinical appearance into non-cavitory lesions and cavitory lesions (5). In this article we will detail the subject of non-cavitating carious lesions, also called white spots.

THE MAIN FACTORS THAT DETERMINE THE APPEARANCE OF WHITE SPOT LESIONS

White spot lesions appear as a result of enamel demineralization. The reason for their presence are the changes in the optical properties of light scattering of demineralized enamel. Various risk factors such as acid-producing bacteria, fermentable carbohydrates and many other host factors such as poor oral hygiene, reduced salivary volume and a sugary diet, sustain the development of these early lesions (6). A review of the literature showed that white spots develop as a result of dental plaque build-up on affected tooth surfaces, particularly due to inadequate oral hygiene. Under these conditions, acids penetrate the surface of the enamel and the demineralization continues in the depth of the enamel. Undetected and untreated in time, these lesions cause the "collapse" of the enamel and the appearance of cavitated caries. It has been shown that these lesions can appear in up-to 4 weeks (7). The concept of the formation of dental caries was explained as follows: pH fluctuations caused by bacteria that are always metabolic active in the biofilm or dental plaque cause irregular losses and gains of minerals ("demineralization" and "remineralization"). These enamel demineralization and remineralization processes, result in the dissolution of hard dental tissues and in the development of caries lesions (8). In the first stage when the defect is located in the enamel, there is a smaller mineral distribution and also a lower interprismatic mineral content in the surface layer. It is important to understand how these lesions develop and what the risk factors are. Since it is a great challenge to make an early detection of early caries that allows clinicians to apply preventive measures to control the demineralization process before the lesions progress, we need to know how to treat them before they become cavitory lesions. White spot lesions are opaque, white, soft lesions characterized by demineralization on the tooth surface. Early diagnosis and treatment of these lesions can prevent the formation of clinical dental caries (6).

THE DIFFERENTIAL DIAGNOSIS OF WHITE SPOT LESIONS

Stains appear translucent when the surface is wet and white-opaque when we dry the surface of the tooth with the air spray. Other hypomineralized lesions are often white-opaque when the surface is moist (11). Fluorosis is a hypomineralization that occurs as a result of excessive incorporation of fluorides during enamel formation. Histopathologically, hypermineralization occurs in the superficial layer of teeth with dental fluorosis and hypomineralization occurs in the outer enamel subunit. Then, a brown color change occurs, due to the infiltration of exogenous chromophore proteins (12). Traumatic hypomineralization occurs as a result of periodontal trauma affecting the temporary teeth. The severity of the trauma is not related to the level of hypomineralization. Even a simple, discrete shock can cause these defects to form. Periapical inflammation after trauma affects mineralization. Traumatic hypomineralization can appear in different forms, locations and colors. They often appear as point lesions in the incisal third. It usually affects one tooth asymmetrically in relation to the corresponding contralateral teeth. Although the history of trauma provides an idea for the diagnosis of these injuries, it is sometimes difficult to recall simple shocks, so the diagnosis of these injuries is often made by excluding other causes (11). MIH syndrome (molar incisor hypomineralization) is the least known lesion that can be included in the differential diagnosis. Clinically, at least one of the four permanent first molars has a qualitative enamel defect. Permanent incisors can also be affected. The enamel of the affected teeth is yellow, brown, cream or white. It is important to note that although there is a difference in the translucency of the enamel of the affected teeth, there should be no changes in the thickness of the enamel (13). Genetic factors causing enamel hypoplasia and hypomineralization include amelogenesis imperfecta, congenital erythropoietic porphyria, ectodermal dysplasia, tricho-dento-ossosis syndrome, etc. Maternal smoking habits, low birth weight, celiac disease and vitamin D deficiencies (such as Rickets disease) can also cause hypomineralization. Infections such as congenital syphilis, chicken pox, rubella, measles, mumps and cytomegalovirus can cause enamel defects (6).

METHODS AND TECHNOLOGIES USED TO DIAGNOSE INCIPIENT DENTAL CARIES

Many technologies can be used to diagnose early caries, including traditional visual inspections, radiographs, transillumination methods, fluorescence methods, electrical conductivity, ultrasound methods and other recently developed technologies. The simplest method of detecting white spots is visual inspection. Enamel demineralization and microporosity affect the light transmission. In this way, the layer loses its bright color and an opaque white appears due to optical refraction. Using a standard examination light and mirrors, opaque white lesions can be detected by the clinician's visual examination. The addition of conventional radiographs to the visual examination increases the precision of diagnosis. However, exposure to ionizing radiation is the most obvious disadvantage. Other possible disadvantages are cases where the outer layer of enamel is intact and cases where occlusal lesions without macroscopic damage are difficult to diagnose. Previous studies have shown no difference in diagnostic effectiveness between conventional and digital bitewing radiographs. With a computerized diagnosis, we can interpret radiographs in order to distinguish between healthy, demineralized and decayed teeth. The Logicon System (Carestream Dental LLC, Atlanta, GA) is an example of this technology. The program matches radiographs with clinical images, compares them and provides a graphical representation of the tooth density (9). The rapid development of imaging technology is beginning to aid in the early detection of caries. Methods include fiber optic transillumination and digital fiber optic trans-illumination of the image, where light transmission

is used. The use of fiber optic light makes it possible to see smaller superficial white lesions. In the digital optical fiber trans-illumination method of imaging, focused images can be taken using a CCD camera installed in the system. The images can be analyzed with the help of a computer, and the diagnosis of interproximal, occlusal and soft surface caries can be made simultaneously. This method allows the documentation of the lesion and the tracking of the progression. The fiber optic method can detect demineralization as early as 2 weeks, but it fails to measure the depth of the lesion (6). There are also systems that use the natural fluorescence that occurs in tooth enamel. The light emission coefficient of a carious lesion is higher than the light emission coefficient of healthy enamel, resulting in less fluorescence in carious lesions. A method that uses the characteristic fluorescence of the teeth is laser fluorescence (DIAGNOdent – KaVo, Germany). Laser beam fluorescence is lower in demineralized enamel than in healthy enamel. Çınar et al. compared DIAGNOdent with visual examination and bitewing radiographs for the detection of occlusal caries. They found that for enamel lesions, the DIAGNOdent has a higher sensitivity than radiographs (10). Another method used in the early diagnosis of dental caries is the study of electrical conductivity. The difference occurs in the electrical transmission of solid and demineralized enamel surfaces due to porosity. Saliva penetrates the enamel and increases the electrical permeability of the tooth. This electrical conductance is measured by a connector placed on a region of high conductivity, such as the gum or skin, and a probe placed in the fissure (6). Today, the most important device used for this purpose is the electronic caries monitor (ECM) (LODE Diagnostic, Groningen, The Netherlands). ECM has limited ability on the occlusal surface in general, being more successful on smooth surfaces. Compared to clinical visual methods, the sensitivity of this system is higher, but the specificity is lower (6). High-frequency pulse-echo ultrasound waves (18 MHz) have been shown to produce different echoes in healthy and demineralized enamel (6). Studies have shown that ultrasound is a successful method in deep dentin lesions, but it is even more useful in evaluating remineralization. A study comparing ultrasound with radiography and histology in mandibular molars for the detection of white spots reported the sensitivity and specificity of the method to be 88% and 86%. It was concluded that ultrasound was a useful tool for detecting these lesions (6).

MANAGEMENT OF WHITE SPOT LESIONS

The goal of modern dentistry is to implement a non-invasive management of carious lesions. Oral hygiene is very important in protecting teeth against white spots. This can be achieved by both motivating and educating patients. It is known that tooth brushing is an effective way to remove dental plaque from tooth surfaces and prevents oral diseases such as caries, gingivitis and periodontitis. (6). Mechanical cleaning is ensured by brushing the teeth with fluoride toothpaste and dental floss. Effective plaque removal from the tooth surface through proper brushing is well known to prevent tooth decay. Technique and frequency vary depending on the patient's disease pattern and oral hygiene needs. It is recommended to remove dental biofilm twice a day to prevent tooth decay. Although manual tooth brushing is a very simple and effective method, a number of studies have stated that the time and effectiveness of tooth brushing is inadequate. Most children brush their teeth regularly, but only for 30-45 seconds. Depending on age and manual skills, teeth may be insufficiently cleaned (14).

1. Fluoride

The initial stage of white spots can be successfully treated with good oral hygiene, topical application of fluoride and/or another caries remineralizing agent. Topical application of fluoride is the first choice of many clinicians to treat incipient lesions. During topical application of fluoride, a calcium fluoride-like material (CaF_2) develops in plaque, on the

surface of the tooth, or in the initial caries lesion. When the pH value drops during a caries attack, CaF_2 is used as a reservoir of fluoride ions ready to be released. Also, when there is fluoride on the enamel surface, fluoroapatite is formed, which has a more durable structure than hydroxyapatite. It is believed to be a major mechanism of fluoride action in enamel remineralization. In addition, topical application of fluoride increases plaque pH and inhibits bacterial metabolic pathways indirectly, in this way it reduces enamel demineralization and it increases remineralization (15). Low-dose topical fluoride is recommended for long periods of time with frequent exposures to avoid dental fluorosis. Applications of high fluoride concentrations in order to treat early lesions are usually preferred to be done in the clinical practice. However, highly concentrated fluoride leads to hypermineralization of the surface layer. Therefore, the penetration of calcium and phosphate ions into the body of the lesion is blocked. This is called lamination and can have some undesirable aesthetic consequences (12). Slow penetration of calcium, phosphate, and fluoride ion from saliva or low fluoride concentrations into lesions should be allowed. In this way, more aesthetically pleasing results will be achieved. This type of treatment can easily remineralize incipient lesions from the deeper parts of the lesion to the outer surface layers of the enamel. Therefore, the chance of achieving a successful and more aesthetic treatment result increases (6). Frequent exposure to low levels of fluoride is the most important part of caries prevention and remineralization. This can be achieved by using fluoride toothpaste, fluoride mouthwash, and fluoride varnish (6).

A. Toothpastes

Fluoride toothpaste is the most commonly used form of fluoride to provide a constant and small amount of fluoride in the oral environment. Various fluoride compounds have been added to toothpaste, including sodium fluoride, sodium monofluorophosphate, amine fluoride, and stannous fluoride. The concentration of fluoride in toothpaste recommended by the WHO (World Health Organization) is between 1000 and 1500 parts per million (ppm). In many countries, low-fluoride dental products (typically 450-500 ppm fluoride) are marketed to children. Toothpaste with an increased concentration of fluoride, 1500 to 4500 ppm, is especially recommended for adults at high risk of tooth decay (16). The American Academy of Pediatric Dentistry (AAPD) recommends using a pea-sized amount of fluoride toothpaste for children up to 3 years of age and a pea-sized amount for children between 3 and 6 years of age. However, children up to 6 years should be supervised when brushing their teeth. Teeth should be brushed twice a day for the toothpaste to have a better effect (6).

B. Mouthwashes

Mouthwashes have been used successfully to prevent tooth decay and manage early lesions in children. Regular use of fluoride mouthwash by children and adolescents has been shown to significantly reduce the occurrence of dental caries. Both daily use of 0.05% NaF (sodium fluoride) mouthwash and weekly rinsing programs with 0.2% NaF (sodium fluoride) mouthwash were found to decrease the incidence of enamel demineralization. Due to the risk of fluoride ingestion, they are not recommended for children under 6 years of age (6).

C. Fluoride varnishes

Fluoride varnishes have been designed to prolong the contact time with enamel and to prevent the immediate loss of the fluoride after application. Therefore, they act as a slow-release reservoir and facilitate greater absorption of fluoride. Although the fluoride concentration in varnishes is very high (5% NaF, 22,600 ppm), the amount of fluoride exposure can be kept under control so that the application of fluoride varnish is safe. In contact with the wet tooth they gradually release fluoride and they are applied quickly and effortlessly. Dental prophylaxis is not necessary before varnish applications, so the working time is considerably reduced. Patients should avoid eating for 2-4 hours after application and avoid brushing their teeth that night so the varnish can be more effective (17). The American

Academy of Pediatric Dentistry (AAPD) guidelines recommended that the fluoride varnishes should be applied at least twice a year for temporary teeth and two to four times a year for permanent teeth. Using varnishes two to four times a year has been found to significantly decrease the incidence of tooth decay (6).

D. Fluoride gels

Fluoride gels can be applied by both doctors and patients. In offices, there are different methods of applying fluoride. One of them is applying the gel in a special device that covers the entire dental arch and is easily accepted by children. Commonly used gels are 1.23% sodium fluoride gel (12,300 ppm F) and acidified phosphate fluoride (APF) gel.

E. Fluoride foam

Fluoride foam has the same concentration (1.23%) and pH (3-4) as fluoride gels and it is applied in the same way. Fluoride foam is applied in the dental practice for 4 minutes and two times a year. The American Academy of Preventive Dentistry has recommended that children at high risk of caries should undergo professional fluoride treatment at least every 6 months. Because risk categories may change over time, the types and intervals of preventive interventions should be adjusted accordingly (6).

2.Xylitol

Polyols are alcohol derivatives of sugars, which are metabolized more slowly than sucrose by oral bacteria. They were first developed for diabetics, but are now used in sugar-free products such as chewing gum, chocolate, baked goods and biscuits. Polyols are sweeteners that include xylitol, sorbitol, mannitol, maltitol, and lactitol. In particular, xylitol provides anti-caries efficacy on dental plaque and cariogenic microorganisms. This reduces the level of *S. mutans* by disrupting the energy production process and leads to cell death. It also reduces the adhesion and acid production of these microorganisms present in dental plaque and saliva. Xylitol is more unique than other sugar alcohols because it promotes mineralization by increasing saliva flow and is non-fermentable by oral bacteria (18). In a study of remineralization of enamel lesions in vitro, Makinen and Soderling demonstrated that very high concentrations of sorbitol and xylitol can influence the bioavailability of calcium, supporting the remineralization process of enamel lesions (6).

3.Chlorhexidine

Chlorhexidine is a frequently used cationic agent with a wide range of antiseptic effects. The effectiveness of the solution in controlling and managing biofilms has been proven in gingivitis, but there is insufficient evidence in preventing initial caries lesions or reducing levels of *S. mutans*. Inconclusive results of some studies have shown that chlorhexidine varnishes are effective in reducing the prevalence of caries, but not during orthodontic treatment. Varnishes are likely to be more effective due to the higher concentration of chlorhexidine and the longer contact time with the tooth surface. Chlorhexidine has bacteriostatic and bactericidal effects on *Streptococcus mutans* and inhibits the acid production in the bacterial plaque. It has been hypothesized that its remineralizing effect on white spots may be due to electrostatic bonding with the phosphate groups of hydroxyapatite causing the precipitation of phosphate salts on the demineralized enamel surface. The combined use of fluoride varnish and chlorhexidine has been shown to be more effective in active lesions than the use of either alone (17).

CONCLUSIONS

A general conclusion would be that the patients should be aware of the importance of prevention and that they should take care of their teeth, because the difference between a reversible lesion (white spot) and an irreversible carious lesion is small, the irreversible condition requiring dental treatment with removal of dental substance.

The goal of modern dentistry is to implement a non-invasive management of carious lesions. Maintaining a good oral hygiene is one of the most important steps in protecting teeth against white spots. This goal can be achieved by both motivating and educating patients.

The initial stage of white spots can be successfully treated with correct oral hygiene, topical application of fluoride or of another caries remineralizing agents.

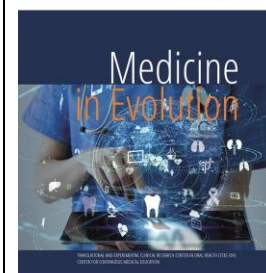
Xylitol is a commonly used sweetener that has important positive effects in reducing dental caries. It reduces the level of *S. mutans* by minimizing the energy production. It also reduces the adhesion and acid production of these microorganisms that are present in dental plaque and saliva. Xylitol supports mineralization by increasing saliva flow and is not fermentable by oral bacteria.

Chlorhexidine is a frequently used cationic agent with a wide range of antiseptic effects. The effectiveness of this solution consists in controlling biofilms located in oral plaque and in saliva. The positive effects have been proven in gingivitis, but there aren't sufficient evidences in demonstrating the prevention of initial caries lesions.

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Decontamination of dental cavities using solution of chlorhexidine versus two type of mouth water. An "in vitro" study



Bojoga D.E.^{1,2}, Miron M.I.^{1,2}, Ciora E.D.¹, Tănase A.D.^{3,4}, Crăciunescu E.L.^{4,5}, Pop D.M.^{4,5}

¹*Department of Oral Rehabilitation and Dental Emergencies, Faculty of Dentistry, "Victor Babeș" University of Medicine and Pharmacy, Timisoara, Romania*

²*Interdisciplinary Research Center for Dental Medical Research, Lasers and Innovative Technologies, Timisoara, Romania*

³*Department of Professional Legislation in Dental Medicine, Faculty of Dental Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania*

⁴*Research Center in Dental Medicine Using Conventional and Alternative Technologies, Faculty of Dental Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania*

⁵*Department of Prostheses Technology and Dental Materials, Faculty of Dental Medicine, "Victor Babeș" University of Medicine and Pharmacy, Timișoara, Romania*

Correspondence to:

Name: Alina Doina Tănase

Address: Eftimie Murgu Square, no 2, 300041 Timisoara, Romania

Phone: +40 733144278

E-mail address: tanase.alina@umft.ro

Abstract

Aim and objectives. The aim of this study is to evaluate the effect of two types of mouthwash compared to the effect of 0.2% chlorhexidine gel in class I prepared dental cavities.

Material and methods. The study included 10 human molars. Class I dental cavities were created. The samples were inoculated with *Streptococcus mutans* suspension. After this part, the experimental procedure was applied using three decontamination solutions: chlorhexidine, Listerine Cool Mint mouthwash and Total Care. After treatment, samples were collected for microbiological analysis.

Results. After carrying out the ANOVA and Tukey -Kramer test for *Streptococcus mutans* values shows that there is a significant difference between the results of group 3, where Listerine Cool Mint was applied, and the results of group 5, where CHX 2% gel was chosen to be applied.

Conclusions. The most significant reduction in the number of *Streptococcus mutans*, is recorded in group 5, the one in which the 0.2% chlorhexidine gel was applied for 60 seconds.

Keywords: *Streptococcus mutans, chlorhexidine, Listerine, dental cavities*

INTRODUCTION

Dental caries is one of the most important public health problems and a very widespread disease worldwide. It is an irreversible, chronic, infectious disease that evolves as a dynamic, multifactorial process and affects the mineralized dental structures. Dental caries is a complex disease caused by enamel demineralization and remineralization in the presence of fermentable carbohydrates, saliva, and cariogenic oral flora [1].

Dental caries is a lesion that forms on the surface of the tooth in the form of a cavity that progresses and results in the loss of tooth structure. Demineralization causes initial changes at the ultrastructural level, which can only be observed with the electron microscope. Clinically, it cannot be detected in its early stages, but as the lesion progresses, the dentist will notice a decrease in enamel translucency, which can be detected during an intraoral examination of the patient. When bacteria accumulate in dental plaque and ferment dietary carbohydrates for a long time and locally produced acids cannot be neutralized by the buffering capacity of saliva, tooth demineralization occurs, leading to cavitory forms of carious lesions [2-5]. Although the ability of low pH to demineralize enamel is well established, tooth decay is a multifactorial disease caused by microbes and influenced by dietary habits, dental characteristics, the buffering capacity of saliva and the host's immune system [5].

Control of the oral microsystem, prevention and treatment of oral diseases is often achieved with the help of antibiotics and antiseptics. The use of these antimicrobial solutions aims to decrease the total microbial load to combat the given condition. One of the most common antiseptics used in oral health care is chlorhexidine (CHX), a bactericidal agent. CHX has a broad spectrum of efficacy and works by interfering with the cytoplasmic or inner wall of the bacterium once it has successfully crossed the outer membrane. CHX is usually added in treatment variants at a concentration of 0.12 or 0.2%. Both concentrations are well above the minimum inhibitory concentration (MIC) of the oral strains tested [6]. However, such tests expose the microorganisms to a constant concentration of the bactericide. Although this approach is a viable solution for systemic treatment, it is not representative of a topical treatment such as mouthwash application. The contact time between the bacteria and the antiseptic is between 60 and 90 seconds during the treatment performed in the oral cavity. Moreover, in the case of oral conditions, the target is a biofilm polymicrobial, and bacteria in biofilms show increased tolerance to antimicrobials compared to planktonic bacteria. Finally, biofilm architecture can greatly influence treatment outcome. The outer layers of the biofilm are more susceptible to antiseptic compared to the inner layers [7,8].

Aim and objectives

The aim of this study is to evaluate the effect of two types of mouthwash compared with the effect of 0.2% chlorhexidine gel in class I prepared dental cavities. Knowing an effective bacterial decontamination protocol at the level of prepared dental cavities will be of real use for the dentists, because a much better and risk-free prevention will be achieved after the long-term obturation with composite materials. All this, competing to significantly reduce the risk of developing residual carious lesions on the long term.

At the beginning of the study, the null hypothesis was established, that there is no statistically significant difference between the three types of treatments used within the experimental groups.

MATERIAL AND METHODS

The work protocol was reviewed and approved by the Research Ethics Committee of the "Victor Babeş" University of Medicine and Pharmacy in Timișoara.

The participation of the patients in the study to collect biological samples, was conditional on being informed both orally and in writing, regarding their role in the research, also, the informed consent was obtained after being informed and understanding by each participant of all the information regarding the study and the way it is conducted.

Inclusion criteria were as follows: teeth whose coronal part was intact.

The exclusion criteria were the following: coronary fillings, clinically detectable carious lesions, white spot lesions, previous exposures to chemical treatments such as hydrogen peroxide, and changes caused during extractions by elevator or forceps, respectively.

The study included 10 human molars extracted for orthodontic/periodontal reasons, and which were kept for a maximum of 30 days in a 0.9% sodium chloride solution at 23°C, until the beginning of the experiment.

After choosing the samples, they were cleaned by ultrasonic scaling (using EMS miniPiezon, SA CH-1260 Nyon Swiss) and professional brushing with fluoride-free paste (Clean Polish, Kerr Hawe).

The dental samples were randomly distributed in the following experimental groups (Fig. 1), as follows:

1. Positive control group
2. Negative control group
3. Listerine Cool Mint
4. Listerine Total Care
5. Chlorhexidine gel 0.2%

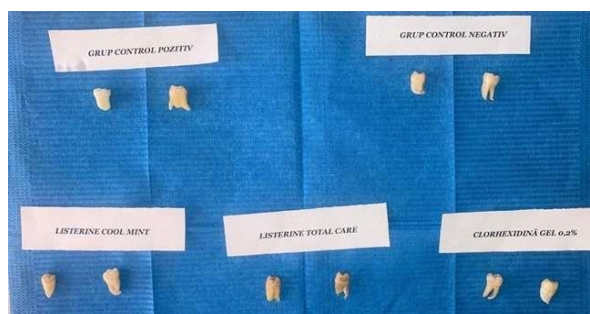


Figure 1. Highlighting the experimental groups selected in the study

Occlusal surface of each tooth was prepared to obtain a Class I cavity with a globular/pear diamond instrument on the high speed (turbine) handpiece.

To have a better control over the preparation of class I cavities, 3 mm was measured with a periodontal probe, at the level of which a rubber stopper was applied, thus facilitating the stage of periodic verification after each moment of dental preparation (figure 2).

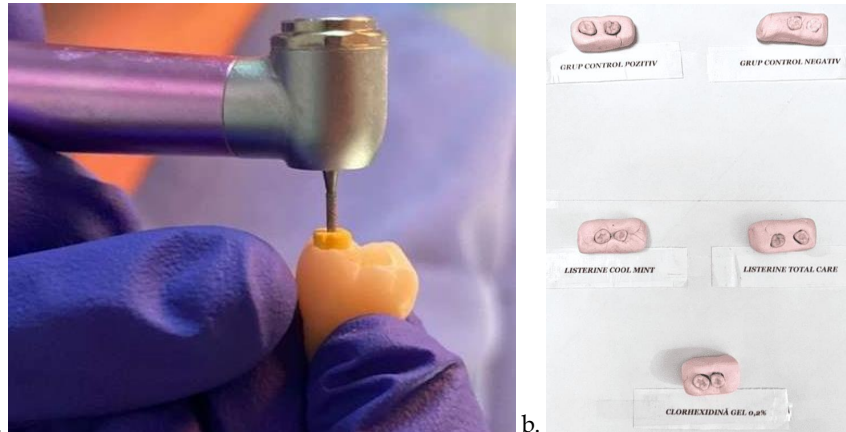


Figure 2. Cavity depth preparation controlled by fixing the rubber stopper on the diamond instrument at 3 mm (a) and the dental cavities prepared on all samples (b)

After making the cavities, the samples were sterilized to ensure the absence of any bacterial form, in an autoclave (C306552 ZETACLAVE B 231, Zhemark S.p.A. B class, Italy) at 121°C for 20 min; then, samples were collected from the cavities obtained, using a sterile applicator that was stored in a sterile container with broth liquid and placed in a thermostat (Jouan IG150 Infrared-controlled CO 2 Incubator, Germany) for 24 hours at 37° C, time required for the development of a possible existing bacterial form. After the 24 hours, the bacterial forms were cultivated on a culture medium with blood agar (Columbia Agar + 5% ram blood, Mediclim, Romania) for 24 hours at 37°C in the same thermostat (Fig. 3), which will show us whether forms of microorganisms were present in the cavities created, after sterilization.



Figure 3. The stage of harvesting and seeding from the level of dental samples after the time of sterilization

An ATCC 25175 suspension containing the *S. mutans* reference strain was prepared at 0.5 McFarland units [9] using a densitometer (DEN-1 McFarland Densitometer, Biosan, BS-050102-AAF, LATVIA).

After preparing the bacterial suspension, 8 of the 10 samples (except the positive control group that was not inoculated) were stored in a sterile container. 20 ml of liquid synthetic culture medium (broth) was placed in each container and 280 µl were taken from the *Streptococcus mutans* (*S.m.*) suspension with the microbiological pipette and mixed with the broth in which the samples were stored. At the end of the process, all containers were inserted into the same thermostat for 24 hours at 37°C to obtain microbial colonies at the level of the prepared odontal cavities.

The next day, from each inoculated container, samples were taken for inoculation on the agar-blood culture medium, to be stored at a thermostat for 24 hours at 37°C to observe the existence of microbial colonies (Fig. 4).

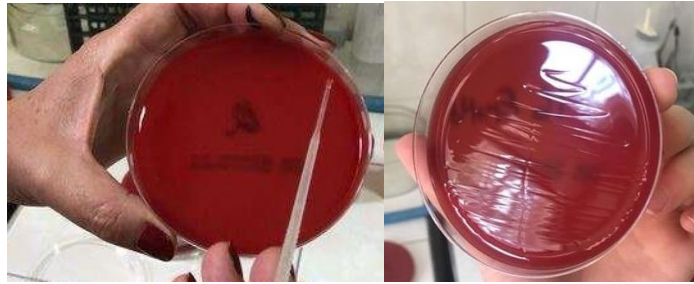


Figure 4. Inoculation of samples on agar-blood culture medium taken from containers inoculated with bacterial suspension

To apply the treatment of group 3, the solution of Listerine Cool Mint (Johnson & Johnson Pvt.Ltd. USA) was used (Fig. 5). The solution was applied in the prepared cavity of the two dental samples, leaving it to act for 60 seconds, after which it was removed by washing for 5 seconds with the water-air syringe from the dental unit and drying with a sterile pad. For all two samples, the treatment consisted of a single application.



Figure 5. Application of the Listerine Cool Mint solution in the class I cavity at the level of the two dental samples of the experimental group 3

To apply the treatment of group 4, the Listerine Total Care solution (Johnson & Johnson GmbH, D-41470 Neuss, DE) was used (Fig.6) in the prepared cavity of the two dental samples, leaving it to act for 60 seconds, after which it was removed by washing for 5 seconds with the water-air syringe from the dental unit and drying with a sterile pad. For all two samples, the treatment consisted of a single application.



Figure 6. Application of the Listerine Total Care solution in the class I cavity at the level of the two dental samples of experimental group 4

To apply the treatment of group 5, gluconate of 0.2% chlorhexidine gel (Elugel 0.2%, Oral Care, France) was used (Fig. 7). The gel was applied in the dental cavity at the level of

both dental samples, leaving it to act for 60 seconds, after which it was removed by washing for 5 seconds with the water-air syringe from the dental unit and drying with a sterile pad. For both samples, the treatment consisted of a single application.



Figure 7. Application of 0.2% CHX gel in the class I cavity at the level of the two dental samples of experimental group 5

After applying the treatment, samples were taken from the dental cavities of experimental groups 3, 4 and 5 with sterile applicators and placed in the broth solution, at a thermostat for 24 hours, 37°C. After this 24-hour period, culture media were seeded with samples from the broth solution and placed in a thermostat for 24 hours at 37°C.

After the two stages of harvesting and seeding, the microbial colonies on the culture media were observed and counted from the 3 moments of harvesting: after the sterilization stage, before applying the treatment with the S.m. suspension. applied to the level of the dental samples and after applying the treatment.

Statistical analysis was performed using Microsoft Excel (version 2012 for WINDOWS), one-way analysis of variance (ANOVA) and the Tukey -Kramer test.

RESULTS

According to several microbiological researches, the numerical results were recorded following the evaluation of each examined sample using a digital colony counter (Colony Star, MultiLab, Funke Gerber), as can be seen in Table 1 and to simplify colony counting a score will be assigned to each numerical value obtained: score 0 is given to the absence of colonies or less than 10 CFU/ml, score 1 = 10² CFU/ml, score 2 = 10³, score 3 = 10⁴, score 4 = 10⁵, score 5 = 10⁶, score 6 = > 10⁷ CFU/ml, [10].

Table 1. Numerical values of the microbiological evaluation in the 3 moments of harvesting

	After sterilization of dental specimens	After the inoculation of SAMPLE with the suspension of S. m.	After treatment experimental		Mediate	SD
			MINIMUM VALUES	MAXIMUM VALUES		
Gr 1 - positive control	0	0	0	0	0	0
Gr 2 - negative control	0	6	6	6	6	0
Gr 3 - Listerine Cool Mint	0	6	4	4	4	0
Gr 4 - Listerine Total Care	0	6	3	4	3.33	0.52
Gr 5 - CHX 0.2%	0	6	1	2	1.50	0.58
SD - standard deviation						

After applying various decontamination solutions to reduce the number of S.m., lower values resulted, compared to those before the treatment, which can be seen in figure 8.

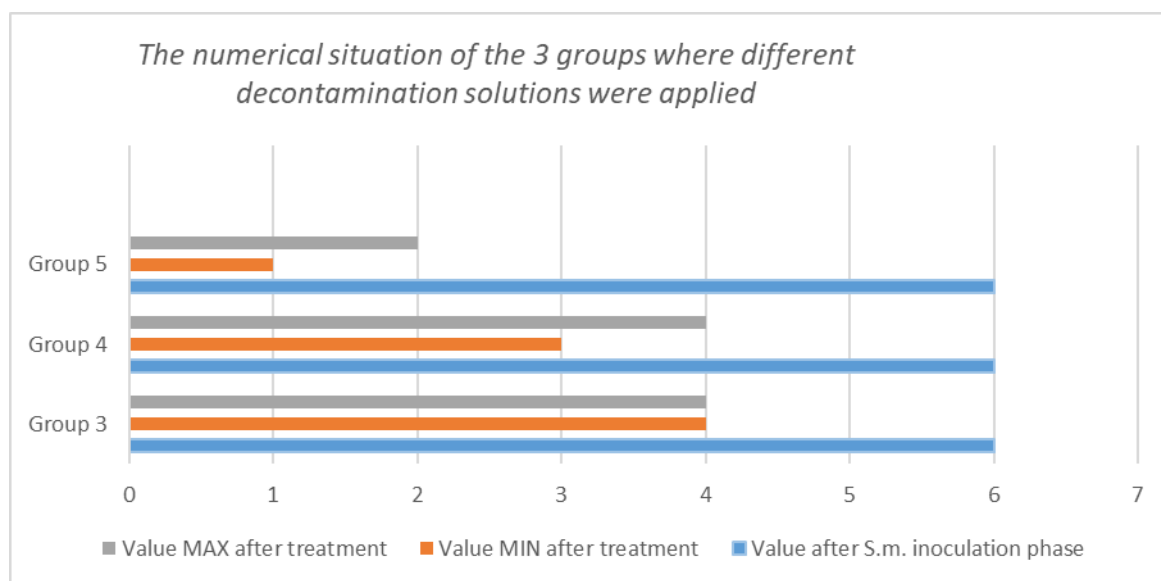


Figure 8. Evolution of the number of S.m. colonies in different stages of the study

For this "in vitro" study, one-way analysis of variance (ANOVA) was used, and depending on the numerical results recorded, the Tukey-Kramer test should be applied to establish possible differences between the types of treatments applied. The level of statistical significance was set at 5% ($p < 0.05$), and the confidence level at 95%.

As can be seen in table 1, for group 1, positive control, the values being identical, the mean and standard deviation is zero. The same situation regarding the recording of a zero standard deviation is found in group 2 and 3.

The highest mean of the values comes from group 2 where no treatment was applied, this being considered a negative control, at the level of which only the inoculation of the dental cavities with S.m. suspension was carried out, while the lowest mean is observed in group 5 where applied CHX 2% gel.

Following the one-way ANOVA analysis, a significant difference can be observed between the experimental groups, regarding the numerical values recorded after the experimental moments ($p < 0.05$).

After carrying out the Tukey-Kramer test for S.m, values shows that there is a significant difference between the results of the groups in which the experimental treatment was applied, compared to the control group samples ($p < 0.05$), values that can be observed in Table 2. It can also be observed that there is also a statistically significant difference between the results of group 3, where Listerine Cool Mint was applied, and the results of group 5, where CHX 2% gel was chosen to be applied.

Table 2. Numerical values of the microbiological evaluation in the 3 moments of harvesting

Group vs.	Group	Average Difference (%)	The standard error	Sig.
1	2	6	0.05	1
3	1	4.11	0.05	1
3	2	-0.6667	0.05	0
4	1	3.33	0.05	1
4	2	-2.2221	0.05	1
4	3	1.5	0.05	0
5	1	1.5	0.05	1
5	2	-3.33	0.05	1
5	3	-1.1667	0.05	1
5	4	1.55	0.05	1

From Table 2 we can see that there is a statistically significant difference for the compared pairs whose Sig is 1, and otherwise, Sig = 0, we do not have a statistically significant difference. Values of Sig = 1 appear for groups 3, 4 and 5 compared to group 1. Also, a statistically significant difference results from the comparison between group 5 and group 3 and 4, where the 3 decontamination solutions were applied. Comparing group 3 with 4, where the Listerine Cool Mint solution was chosen, respectively Total Care, no statistically significant differences were recorded.

DISCUSSIONS

The aim of this study was to evaluate the effect of two types of mouthwash compared to the effect of 0.2% chlorhexidine gel on prepared Class I dental cavities. Knowing an effective bacterial decontamination protocol at the level of prepared dental cavities will be of real use to dentists, because a much better and risk-free prevention will be achieved after the long-term obturation with composite materials. All this, competing to significantly reduce the risk of developing residual carious lesions in the long term. For this purpose, S.m. colony counts were performed and the distribution of colonies in culture media was interpreted.

The recorded results show the achievement of a significant reduction of S.m. colonies after the application of CHX 0.2% gel compared to the two types of Listerine used, therefore, the null hypothesis was stated that there are no statistically significant differences between the types of solutions oral decontamination, may be rejected.

The results of the present study, obtained after the application of CHX 0.2% gel are consistent with the results of other studies in the specialized literature, demonstrating its ability to reduce bacterial plaque at a concentration of 0.2% [11].

The efficacy of alcohol-free Listerine as a factor in reducing plaque and gingivitis compared to the placebo group (a 5% hydro-alcohol mouth cream) was first demonstrated by Charles et al. [12] in a single-center, randomized, examiner-blind, two-week, no oral hygiene, parallel-group, controlled clinical trial of 90 participants. Listerine without alcohol was more effective ($p < 0.001$) than the negative control group in reducing plaque, reducing gingivitis, and reducing gingival bleeding.

Ulkur et al. [13], evaluating the number of bacteria, shows that after using an alcohol-free essential oil mouthwash for four days, the number of *Streptococcus mutans* colonies is slightly higher compared to alcohol-based essential oils and water mouth with 0.1% alcohol-free CHX, while no difference appeared on the surface of the tongue.

Traditional essential oils containing alcohol have been used for years as tooth brushing adjuncts in the oral hygiene approach, so their effectiveness in controlling plaque and gingivitis is well documented in the literature; appeared equivalent to CHX for long-term control of gingival inflammation, but CHX appears to perform better than essential oil and alcohol mouthwashes in plaque control [14].

This "in vitro" experimental study aimed to observe the effectiveness of several types of treatments to reduce pathogenic oral microorganisms in class I dental cavities, areas of major importance that will later be filled with coronary restorative materials and where there is most often the risk of developing residual carious lesions because of an incorrect toilet of the cavity.

Although the three treatments gave good results in this research, the best efficiency is demonstrated by group 5, where the CHX 2% gel was applied, compared to the other groups, less so with group 3 whose treatment was based on Listerine Cool Mint, where the results did not show statistically significant differences with the negative control group.

Individual studies have shown that 0.2% CHX mouthwash can reduce plaque indices and the incidence of white spot lesions from fixed orthodontic appliances [15]. However, a

systematic review by Tang et al. [42], although detecting significant reductions in *S. Mutans* with CHX mouthwash, found only little evidence that CHX use is related to clinical benefits with reduced carious lesions for people wearing fixed orthodontic appliances [16].

Currently, for the prevention of carious lesions, daily oral rinsing with 0.05% sodium fluoride is recommended [17-21]. The results of these studies in the specialized literature are not consistent with the numerical values recorded after the application of the 0.2% CHX gel, which reveals the fact that the clear effect and mode of action of the CHX gel in concentration is not known now of 0.2% at the level of the dental hard structure.

Although the obtained results can guide us towards the introduction into the daily practice of odontal treatments, of a protocol for decontamination of cavities prepared with Listerine solution or CHX 0.2% gel as the main agent, the limits of this study can refer to the number restricted by dental samples, the use of the same decontamination solutions but with their application in the prepared cavities for a period longer than 60 sec, or their use in combinations, gel-solutions, as well as the implementation of another evaluation method, with fewer human errors.

CONCLUSIONS

1. The most significant reduction in the number of *Streptococcus mutans*, is recorded in group 5, the one in which the 0.2% chlorhexidine gel was applied for 60 seconds.

2. Dental treatments are carried out throughout the dental practice, which will determine an appropriate implementation from this point of view of the appropriate use of chlorhexidine, as a protocol for decontamination of dental cavities, reducing the risk of developing residual carious lesions.

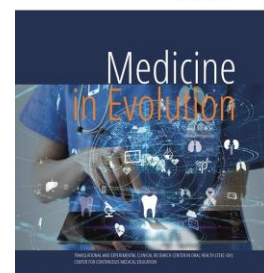
3. The most accessible adjunctive method to tooth brushing and widely available, at a moderate price, is the use of CHX in a concentration of 0.2%, with satisfactory results regarding the reduction of the number of pathogenic oral microorganisms depending largely on the period of use and patient loyalty from this point of view.

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Submandibular lodge abscess. Case presentation



Domocoş D.¹, Bumbu B.A.¹, Tripe S.², Indries C.F.², Torsin R.², Precup A.I.¹

¹*Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania*

²*Oradea County Emergency Clinical Hospital, Oral and Maxillofacial Surgery department*

Correspondence to:

Name: Bogdan Andrei Bumbu

Address: Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania, December 1st Square no.10, 410068 Oradea, Bihor County, Romania

Phone: +40 770207463

E-mail address: bogdanbumbu@uoradea.ro

Abstract

The submandibular lodge abscess represents a limited purulent collection of the primary mandibular space, the most frequently involved causative factor being the dento-periodontal damage of the lower molars, especially the third molar.

The article presents the case of a 27-year-old patient with a marked swelling of the right hemiface, a swelling placed submandibular, which extends anteriorly under the chin and posteriorly to the level of the anterior border of the sterno-cleido-mastoid muscle, accompanied by marked trismus and pain.

Keywords: Submandibular lodge abscess, swelling, trismus

INTRODUCTION

Odontogenic infections have as their starting point the teeth and neighboring structures; at the oro-maxillo-facial level there is increased variability depending on the etiological factor, the type and virulence of the pathogen, the anatomical reports, the general state of health of the patient and the immune response [1,2]. The infectious process evolves in three stages - inoculation, cellulitis and abscess formation [3].

The submandibular abscess represents a limited purulent collection of the primary mandibular space, the most frequently involved causative factor being the dento-periodontal damage of the lower molars, especially the third molar [4].

The microbial flora present is polymorphic, mixed and non-specific. Oro-maxillofacial suppurations are 87% plurimicrobial and only 13% monomicrobial [5,6].

The anatomical-pathological relationship between the roots of the lower molars and the mandibular cortical bones, together with respecting the path of least resistance, determines the perforation of the lingual cortex under the insertion of the mylohyoid muscle [1].

MATERIAL AND METHODS

We present the case of a 27-year-old patient with a marked swelling of the right hemiface, a swelling placed submandibular, which extends anteriorly under the chin and posteriorly to the level of the anterior border of the sterno-cleido-mastoid muscle, accompanied by marked trismus and pain (Figure 1). The integuments in the region appear congested, warm, distended and glossy, palpation reveals fluctuance, endo-oral the mucosa of the floor of the mouth on the right side is congested and edematous (Figure 2).



Figure 1. Clinical appearance: right hemiface swelling



Figure 2. Intraoral clinical appearance (multiple dental septic outbreak)

The patient complains of spontaneous pain on palpation; also dysphagia, odynophagia and dehydration. The general condition is altered with fever and tachycardia. The patient has no other health conditions. Clinically, percussion in the shaft is positive at the level of tooth 48.

Paraclinical investigations help us in diagnosis. Scrolled radiograph of the mandible (Figure 3) reveals the starting point of suppuration, acute apical periodontitis 48 and the rest of the tooth 47. Laboratory analyses, blood count reveal elevated leukocyte level and significantly elevated C-reactive protein.



Figure 3. Scrolled radiograph of the mandible

Emergency surgery is performed under general anesthesia (Figure 4) with intravenous sedation, local anesthesia, incision and drainage of the involved region with secretion collection for antibiogram, application of the drain tube.



Figure 4. Intraoperative clinical aspect: incision and collection drainage, microbiological examination

RESULTS

Through the drain tube, antiseptic washes are done for seven days. Antibiotic therapy is initiated with clindamycin 300mg i.v. 2-0-2, the antibiotic being chosen based on the

antibiogram, analgesics, anti-inflammatory, hydro-electric rebalancing, liquid and semi-liquid diet.



Figure 5. Clinical appearance three days after incision, drainage and antibiotic treatment

The evolution was favorable (Figure 5), the patient presented pain relief, the disappearance of trismus, the hospitalization period was seven days. Dental septic outbreaks were also cleaned up.

DISCUSSIONS

The management of suppurations of the submandibular lodge involves a well-defined protocol: emergency surgical and medical treatment; its lack causes diffusion in neighboring spaces with the appearance of phlegmon, which can in turn have serious general complications - mediastinitis, cavernous sinus thrombosis or meningitis. The favoring factors for the appearance of diffuse suppurations are represented by the decrease in the body's resistance (cachectic diseases, overwork, diabetes, chemotherapy, corticotherapy), the increased virulence of the microbial flora, as well as incorrectly conducted antibiotic therapy.

The Minimally Invasive Intraoral Approach (MIIA) is performed on selected cases of abscesses and phlegmons of odontogenic origin when the infection has not extended beyond the lower mandibular margin. This technique is followed by excellent cures, the impact required by MIIA being low compared to the traditional cervicotomy approach [7,8].

Submandibular abscess in some cases can be treated by intraoral drainage, this being a better technique than external in terms of cosmetic result. Postoperative recovery is easier because daily irrigation and dressing of the wound is not required. There may also be no risk of damaging the surrounding nerves [8].

The bacteria responsible for odontogenic abscesses are frequently those in dental plaque, *Streptococcus Spp* and *Staphylococcus Aureus* being the most frequently incriminated bacteria [9,10].

Frequently the origin of submandibular lodge abscesses are lower molars, their periapical periodontitis being determined by caries in 90% of cases [11]. Pericoronitis, following the incomplete eruption of a wisdom tooth can favor bacterial proliferation in the

region between its crown and the surrounding soft tissues. In the case of aggressive forms, it can spread to peripheral tissues [12].

Antibiotic therapy for submandibular sinus abscesses is based on broad-spectrum antibiotics such as penicillin, clindamycin, and metronidazole. The literature also supports the use of corticosteroids. The antibiogram of the material taken during surgery is useful to identify the bacteria and to start a targeted therapy. Surgical intervention must be supported by antibiotic therapy [13,14].

In the case of submandibular lodge abscesses, to treat infections, in most cases it is necessary to perform the extraction of one or more dental elements [15].

The location of the submandibular incision depends on the affected area. The incision should be placed in healthy skin when possible, not at the site of maximum fluctuation, as these incisions tend to heal with an unsightly scar. The incisions are preferably placed in a natural skin fold. An intraoral subperiosteal incision and an extraoral incision may be required to drain the submandibular space. The extraoral incision should be made approximately 3 to 4 cm below the angle of the mandible. The incision is made on the skin and subcutaneous tissues, up to the platysma [11,16].

CONCLUSIONS

The favorable evolution in a submandibular abscess involves a well-defined process. A submandibular abscess is diagnosed based on clinical evaluation and imaging tests. Dental septic foci that represent the starting point of suppuration must be cleaned to prevent recurrence. The key to a successful recovery is prompt diagnosis and appropriate treatment, along with diligent adherence to postoperative care instructions. Oro-maxillofacial infections can put the patient's life at risk, both by compromising the upper airways and by the serious septic condition they can induce. Also, these infections can spread to other structures, leading to serious specific complications.

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Assessment of the effects of allium sativum on the dental plaque



Flueras R.^{1,3}, Lile I.E.^{1*}, Freiman P.C.¹, Vaida L.², Stana O.L.¹, Popovici R.A.³, Stana A.⁴, Marian D.¹, Ilyes I.¹, Berari A.¹, Hosszu T.¹

¹Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania

²Department of Dentistry, Faculty of Medicine and Pharmacy, University of Oradea, Romania

³Department I, Faculty of Dental Medicine, University of Medicine and Pharmacy "Victor Babeş, Timișoara,

⁴Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

Correspondence to:

Name: Ioana Elena Lile

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldis”

Phone: +40 729 130 487

E-mail address: lile.ioana@uvvg.ro

Abstract

Aim and objectives: Over time, individuals have come to comprehend that in order to maintain good health, it is imperative to utilize natural substances as extensively as possible to avoid detrimental effects on the body. In light of this, researchers have undertaken certain investigations with the aim of substituting chemically-based mouthwash products with natural alternatives available in the market. These studies have led to the revelation that the extract derived from *Allium sativum* possesses the remarkable ability to eliminate plaque without causing irritation to the tissues or requiring the use of additional substances. Building upon these findings, our study sought to scrutinize the effects and inherent properties of *Allium sativum* within the oral cavity, particularly in the presence of dental plaque on the dental arches.

Material and methods: Bacterial plaque deposits became visible with the help of substances, erythrosine was used in the study, and the properties of *Allium sativum* were evaluated, the effect being clearly visible after about one minute. Quigley-Hein index was used in the evaluation of plaque deposits and a diagram was created to understand if it was actually a process of reducing bacteria.

Results: The results were good due to the fact that the *Allium sativum* extract allowed the removal of a large part of the plaque from the dental arches.

Conclusions: It was confirmed that this natural substance can be a good alternative to mouthwash with chlorhexidine, even if with less effective results.

Keywords: dental plaque, oral hygiene, dental caries, erythrosine

INTRODUCTION

The impact of mechanical oral hygiene techniques on the levels of microorganisms in saliva, particularly mutans streptococci, is of great interest to dentists who prioritize preventive care.

Regular and effective use of oral hygiene techniques, such, as toothbrushing and interdental cleaning have been proven to impact the levels of microorganisms in saliva, including mutans streptococci [1]. These techniques can help inhibit. Eliminate microorganisms reduce plaque bacteria and minimize gingival inflammation when practiced consistently and correctly [2]. A study investigating the effects of oral hygiene education and professional tooth cleaning discovered a decrease in the number of *Streptococcus mutans* in saliva after three months indicating that these measures have the potential to control species [3]. Similarly another study demonstrated that tongue scraping, tongue brushing and saturated saline rinsing all showed effectiveness in reducing streptococcal colony counts in saliva [4]. However despite improvements, in oral hygiene status salivary mutans streptococci levels tend to increase after treatment. Therefore it is crucial for individuals to follow procedures to reduce the risk of dental caries. Dentists prioritize care. Emphasize regular and effective mechanical oral hygiene techniques as essential for maintaining oral health and controlling microorganism levels in saliva.

Mechanical oral hygiene techniques (toothbrushing and interdental cleaning) have shown to have an impact on the number of microorganisms in saliva, that includes mutans streptococci [5]. These techniques, when used regularly and effectively, can help inhibit or kill oral microorganisms and reduce plaque bacteria and gingival inflammation [6]. In a study evaluating the effect of oral hygiene education and professional tooth cleaning, a significant reduction in salivary count of *Streptococcus mutans* was observed after 3 months, indicating the potential of these measures to control cariogenic species [7]. Another study found that tongue scraping, tongue brushing, and saturated saline rinsing all showed equal efficacy in reducing streptococcal colony counts in saliva [8-9]. For example after an orthodontic treatment the number of mutans streptococci in the saliva increases, and it is important to reduce the risk of caries so that oral hygiene status can be improved [10]. Therefore, dentists prioritize preventive care and emphasize the importance of regular and effective mechanical oral hygiene techniques to maintain oral health and control microorganism levels in saliva.

The act of brushing teeth with toothpaste containing fluoride is widely regarded as a pivotal measure in preventing tooth decay [11-12]. Tooth brushing with fluoridated toothpaste is considered to be the “milestone” of caries prevention [13-14]. However, tooth brushing alone is effective in reducing bacterial counts in the mouth, but not enough and to overcome this issue, it was decided to incorporate antimicrobial or other chemotherapeutic agents in dental practice [15].

Mouth rinsing as a formal practice was first used in China, in 2700 bc, for the treatment of disease of the gums and is the most cost-effective method of preventing dental caries [16]. Mouth rinsing for the prevention of dental caries in children and teenagers was established as a mass prophylactic method in the 1960s and has shown an average efficacy of caries reduction between 20 and 50% [17].

Chlorhexidine has been studied extensively for over 20 years, and is the gold standard for chemotherapeutic agent against mutans streptococci and dental caries [18].

To prove that even natural products can achieve positive results on bacterial plaque removal, we looked for some variants of chlorhexidine [19]. We discovered the *Allium sativum* extract, which has many characteristics against the accumulation of the plaque, but

its capacity was analyzed step by step [20]. Demonstrating the effect of an ordinary product used in the kitchen, completely natural and cheap was a surprise for us all [21].

Aim and objectives

In order to demonstrate that even natural products can yield positive outcomes in the removal of bacterial plaque, we explored various iterations of chlorhexidine. This led us to discover the extract of *Allium sativum*, which possesses numerous attributes that combat plaque accumulation. However, we meticulously analyzed its efficacy step by step. The revelation that an ordinary, completely natural, and inexpensive kitchen product could produce such an effect was a pleasant surprise for all involved.

MATERIAL AND METHODS

The research was conducted at the Aurel Vlaicu Polyclinic and comprised a total of 13 participants who were students specializing in dental medicine. These individuals fell within the age range of 20 to 25 years. Each participant was duly informed about the procedures involved in the study and provided their consent by signing a written agreement that contained all the necessary information.

Every student received a single clove of *Allium sativum*, commonly known as garlic, as well as a plaque indicator.

Upon performing chemical analysis on *Allium sativum*, it was discovered that this plant contains sulfur-containing compounds, such as Alicin. Alicin exhibits properties of being an antioxidant and has the capability to attach sulfur (SH) groups to enzymes and proteins, thereby altering their activities. This, in turn, leads to the inhibition of sulfur enzymes. Furthermore, Alicin has the unique ability to rapidly penetrate cell membranes and enter cells.

The plaque indicator is a valuable and effective tool used in both professional and domestic oral hygiene. Its purpose is to assess the presence, quantity, and location of plaque buildup, even in the smallest amounts, and facilitate its removal. These indicators are composed of non-toxic chemicals that have the capacity to bind to the organic components of bacterial plaque. In our study, we utilized erythrosine as the plaque indicator.

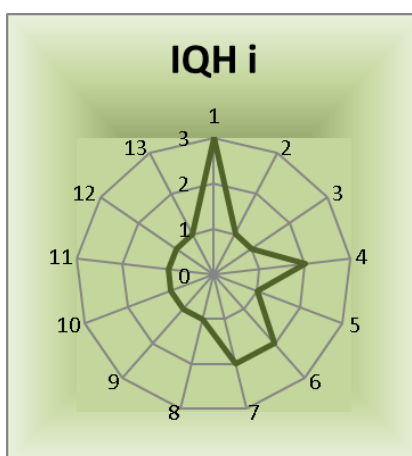


Figure 1. Quigley-Hein plaque index initially

The method of using the plaque indicator is as follows: it is imperative not to clean the teeth in order to promote plaque accumulation. After consuming a source of carbohydrates to facilitate the accumulation of plaque, an erythrosine tablet was employed to reveal the

presence of dental plaque. The tablet was held in the oral cavity for a duration of one minute. Due to its effect, the tablet uniformly stained all deposits of dental plaque in a vivid red hue.

Each participant in the study was thoroughly examined, and the data obtained from these examinations were meticulously documented in the patient records and captured through photographs of the oral cavity (fig.1).

The assessment of plaque quantity was conducted by means of the Quigley-Hein plaque index, which is utilized to evaluate the extent of plaque coverage on the dental crown, disregarding its thickness.



Figure 2. IQH before and after

Consequently, the surface area occupied by the plaque was assessed and assigned scores ranging from 0 to 5 as follows: absence of plaque was assigned a score of 0; a fragmented strip of plaque at the gingival margin was assigned a score of 1; the presence of a continuous strip (up to 1mm) of plaque at the gingival margin was assigned a score of 2; the existence of a plaque strip exceeding 1mm in size, covering less than one third of the gingival area of the dental surface, was assigned a score of 3; plaque coverage surpassing one third but less than two thirds of the dental surface was assigned a score of 4; a score of 5 represents plaque coverage exceeding two thirds or more of the dental surface.

In order to facilitate the centralization of data, the initial assessment of the Quigley-Hein plaque index involved the scoring of IQH i and IHQ f. Following the maintenance and mastication of *Allium sativum* in the oral cavity, the evaluation of the Quigley-Hein plaque index was conducted (fig.2).

RESULTS

The data was inputted into an Excel spreadsheet to facilitate the creation of charts and subsequently transferred to statistical software for analysis.

Upon conducting the initial consultation, it was discovered that the majority of participants, specifically nine in number, exhibited a Quigley-Hein plaque index of 1. This index signifies the presence of a non-continuous band of plaque located at the gingival margin.

Solely one patient displayed an IQH of 3, denoting the presence of a plaque band greater than 1mm in size, which covered less than one third of the gingival surface of the

coronary surface. In total, four participants showcased a continuous and narrow strip of plaque situated along the gingival margin, measuring up to 1mm (fig.3).

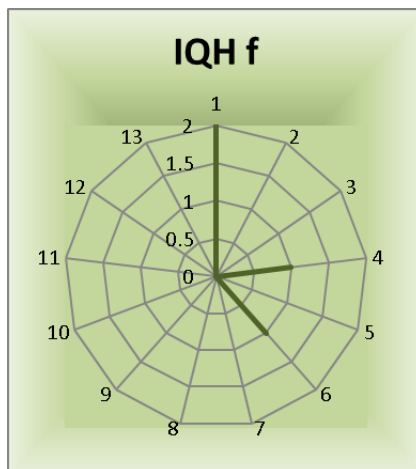


Figure 3. Final IQH

Following the comprehensive assessment of the Quigley-Hein plaque index in each participant, we transitioned to utilizing *Allium sativum* in order to observe its impact on periodontal tooth structures. Each participant was instructed to chew a clove of *Allium sativum* for a duration of 3 minutes.

The eradication of the plaque's coloration was progressively intensified. The participants were once again consulted and the collected data were reported with accompanying photographs. Following the recording of each participant's data, the obtained results were meticulously analysed, leading to the formulation of several personal and general conclusions.

Hence, it can be deduced from the graph above, that a total of ten individuals possessed a Quigley-Hein plaque index of zero, while only one patient exhibited an IQH 1 with a sporadic band of plaque at the gingival boundary.

DISCUSSIONS

The acquired results were subsequently juxtaposed with the initial findings and have been visually represented in the diagram below.



Figure 4. Comparison of the initial and final IQH

In assessing the impact of *Allium sativum* on bacterial plaque, it was observed that the values experienced an average reduction of one point on the Quigley-Hein scale. This serves to underscore the beneficial effects of *Allium sativum* on oral well-being.

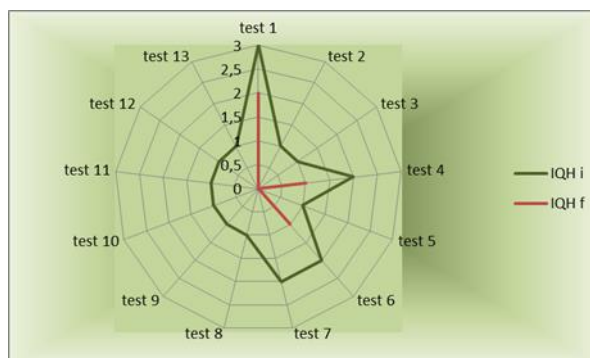


Figure 5. IQH before and after

CONCLUSIONS

The research findings indicate that *Allium sativum* effectively reduces the buildup of dental plaque, as evidenced by an average decrease of one degree on the Quigley-Hein scale. The visual documentation obtained from each individual instance further substantiates this outcome. The obtained results unequivocally validate the advantageous properties of *Allium sativum* as a holistic approach to uphold optimal oral hygiene.

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Conservative treatment of the dental pulp in the young permanent dentition



Hosszu T.¹, Lile I.E.^{1*}, Berari A.¹, Marian D.¹, Freiman P.C.¹, Stana O.L.¹, Stana A.², Flueras R.¹, Popa M.³, Dinu S.³, Ilyes I.¹

¹Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania

²Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

³Department 2, Faculty of Dental Medicine, University of Medicine and Pharmacy "Victor Babeş", Timișoara, Romania

Correspondence to:

Name: Ioana Elena Lile

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldis”

Phone: +40 745305221

E-mail address: lile.ioana@uvvg.ro

Abstract

Aim and objectives: The purpose of this clinical trial was to evaluate the effectiveness of calcium hydroxide [Ca(OH)₂] and mineral trioxide aggregate (MTA) in treating deep carious lesions using the direct total caries removal approach. The objective of treatment planning for young permanent teeth is to ensure the well-being of the pulp, while also facilitating ongoing root growth and the natural formation of dentin.

Material and methods: The study was carried out on 81 teeth with advanced caries treated by indirect pulp capping using calcium hydroxide and MTA.

Results: Following therapy, the recall rates were 92% at six and twelve months. Endodontic emergency treatment was provided for four teeth that were capped with Ca(OH)₂ (2 at 6 months and 2 at 12 months posttreatment), and two capped with MTA (2 at 12 months posttreatment), due to signs of irreversible pulpitis that were confirmed clinically and/or radiographically. Between the two pulp-capping agents at six and twelve, there were not significant differences in pulp vitality.

Conclusions: When it comes to indirect pulp-capping success can be achieved with both materials: calcium hydroxide and MTA.

Keywords: pulp-capping, dentin repair, pulp protection, tooth decay, permanent immature teeth

INTRODUCTION

Conservative treatment of young (immature) permanent teeth is very important because they are characterized by an incompletely formed root and an open apex. When teeth with profound caries lesions or unintentional pulp exposure are treated, pulp capping is a minimally invasive essential therapy that keeps the pulp functioning. [1,2] The absence of the apical periodontium in the terminal area of the root, forces us to apply other endodontic techniques in the situation of pulpal or pulpo-periodontal damage of these teeth, different from those applied to mature permanent teeth. These techniques aim to maintain pulpal vitality at least in part to allow for further root formation and apex maturation when possible. In the case of immature permanent teeth, untreated dental caries are the main factor of pulpopathies due to the possibility of faster action and evolution, due to the reduced thickness and increased permeability of the dentin. [3] In the first phase, in the dentin and in the pulp there are defense phenomena characterized by: the formation of sclerotic dentin (by intra and peritubular calcifications at the level of the dentin) and the deposition of tertiary dentin at the pulpal level. By advancing the decay process, in the odontoblastic and subodontoblastic area, signs of chronic inflammation appear (mild vasodilatation and the appearance of some defense cells). This stage is asymptomatic and reversible. [4]

Capping is a complex therapeutic method, addressed exclusively to deep cavities prepared during the treatment of dental decays, having the role of protecting the dental pulp and preventing pulpal inflammation or other diseases. Another role is to stimulate the mechanisms of neodentinogenesis (formation of new dentin) which ensures the partial recovery of hard dental substances. In addition to these objectives, indirect capping also aims to ensure pulpal healing conditions, block the activity of existing bacteria, and reduce wound permeability by blocking the dentinal tubes, thus ensuring the protection of the pulp from external physical and chemical agents. It was found that vital dentin had a higher resistance against decay than non-vital dentin. Therefore, under certain conditions, an attempt to keep the exposed pulp vital can be successful. [5-7]

For the treatment of infected pulp, it is recommended to remove the decays, prevent the trauma, and apply a substance that induces healing. The idea that a vital pulp is important for the long-term preservation of a tooth and that the exposed pulp is capable of forming hard tissue has been widely accepted. [8] Calcium hydroxide was used globally as a protective paste layer and has been the standard for the past 50 years. Its use is well documented and its degree of safety for pulpal capping is clinically acceptable. [9, 10] Historically, calcium hydroxide ($\text{Ca}(\text{OH})_2$) has been considered the gold standard. Despite to the positive experience with calcium hydroxide, contemporary literature accepts many newer materials for the pulp, such as dentin adhesives, mineral trioxide aggregate, collagen, chondroitin sulfate, hyaluronic acid, calcitonin, ammonium hydroxide, barium, magnesium, aluminum, strontium hydroxide, albumin, cyanoacrylate manufacture. [11, 12] At this time, due to its bioinductive properties, pulpal capping is indicated to be made with materials derived from Mineral trioxide aggregate (MTA), the future of capping paste as a predictable and viable way of treatment seems to be correct. [13-15] The recommended therapeutic methods in the endodontic therapy of immature permanent teeth are indirect or direct capping that fully preserves the vitality of the pulp, based on the stimulatory effect of calcium hydroxide or derivatives resulting from MTA. [16]

Preservation of the vitality of the pulp of immature permanent teeth is possible due to the numerous embryonic cellular elements with high biological value and the rich vascularization that offers a high degree of reversibility to inflammatory processes and even healing. [17, 18]

Aim and objectives

The ultimate goal in the treatment of pulpal diseases of immature permanent teeth is the integral preservation of the vitality of the pulpal organ necessary for the complete development of the root.

MATERIAL AND METHODS

A longitudinal interventional randomized control trial was conducted on 70 people (81 teeth), of which 40 boys and 30 girls aged between 8-16-year-old children. A single operator, trained in the standardization of the procedures, performed all of the restorative treatments. A maximum of two teeth per patient were included in this study. (In cases where two teeth were restored in the same patient, one of the teeth was capped with MTA, while the other was capped with Ca(OH)₂). A simple randomization method was used for selection – the first tooth selected was assigned to be treated with Ca(OH)₂ and the second with MTA.

The clinical criteria of inclusion were:

- active carious lesion deep into dentin, involving occlusal and/or proximal surfaces of primary molars, without clinical observation of pulp exposure;
- absence of clinical symptoms of irreversible pulpitis, such as spontaneous pain or sensitivity to pressure;
- absence of clinical diagnosis of pulp exposure, fistula, swelling of soft and periodontal tissues, and abnormal tooth mobility;
- possibility of restoration.

All teeth exhibited initial deep caries and no prior restorations.

One operator completed all indirect pulp caps. After patients obtained profound local anesthesia, the operator placed a dental dam and used an oral sealant to prevent saliva leakage where necessary.

Group I, calcium hydroxide. Calcium hydroxide was applied using the steps: anesthesia, isolation and cavity preparation. A thin layer of about 1 mm was applied on the opening, the material used was Kerr Life, then a base layer composed of a phosphate cement was applied and then a final composite restoration.

Group II, MTA. The MTA was applied as follows: the cavity was cleaned under anesthesia, isolation and cavity preparation. The MTA was mixed with sterile water in the proportions recommended by the manufacturer, the resulting paste being applied, the thickness of the applied paste was 1.5-2.5 mm.



Figure 1. Tooth anesthesia



Figure 2. Removal of decayed dentin



Figure 3. Application of calcium hydroxide



Figure 4. The final appearance of the filling



Figure 5. Cavity preparation for the MTA



Figure 6. The MTA layer applied

A base of glass ionomer cement was applied after the pulp-capping materials were applied. After that, the teeth were etched for 30 seconds with 37% phosphoric acid, and Prime and Bond NT, a single-bottle adhesive system, was applied. The restoration procedure was then finished by gradually inserting a microfilled hybrid composite resin material into the cavities and using the LED device to light cure it for 20 seconds. Rubber cones, discs, and diamond-composite finishing burs were then used to polish the teeth.

The patients were informed of the recall appointments at baseline (one week) and 6, 12 months posttreatment. Two skilled and calibrated dentists evaluated all subjective symptoms, such as pain or tooth sensitivity to different stimuli, during the observation periods. When pulp vitality was seen, along with a normal response to thermal, electrical, and tactile tests and no indications of spontaneous pain, the treatment was deemed clinically successful. When radiolucency and periodontal ligament space widening were absent, it was deemed radiographically successful.

RESULTS

The study included 70 people, of which 40 boys and 30 girls aged between 8 and 16 years, (Table 1) patients selection. A total of 81 permanent teeth of 70 patients were capped randomly with either Ca(OH)_2 (n=42) or MTA (n=39) and restored using composite resin.

The patients included 30 girls and 40 boys, with a mean age of 12 years.

Table 1. Distribution by sex and the number of cappings

Total number of the consulted subjects		Total number of cappings	
Boys	Girls	Boys	Girls
40	30	48	33
70		81	

According to table 1 we notice the distribution by sex of the studied group, so we notice that the female sex is represented in a proportion of 43% while the male sex is represented in a proportion of 57%.

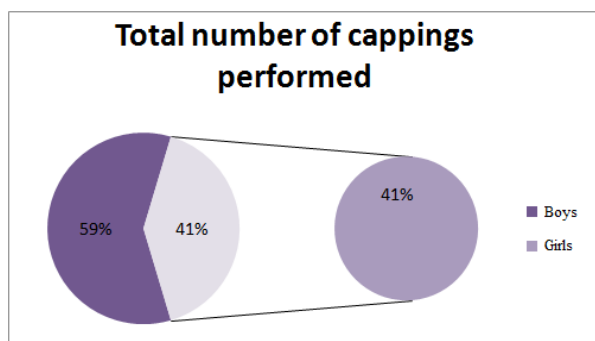


Figure 7. Capping performed on both boys and girls

Out of a total of 70 children examined, 40 were boys (57%) and 30 girls (43%). In this group, 81 pulp cappings were performed, of which 48 are for boys (59%) and 33 for girls (41%), the difference between the two sexes being insignificant.

Table 2. Materials used for cappings

Materials used for cappings	
Ca(OH) ₂ 42	MTA 39

Table 2 illustrates the material used for the cappings, calcium hydroxide and MTA. We can notice that 51.85% of the cappings were made with calcium hydroxide and 48.14% cappings was done with MTA. (Fig. 8)

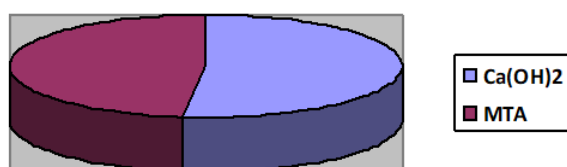


Figure 8. Material used for the cappings

Table 3. Distribution of cappings chosen on the arches

Teeth chosen for the acpping technique							
Maxillary				Mandible			
Lateral group		Front group		Lateral group		Front group	
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
23	12	3	2	25	16	0	0
35		5		41		0	
40				41			

As can be seen in the table above, molars were the most susceptible to this operation, work was done almost equally on both arches. There were also 6 cases in which patients had

extensive caries in the front teeth, due to the fact that the patients were young, it was decided to capping the pulp chamber to the detriment of endodontic treatment.

Table 4. Clinical Assessment of Tooth Vitality Distribution

Material	Condition of Pulp Tissue			
	Normal (vital)		Irreversible Pulpitis	
	n	%	n	%
Calcium Hydroxide (n=42)				
<i>baseline</i>	42	100	-	-
<i>6 months</i>	40	95.24	2	4.76
<i>12 months</i>	38	90.48	2	4.76
Total			4	9.52
Mineral Trioxide Aggregate (n=39)				
<i>baseline</i>	39	100	-	-
<i>6 months</i>	39	100	-	-
<i>12 months</i>	37	94.78	2	5.13
Total			2	5.13

DISCUSSIONS

Using the full caries removal technique, we evaluated the effectiveness of MTA and Ca(OH)₂ as pulp-capping materials for treating teeth with deep dentin carious lesions. The present study's results demonstrated the high success rate of indirect pulp capping, which was found to be as high as 92.59% regardless of the material used, and the high efficacy of complete caries removal using a one-visit approach. This high success rate could be explained by a precise diagnosis, total removal of the carious tissue, which stops the carious process from progressing, and a well-sealed restoration that stops microleakage. Because of the tight restoration, any remaining cariogenic bacteria in the cavities would have perished upon the removal of their food source, causing the arrest. [28, 29]

To minimize the pulpal response, restorative materials must seal the edges of the cavity, prevent micro-infiltration and block the arrival of bacterial substances to the pulp by penetrating the dentinal tubules. However, if micro-infiltration from several restorations could be measured in vivo, it is very likely that all restorations will show some form of infiltration. If these teeth remain asymptomatic, it is probably because the rate at which exogenous materials pass through the dentin to the pulp is balanced by the rate at which these materials are removed through the pulp circulation, thus ensuring its vitality. Consequently, it is desirable that the dentinal barrier effect be maximized to provide the best pulpal protection. Each situation must be evaluated to determine which method is more favorable in achieving the best barrier effect. [30-34]

The role of indirect capping is also to ensure that the pulp healing process has the necessary conditions, namely, blocking the activity of existing bacteria and reducing the permeability of the lesion by blocking the dentinal tubules. Pulpal protection against external factors, both physical and chemical, is ensured in this way. In order to be able to apply this procedure, it is necessary to understand the cariogenic activity, how the carious processes work and who influences the progression of caries. In addition, the dentist must have knowledge of the biofilm of a carious lesion, how neodentinogenesis works but also alternative methods of excavation, all of which are necessary in order to treat a deep carious lesion and most likely extended by a successful indirect capping, the opening of the pulp

chamber being considered a failure in this chapter. [35] Thus the metabolic activity of the dental wound together with the biofilm from the tooth surface are the forces responsible for any mineral loss at the level of a tooth or the cavitory surface.

Contrary to the generally used procedures in filling a cavity, there is little evidence that the affected dentin should be completely removed and that this procedure should be more important than sealing the cavity. Affected dentin release does not appear to be involved in the progression of caries, pulpal inflammation, or pulpal necrosis. In this process some bacteria survive, many doctors have wondered what will happen to them and if they do not cause further damage and why they do not.

The pathology of dental caries is a dynamic process that takes place in the dental plaque, this being the microbial deposit or biofilm on the dental surface that results in an alteration of the balance between the dental substance and the overlying biofilm. Over time there may be a loss of minerals leading to the destruction of hard dental tissues and a visible dental lesion may occur.

Mechanical exposures are more likely to succeed in straight capping than carious-based openings. If the operator selectively selects the case, obtains hemostasis, in the case of direct capping, disinfects the exposure and the prepared cavity, uses the dam and properly seals both the pulp opening and the cavity preparation, success can be achieved with both calcium hydroxide and MTA. Although both techniques can successfully achieve pulp capping, the calcium hydroxide technique has proven successful over a longer period of time.

The gold standard of indirect pulp-capping materials, calcium hydroxide, is still widely used due to its ease of handling, paste form, and cheaper price when compared to MTA. However, studies found that professionals working in university settings tended to use MTA due to their up-to-date knowledge of contemporary literature, suggesting that MTA may become more popular in the future. [26]

CONCLUSIONS

For the treatment of deeply embedded carious lesions, indirect pulp capping in conjunction with total caries removal demonstrated a good success rate. At 12 months after treatment, Ca(OH)₂ and MTA were both found to be clinically effective.

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The role of fluoride in the prevention of tooth decay



Ilyes I.¹, Lile I.E.^{1*}, Berari A.¹, Marian D.¹, Freiman P.C.¹, Olariu I.¹, Stana O.L.¹, Stana A.², Flueraș R.¹, Hosszu T.¹

¹Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania

²Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

Correspondence to:

Name: Ioana Elena Lile

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldis”

Phone: +40 745305221

E-mail address: lile.ioana@uvvg.ro

Abstract

Aim and objectives; This study aims to demonstrate the need for fluoridation at an early age, in order to reduce the risk of tooth decay. Local fluoridation, associated with oral hygiene and general fluoridation, combined with a rational diet, scientifically designed in the spirit of non-karyogenesis, systematically applied in preschool and school children, has allowed a significant reduction in frequency and intensity indices of dental caries, in European populations with high economic and health standards. Systematic oral hygiene, generalized in school children through educational methods has led to a reduction in the rates of marginal gingivitis.

Material and methods; 50 children aged 6-12 years were selected and randomly divided into two groups (n = 50): (1) control: no preventive intervention oral hygiene instructions; (2) oral hygiene instructions and fluoride varnish at baseline and 6 months later. At baseline and 6 and 12 months after the intervention, caries risk reduction was the primary outcome.

Results; A total of 43 completed the study. There was no significant difference between groups. Oral Hygiene Instructions alone or associated with the use of fluoride varnish reduced the caries incidence in young children.

Conclusions; The incidence of dental caries in young children was decreased by oral hygiene instructions either by themselves or in conjunction with fluoride varnish use.

Keywords: tooth decay, fluoride-based substances, prophylactic measures, oral hygiene, oral health, periodontal disease

INTRODUCTION

Fluoridation has been talked about since the end of the 18th century, when various articles appeared in the European press. They promoted fluoride as a method of combating tooth decay. It was then believed that the addition of 100g of fluorine in powder form could help remedy dental disease. Attention has also been drawn to calcium fluoride tablets that appeared in Denmark in the early 20th century, they were supposed to help “fix tooth decay” (R. Allan Freeze, Jay H. Lehr, 2009). [1]

In 1901, an American surgeon, John M. Eager, sent to Naples, noticed and described the appearance of dark brown spots on the teeth. He wrote a statement about what was happening and the following year was the first article published by the Public Health Service on the subject. [2]

Temporary teeth have an important role in forming and guiding permanent ones. Tooth loss is most commonly caused by untreated tooth decay. The caries process progresses if left untreated. That is why it is important to be treated early. [3] By affecting the temporary teeth by the caries process, it is possible to reach the penetration of the permanent tooth bud.

Fluoride is known to primarily help remineralize tooth enamel, which strengthens teeth and removes their sensitivity. If the temporary teeth have demineralized enamel, it is recommended to use fluoride to remineralize the enamel. Through its mechanism of action, fluorine, forms a hydroxyapatite crystal that enter the enamel and form fluorapatite. [4, 5]

For fluoride treatment to be effective, the patient must have good dental hygiene and follow regular visits to the dentist's office. In order for the fluoride treatment to be as good as possible and to give results, it is also recommended to use different methods for the home, such as fluoride toothpastes, mouthwashes, but only according to the dentist's instructions. [6] Fluoridation is a process by which the tooth is given an additional supply of fluoride, thus increasing its resistance to caries and stopping the evolution of caries already formed. [7-9] Fluoridation is a non-invasive technique, and easily accepted by patients of all ages, and is also a painless method. The multitude of existing fluoridation methods allows the choice of the most effective for each patient. Fluoridation can be used even in early caries, the process of which is slowed down due to the intake of fluoride, which combats the demineralization of tooth enamel. [10-12]

Aim and objectives

This study aims to demonstrate the need for fluoridation at an early age, in order to reduce the risk of tooth decay. Local fluoridation, associated with oral hygiene and general fluoridation, combined with a rational diet, scientifically designed in the spirit of non-karyogenesis, systematically applied in preschool and school children, has allowed a significant reduction in frequency and intensity indices of dental carie, in European populations with high economic and health standards. Systematic oral hygiene, generalized in school children through educational methods has led to a reduction in the rates of marginal gingivitis.

MATERIAL AND METHODS

There are fluoridation methods that can also be used at home, such as fluoride toothpastes (Fig. 4), mouthwashes, floss (fig. 5) and fluoride toothpicks.

The success of fluoridation is seen in time, depending on the chosen treatment method, sooner or later. The effectiveness of the treatment also depends on the patient's oral hygiene, on how he follows the instructions given to him by the dentist.

We conducted a research on a group of 50 children aged 6-8 years and 8-12 years, of different sexes.

Exclusion Criteria

- ✓ medical history of systemic diseases
- ✓ drug allergies
- ✓ congenital physical or mental disabilities
- ✓ oral or dental anomalies or disabilities
- ✓ unwillingness to participate due to lack of time

Inclusion Criteria

- ✓ at least 4 erupted primary teeth
- ✓ none of the teeth showed signs of noncavitated or cavitated caries
- ✓ age between 6-12

A sample size of 50 persons was estimated



Figure 1. Application of fluoride varnishes

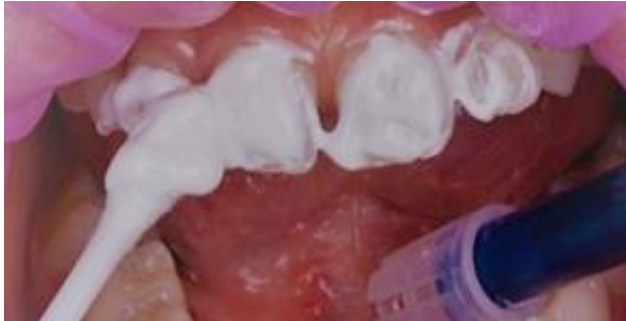


Figure 2. Application of fluoride gel



Figure 3. Fluoride sealing



Figure 4. Fluoride toothpaste



Figure 5. Dental floss

After dental examinations the children were randomly divided into two equal groups of 25 participants each.

Group 1 (Control) - Control group participants did not receive any oral health care intervention. The placebo, a water-based colored solution similar to FV, was painted over the tooth surfaces, and the placebo varnish was applied at baseline and at the 6-month follow-up appointment.

Group 2 (Test) - The parents received oral health instruction. The dentist cleaned the children's teeth by brushing and isolated them with cotton rolls. FV that contained 5% sodium fluoride was applied with a disposable brush to all tooth surfaces and left for 1 min. A small amount of varnish was applied to all primary teeth at baseline. The parents were advised not to allow the child to eat rough (abrasive) foods for the remainder of the day [Holve, 2008] and not to brush until the following day [Weyant et al., 2013]. The FV was applied again 6 months later.

RESULTS

This study aims to demonstrate the need for fluoridation at an early age, in order to reduce the risk of tooth decay. Local fluoridation, associated with oral hygiene and general fluoridation, combined with a rational diet, scientifically designed in the spirit of non-karyogenesis, systematically applied in preschool and school children, has allowed a significant reduction in frequency and intensity indices of dental carie, in European populations with high economic and health standards. Systematic oral hygiene, generalized in school children through educational methods has led to a reduction in the rates of marginal gingivitis. We conducted a research on a group of 50 children aged 6-8 years and 8-12 years, of different sexes. (table 1)

Table 1. Classification of patients according to age

<i>age</i>	Group 1 (n=25)	Group 2 (n=25)
<i>6-8</i>	11	10
<i>8-12</i>	14	15
<i>total</i>	25	25

In children aged 6-8 years, poor oral hygiene was found, as they needed more training in brushing their teeth. In the category of 8-12 years, better oral hygiene was found (fig. 6)

Oral hygiene depending on age

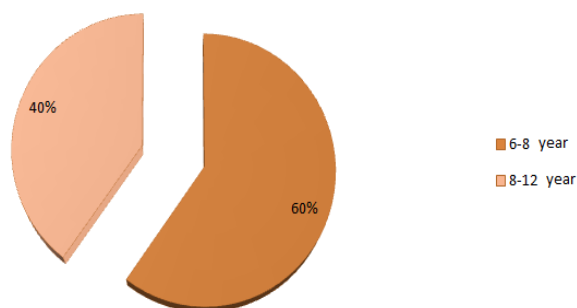


Figure 6. Oral Hygiene depending on age

Of the total number of patients examined, there were 27 girls (54%) and 23 boys (46%). Better oral hygiene was observed in girls than in boys. Regarding the need for fluoridation in both cases, a deficiency of fluoride was observed in the oral cavity. Fluoridation was performed on groups of teeth, but also isolated on a single tooth, the needs being different for each. (fig. 7)

Oral hygiene depending on sex

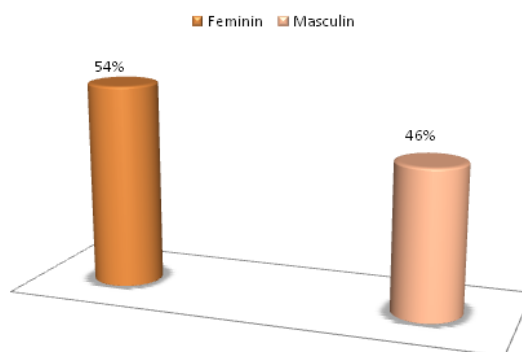


Figure 7. Oral hygiene depending on sex

The predisposition to dental caries is different from one patient to another, so we have patients with low predisposition to caries, medium and high. This predisposition interests us to see to what extent it is necessary to perform dental fluoridation and to know the number of people affected to determine the necessary treatment. Fluoridation helps to strengthen teeth

and prevent the formation of cavities, so by establishing the predisposition to caries of each can be established fluoridation by the most appropriate method. (fig. 8)

Predisposition to caries

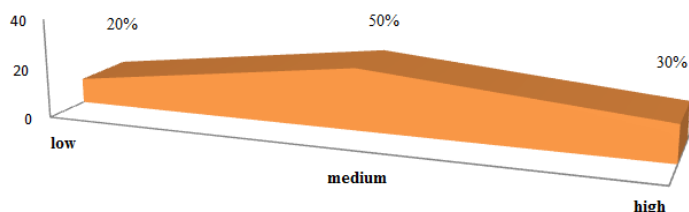


Figure 8. Predisposition to caries

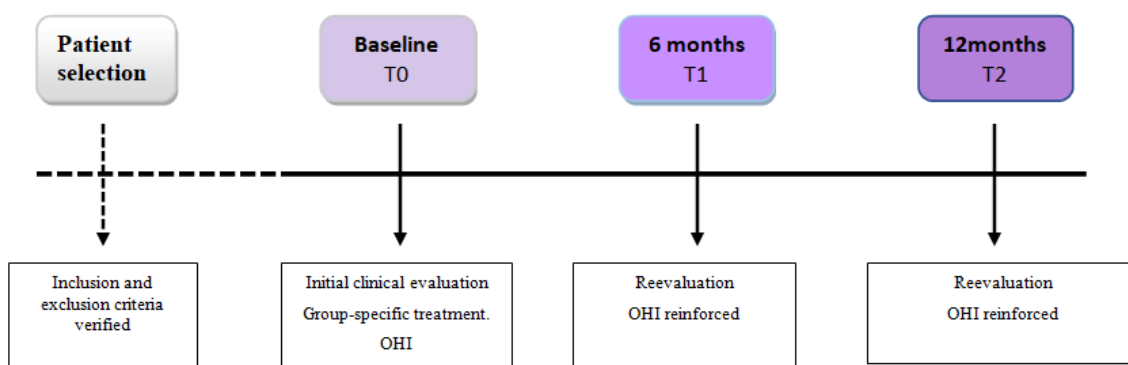


Figure 9. TIMEFLOW

Table 2. Reduction in caries incidence during the follow-up period

<i>caries</i>	Group 1 (n=25)	Group 2 (n=25)
<i>6 months</i>	1	-
<i>12 months</i>	2	2
<i>Difference to baseline</i>	3	2

DISCUSSIONS

Our study's potential weaknesses included the small sample size, the participants' geographic locations, and the lack of knowledge of the risk factors for childhood caries. Furthermore, children from different socioeconomic backgrounds – such as those who live in rural areas or see a private pediatrician – were not included in this study. While these factors may have an impact on the features of oral health education programs, they may not be

practical in all clinical settings. It's also possible that some of the parents didn't fully or accurately follow our instructions.

The study aimed to highlight the different methods of fluoride-based treatment in combating tooth decay. It is known that the prevalence of caries is still high due to the lack of information to people about prevention methods. Following the study, we noticed that girls had better oral hygiene than boys and were more concerned about what might happen over time if they did not follow, first of all, the rules of oral hygiene. I also explained to the children the correct brushing technique to help them improve their oral hygiene. We have also provided them with various additional methods that help make brushing more efficient, such as mouthwashes and flossing. [13]

Fluoridations were performed in several sessions with fluoride varnishes, fluoride gels, fluorine sealants, fluoride-releasing devices and even fluoride-releasing glass-ion cements in those who needed fillings. Fluoridation helps primarily to restore demineralized enamel and strengthen teeth. This is a non-invasive method and much more easily accepted by children, taking into account the fact that it is also a painless application technique. We have seen the success of fluoridation over time, but also due to the fact that children have understood how important it is to have good oral hygiene and how much it helps to form and maintain healthy teeth in the oral cavity. [14]

Untreated tooth decay is the most common cause of tooth loss. The causes of dental caries are bacterial plaque deposits formed due to poor hygiene. The appearance of fluoride in dental practice has led to better prevention of caries. Fluoridation is one of the methods used to reduce the risk of tooth decay. By fluoridation the enamel is remineralized, the tooth strengthens and the tooth sensitivity disappears. Fluoride, through its mechanism of action, inhibits enamel demineralization and accentuates its remineralization.

The technique of fluoridation is easy to perform, without traumatizing the teeth in the oral cavity. Fluoride materials are applied either by brushing, in the case of fluoride varnishes or with the help of special gutters, for fluoride gels, or by ingestion or can be applied to tooth sealants that release fluoride ions. [15]

Regular check-ups at the dentist help maintain the success of fluoride therapy. Through visits to the dentist, he can detect the demineralization of the enamel in time and can immediately institute a suitable fluoride treatment, so as not to lead to caries. Because there are teeth with much deeper morphology and here the effectiveness of simple fluoridation is lower, it is recommended to use fluoride sealants. [16]

CONCLUSIONS

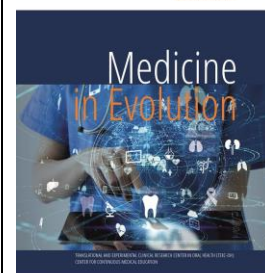
Fluorine sealants release fluoride ions into the tooth structure. They help to keep healthy teeth in the oral cavity for a long time and being a non-invasive method can be recovered at any time. Dental fluoridation is an effective method of remineralizing tooth enamel, so the risk of tooth decay decreases greatly.

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Giant cell granuloma of the floor of the mouth in a patient with glycogen storage disease type Ib. Case report



Iurcov R.¹, Precup A.I.¹, Costea C.P.¹, Daina M.D.², Moldovan I.³, Todor L.¹, Bumbu B.A.¹

¹Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania

²Faculty of Medicine and Pharmacy, University of Oradea, Romania

³AI Dent Center Cluj-Napoca

Correspondence to:

Name: Liana Todor

Address: Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania, December 1st Square no.10, 410068 Oradea, Bihor County, Romania

Phone: +40 723517100

E-mail address: liana.todor@gmail.com

Abstract

Central giant cell granuloma (central giant cell granuloma) is an uncommon benign bony lesion that occurs in the mandible and maxilla and accounts for approximately 7% of all benign tumours of the jaws. Central giant cell granuloma occurs predominantly in children or young adults, with approximately 75% of cases presenting before 30 years of age although presentation can occur at any age. The majority of these lesions were asymptomatic and relatively innocuous. However, some displayed a more aggressive clinical course characterized by root resorption, pain or paresthesia, and cortical perforation. Females are affected more frequently than males, with a ratio of 2:1.

Keywords: Central giant cell granuloma, bony lesion, mandible, tongue, glycogen storage disease

INTRODUCTION

Giant cell-rich lesions of bone represent a heterogeneous group of multinucleated giant cell proliferation of osteoclastic type. In the maxillomandibular region, some are commonly found, such as central or peripheral giant cell granulomas, cherubism, aneurysmal bone cyst, and brown hyperparathyroidism tumor, while others are more rarely found, such as giant cell tumors of the bone and giant cell tenosynovial tumor of the temporomandibular joint [1,2]. Giant cell tumor of the bone was described in 1818 by Cooper and Travers and is listed in two forms in the general classification of bone and soft tissue tumors that was modified in 2020: the bone form classified as osteoclastic giant cell-rich tumors, malignant or of intermediate malignancy (locally aggressive, rarely metastatic), and the form in “soft tissue” classified as so-called fibrohistiocytic tumors of intermediate malignancy [3,4]. Bone giant cell tumors are either benign or malignant primary tumors. In the Glycogen Storage Disease (GSD) type 1b, the enzyme glucose-6-phosphatase (G6P) cannot be transported across the microsomal membrane in the liver, and the glycogen cannot be metabolized [5]. The glycogen accumulates in several organs, such as liver and kidneys [6,7], and the disease leads to systemic and intraoral manifestations. The main systemic manifestations are hypoglycemia, hyperlipidemia, hyperuricemia, hepatomegaly, short stature, growth retardation, neutropenia, and neutrophilic dysfunction with recurrent infections [8, 9]. Patients with GSD 1b show poor prognosis and high mortality rate [10]. The incidence of glycogen storage disease type I (both GSD Ia and GSD Ib) is 1 in 100,000 live births. Approximately 20% of glycogen storage disease type I is GSD Ib.

MATERIAL AND METHOD

We present a case of a 19-year-old patient known with a glycogen storage disease type I b. He presented to the Emergency County Hospital Bihor with difficulty breathing, feeding and sialorrhea. Intraorally there was a large hyperplastic purplish lesion on the floor of the mandible (Figure 1) measuring approximately 6,5 cm long and 4 cm width, asymptomatic with no numbness of the area, lower lip and mental area.



Figure 1. Clinical aspect: polylobulated parenchymal and osteolytic lesion

The CT examination demonstrated parenchymal and osteolytic polylobulated lesion centered on the body of mandible and oral floor, with differential iodophilia and expansion in

the subcutaneous soft tissue and perilingual groove. It causes osteolysis in the superior one third of the body of the mandible and alveolar bone (Figure 2).

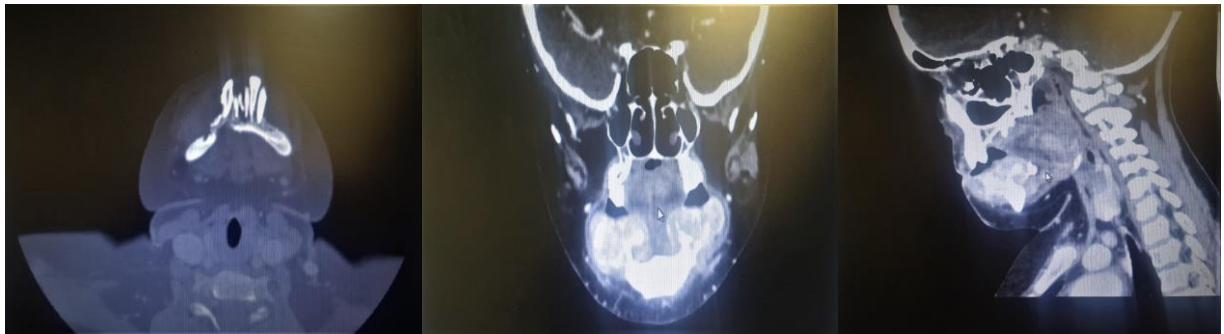


Figure 2. Lesion centered on the body of the mandible and the floor of the mouth; osteolysis of the upper third of the body of the mandible and the alveolar process

The patient understands the necessity of surgery, is informed about the steps involving the therapy and prognosis. The complete excision of the tumor is performed under general anesthesia (Figure 3).

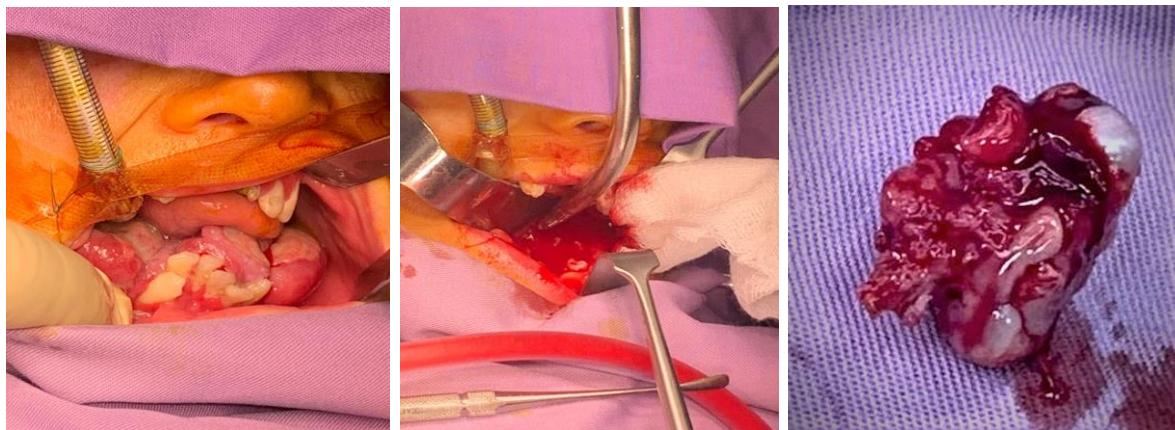


Figure 3. Excision of the tumor and extraction of the frontal teeth

After performing the surgery under general anesthesia, the excised tissue was taken for histopathology examination (Figure 4).

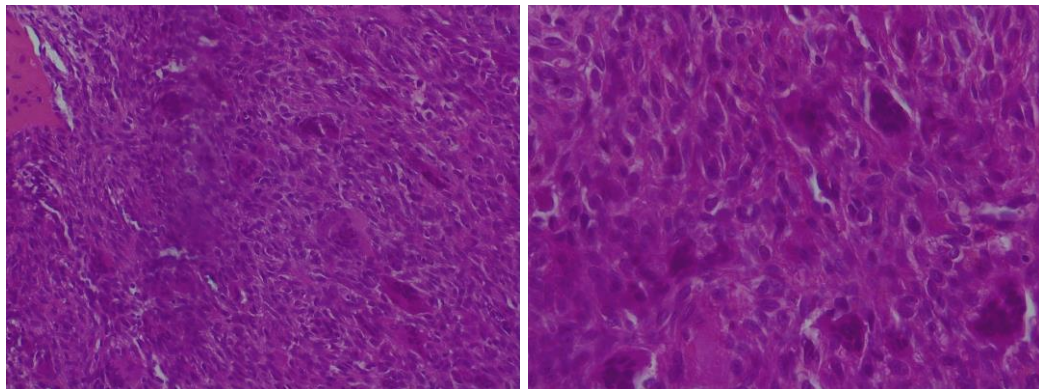


Figure 4. Multinucleated giant cells within a background of plump proliferating mesenchymal cells with extensive red blood cell extravasation

RESULTS

Post operative the patient had a good healing. Pain and discomfort after the procedure were managed with medication; the patient was given antibiotics, anti-inflammatory, and analgesic drugs. Mentally he was optimistic and pleased about the result. He tolerated well the soft diet for seven days and maintained a good oral hygiene. The sutures were removed after ten days.

The postoperative evolution was good, the patient being periodically called for control (Figure 5).



Figure 5. The clinical situation one year postoperatively

DISCUSSIONS

The frequent intake of carbohydrates, to support blood glucose levels, provides a substrate for oral cariogenic bacteria by implementing the risk of developing caries. Furthermore, the generalized growth retardation of these subjects could also explain the eruption delay of the dental elements [11,12]. GSD I b is a variant of GSD I a; it is due to the defect of the glucose-6-phosphate transporter and presents further manifestations, such as neutropenia, altered neutrophil migration and bactericidal activity [13]. Patients are more susceptible to oral ulcers, periodontitis and oral cavity infections [13,14].

Current management of giant cell granulomas is based on surgical resection combined with supported curettage or peripheral osteotomy, to reduce the risk of recurrence [15]. For aggressive lesions, an "en bloc" resection may be considered [16]. Several pharmacological treatments are described as effective alternatives to the surgical management of giant cell granulomas. These are essentially subcutaneous injection of calcitonin or alpha interferon and intra-lesional injection of corticosteroids, although they have significant drawbacks (long duration of treatment, need for additional surgery in case of ineffectiveness and side effects [17,18]).

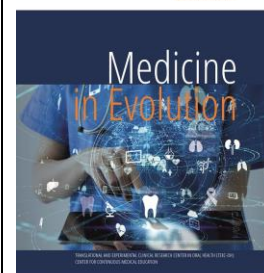
CONCLUSIONS

The diagnosis of giant cell granuloma of the floor of the mouth is essential for a good outcome. Communication between dentist, oral surgeon, geneticist and nephrologist is essential for the benefit of the patient. Oral hygiene is very important and needs serious attention from the patient because patients with glycogen disease type Ib are more susceptible to oral ulcers, periodontitis and oral cavity infections.

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Chronic mechanical trauma and oral squamous cell carcinoma. Case report



Bumbu B.A.¹, Precup A.I.¹, Costea C.P.¹, Daina M.D.², Moldovan I.³, Iurcov R.¹

¹*Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania*

²*Faculty of Medicine and Pharmacy, University of Oradea, Romania*

³*AI Dent Center Cluj-Napoca*

Correspondence to:

Name: Alexandru Iosif Precup

Address: Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania, December 1st Square no.10, 410068 Oradea, Bihor County, Romania

Phone: +40 743143120

E-mail address: sanduprecup@yahoo.com

Abstract

Oral squamous cell carcinoma (OSCC) occurs in approximately 95% of people older than 40 years; usually, it is diagnosed at the age of 60 years. These types of carcinomas represent 90% of the neoplasms of the oral cavity, the tongue, lips, floor of the mouth. The etiology of OSCC is multifactorial. Chronic mechanical trauma due to sharp teeth has also been suggested as an etiology of oral squamous of the tongue together with alcoholism, smoking, gene pool, human papilloma virus, poor oral hygiene. Base of the tongue is a distinct entity with different implications regarding treatment, prognosis and monitoring.

Keywords: Carcinoma, chronic trauma, oral cancer, sharp teeth, tongue

INTRODUCTION

Ninety-five percent (95%) of oral squamous cell carcinoma (OSCC) cases occurs in people who are older than 40 years; it is usually diagnosed at the age of 60 years [1]. OSCC is more common in men than women; this is due to the high risk of tobacco and alcohol consumption. The etiology of OSCC is multifactorial, including tobacco, alcohol, poor hygiene, human papilloma virus, and nutritional factors. Chronic mechanical trauma due to sharp teeth has also been suggested as a possible etiology of tongue-OSCC (Figure 1) [2]. Treatment of OSCC is determined by the metastatic and degree of tissue dysplasia. The first-choice treatment for tongue OSCC is surgery that is followed by radiotherapy or radio chemotherapy [3].



Figure 1. The tongue presents a lesion with no signs of healing

Unfortunately, almost half of the oral cancers are diagnosed at advanced stages (stage III or IV), with 5-year survival rates ranging from 20-50%, depending on tumor sites [4]. The overall diagnostic delay would include the period elapsed since the first symptom or sign until the definitive diagnosis [5].

MATERIAL AND METHODS

A 47-year-old female patient was presented to the Emergency County Hospital Bihor, with pain and a lateral tongue ulcerated lesion (Figure 2) with no signs of healing, for over a month. Intraoral examination shows molars 36 and 37 with mesialization and lingual inclination (Figure 2), the cusps of both teeth are in close contact with the ulceration. With an extraoral examination, no submandibular lymph nodes were palpable.

The patient had no history of smoking, drinking alcohol, or hypertension. There is no history of family-related cancer. The lesion was suspected to be malignant, a computer tomograph with contrast substance was performed with no pathological modifications.



Figure 2. The teeth 36, 37 mesialized and lingualized

The surgical treatment had two phases. Phase one incisinal biopsy and histopathology examination. Analysis showed that the microscopic diagnosis is oral squamous cell carcinoma (OSCC) with infiltration and minimal keratinization. The patient is informed about the diagnosis, prognosis and therapy. She is also scheduled for surgery. Tooth extractions 36 and 37 are performed in phase II; the patient underwent a partial hemiglossectomy under general anesthesia. The excision was made 2 cm from the affected site, and the malignant mass and healthy surrounding tissue were removed (Figures 3,4). The defect was repaired and sutured. After performing the surgery, the excised tissue was taken for histopathology examination. The result was with no tumoral infiltration.

After a postoperative histopathology examination, the patient was referred to an oncologist for staging and to be recorded. Follow-up and long-term clinical evaluation is needed to prevent the recurrence.



Figure 3. Tooth extractions 36, 37



Figure 4. Excision of tumor and suture

RESULTS

Post operative the patient had a good healing. Pain and discomfort after the procedure were managed with medication; the patient was given antibiotics, anti-inflammatory, and analgesic drugs. Mentally she was optimistic and understood the importance of the early

detection and reaction to the neoplasm she was diagnosed with. She tolerated the tube feeding for 5 days very well (Figure 5) and maintained a good oral hygiene. She did not speak knowing that the movement of the tongue could delay the healing. The sutures remained for 7 days. The patient needs surgical and oncological follow-up as scheduled at 3, 6 and 12 months.



Figure 5. Enteral tube

DISCUSSIONS

In the present case, a 47-year-old female patient presented an OSCC due to mechanical trauma caused by sharp teeth. In the literature, it is mentioned that tongue cancer can be seen in young patients, under 45 years old, mainly in females who abstain from tobacco and alcohol [6]. Mechanical trauma, like sharp teeth and other etiologies such as fractured fillings and ill-fitting dentures, can induce the development of OSCC [7,8]. The pathogenesis is debatable, but the characteristic of the trauma must be low intensity and persistent [9]. The lateral of the tongue is the highest area close to trauma, because, during the physiological function of a normal swallowing pattern, this area is trapped between dental arches approximately three times per minute. [9] This trauma can promote epithelial cell transformation [10]. Tobacco and alcohol have long been implicated in the etiology of tongue cancer in older adults [11].

Although the mouth is visually accessible for examination, the diagnosis of OSCC is frequently delayed because it may be difficult to distinguish clinically from other diseases.

We consider that colleagues from other specialities, like otolaryngologists and dentists, have an important role for oral screening and detecting oral cancers.

Generally, oral cancer has a poor prognosis. When carcinoma has metastasized to the lymphatic gland, the survival rate will decrease.

In this case, we were able to diagnose quickly. Early diagnosis of OSCC is helpful to increase the survival rate of the patient.

CONCLUSIONS

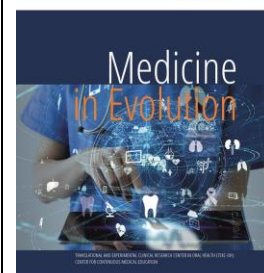
Early diagnosis of OSCC is essential for a good outcome. Communication between dentist, oral surgeon, oncologist and radiotherapist is essential for the benefit of the patient.

Mechanical trauma, like sharp teeth, fractured fillings and ill-fitting dentures must be quickly identified because it can induce the development of OSCC.

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Oral health: investigating the impact of auxiliary techniques on dental plaque removal



Lile I.E.¹, Baroni G.¹, Popovici R.A.², Freiman P.C.¹, Vaida L.³, Stana A.⁴, Stana O.L.^{1*}, Marian D.¹, Ilyes I.¹, Berari A.¹, Hosszu T.¹

¹Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania

²Department I, Faculty of Dental Medicine, University of Medicine and Pharmacy "Victor Babeş, Timișoara

³Department of Dentistry, Faculty of Medicine and Pharmacy, University of Oradea, Romania

⁴Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

Correspondence to:

Name: Otilia Lavinia Stana

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldiș”

Phone: +40 740662199

E-mail address: stana.otilia@gmail.com

Abstract

Often the patients are facing a wide range of toothbrushes, and they are faced with a dilemma, not knowing which one to choose, so the purpose of this study is to determine the efficiency of the various toothbrushes. In this sense, the study aims to analyze a series of toothbrushes with different characteristics: size, shape, hardness of the brush and length of the brush. By using a series of techniques we were able to evaluate their effects before and after cleaning the teeth. Initially, the amount of bacterial plaque present in the dental-periodontal structures of the oral cavity was revealed. For the evaluation of the dental plaque we used the Silness Loe plaque index and to evaluate the best toothbrush I asked the patients to use Bass's brushing technique. For coloring the plaque, red dye FDC Nr. 30 was used.

Keywords: dental sealing, minor lesions, sealants, composite, erosion

INTRODUCTION

Bacterial plaque, a biofilm that forms on tooth surfaces due to bacterial colonization, manifests in colorless, white, or yellow hues. With a well-organized structure comprising various bacterial types, plaque formation is influenced by factors creating tooth surface roughness, facilitating bacterial adhesion and growth. The presence of plaque can contribute to periodontal diseases and dental decay. Diverse methods, encompassing both subjective and objective scoring systems, have been proposed for assessing plaque deposits [1] [2] [3] [4].

There are nearly 25,000 species of bacteria involved in bacterial plaque formation, a microbial system with a rich metabolic activity. Not removed daily, dental plaque causes cavities, periodontal disease and tartar. Initially, the plaque is soft enough to be mechanically removed. In 48 hours, it begins to harden, and in 10 days it becomes tartar, much more difficult to remove. Dental plaque forms a sophisticated microbial biofilm community encompassing hundreds of bacterial species, serving as a significant catalyst for oral infections, cavities, periodontal disease, and the creation of tartar. The inception of plaque development commences with the attachment of primary colonizers to oral tissues, succeeded by coaggregation and the establishment of a dense biofilm matrix [5] [6]. The plaque biofilm, marked by its high dynamism, undergoes alterations in both taxonomic composition and functional capacity throughout its maturation [7].

Failure to remove plaque on a daily basis results in its solidification into tartar, presenting a more formidable challenge for elimination [8]. The microbial community within the plaque biofilm exhibits robust metabolic activity, and its dysbiosis significantly contributes to the instigation and progression of periodontal diseases [9]. Hence, effective control of plaque holds paramount importance in preserving oral health and thwarting the onset of dental diseases.

Oral biofilm, constituting a complex microbial community with numerous bacterial species [10] [11], plays a pivotal role in the progression of oral disorders, ranging from incipient lesions to intricate clinical cases. The onset of biofilm development occurs as primary colonizers attach to oral tissues and engage in coaggregation [12]. Employing revealing solutions, such as extracts from red dragon fruit peel and mangosteen rind, proves beneficial in visually appraising and evaluating the adhesive capabilities of the biofilm [13].

Various biofilm indices have been suggested to assess its accumulation, encompassing non-quantitative approaches grounded in clinician observation and quantitative methods for objective measurement [14]. The plaque begins to form immediately after eating and, if not removed, can cause very serious problems. At first it causes inflammation of the gums (gingivitis) and over time can lead to periodontitis, a disease that affects the periodontium, causing the loss of teeth, with consequent functional problems at the level of dental occlusion and aesthetic problems.

The primary dental plaque can be removed by brushing the teeth correctly, which helps to remove the formed film and the soft deposits on the dental and gum surfaces [15]. Tartar, in dentistry, is a deposit also due to the presence of calcium salts in saliva. It is a set of mineral compounds formed by about 80% from inorganic salts, containing phosphorus, calcium and sodium, and the remaining 20% from other substances. Dental brushing is recommended after each meal or twice a day, in the morning and in the evening. Using combine methods in removing dental plaque is necessary for a good oral health, and implies using toothbrushing and auxiliary means such as dental floss [16]. There are several brushing techniques, for example Charters technique, Bass technique, Stillman technique and Fones technique. These techniques differ by: positioning of the bristles, their hardness but also by

the performed movements, etc. There are several methods to assess bacterial plaque status, by means of bacterial plaque indices, with the help of revealing substances [16-24].

Aim and objectives

The objective of this study was to evaluate the effectiveness of diverse toothbrush types, varying in both bristle hardness and design, in eliminating bacterial plaque from the vestibular aspect of teeth in participants aged 20 to 29. The study aimed to discern the most efficacious toothbrush by applying the Silness Loe plaque index and the BASS brushing technique, taking into account the array of toothbrush variations. This endeavor seeks to provide nuanced insights into the interplay of toothbrush type and brushing technique on dental plaque removal and overall oral hygiene among young adults pursuing dental medicine.

MATERIAL AND METHODS

The study was conducted in the Vlaicu Policlinica, within the hours of oral-dental prevention. The study included a number of 25 participants, ranging in age from 20 to 29, these being students of 2nd year of dental medicine. From the point of view of the form we evaluated about 10 types of toothbrushes.

After choosing a method of evaluation of the plaque index, that of Silness Loe was chosen, which takes into consideration only the vestibular face of the teeth, during the consultation, and we evaluated it to all participants in the study. To better highlight the deposits in order to determine the plaque index, although the requirements of this index do not require it, a relevant substance was used: Red FDC Nr. 30, to facilitate the evaluation of the results. All participants used different types of brushes, with different hardness of the bristles, and we were able to evaluate for each participant the best toothbrush in removing the bacterial plaque by plate index and BASS brushing technique.

According to the Silness Loe (ISL) index, the index of the plate is done in two stages: with a simple inspection a score of 2 or 3 can be given, for a visible accumulation of plaques, and with the help of a periodontal probe, if the plaque is not visible, the tooth surface is tracked at the gingival margin, after which the tip is examined; if we do not notice anything, it is scored with 0, if there is a plaque on the probe, it is scored with 1. The 0 to 3 rating is made according to the following criteria: 0 represents the absence of plaque, 1 means the adhesive film at the free gingival margin, at the neighboring dental surfaces, which is observed by taking the probe on the tooth surface, 2 means moderate accumulation of white deposits at the gingival margin, which is observed upon inspection, 3 represents the abundance of white matter in the gingival pouch, on the tooth and on the gingival margin

In the study participants were asked to use BASS brushing technique to remove the bacterial plaque. According to it the brush was placed with oblique bristles, at an angle of 45 degrees, so that the tip of the brush rests on the dental faces and on the edge of the gum. Twenty horizontal movements were made, on each segment of the arch, in order to allow the brushes to penetrate into the gingival grooves and interdental spaces. On the oral side the brush was applied with the vertical handle, and at the level of the occlusal faces the brushes were placed perpendicularly, to penetrate the occlusal ditches and ditches.

Several types of toothbrushes were included in this study, which varied in both shape and hardness of toothbrushes. Thus from the point of view of the bristles they were: extrasoft, hardness noted in the study with ES, soft, scored with S, average scored with M, hard scored with H and extra hard scored with EH.



Figure 1. Types of toothbrushes

T1, had the head of the big brush, and the tip was round. Also the lateral bristles were oblique, being in different lengths, aiming at interdental cleaning.

T2 had the head of the rectangular thin brush. The bristles were all the same length and were soft as hardness, no damage to the gums.

T3 had thin head with a rounded tip. The bristles were hard and of different lengths. He had some very short bristles not to cause damage to teeth surfaces while the longer ones do interdental cleaning.

T4 was thin-skinned, with rounded head and medium hardness tufts.

Type 5, T5 had medium hardness bristles and positioned in different directions. It also had 4 rubber tufts, very useful for interdental cleaning.

T6 had soft hardness tufts, was thin and had some filiform bristles to reach interdependent spaces and to pass it from one side to another for a very efficient cleaning.

T7 had bristles of different lengths and medium hardness.

T8 had bristles of different lengths, higher to the middle and bristles were like thin threads. It was soft hardness.

T9 was hard but had different lengths with the area towards the concave tip. At the top the bristles were higher to clean the retromolar spaces well.

The T10 was extra hard and had higher lateral and shorter bristles in the central area.

CASES

We selected several cases to present, in order to demonstrate the effectiveness of several types of toothbrushes. In the study we observed that the type of the toothbrush influences the outcome of the hygiene in different patients but this can be of course due to using a correct technique.



Figure 2. Patient before and after toothbrushing with an extra hard toothbrush

Before brushing, after coloring the index plaque: 1
Toothbrush hardness: extra hard
After staining, after brushing the index plate: 1



Figure 3. Patient before and after toothbrushing with a medium toothbrush

Before brushing, after coloring the index plaque: 1
Toothbrush hardness: Medium
After staining, after brushing the index plate 0/1



Figure 4. Patient before and after toothbrushing with an medium toothbrush

Before brushing, after coloring the index plaque: 0
Toothbrush hardness: Medium
After staining, after brushing the index plate: 0

RESULTS

We evaluated 25 patients out of these 5 were women and 20 were men.

Of the patients we examined 4 were 21 years old, 2 patients were 23 years old, 2 patients were 24 years old, 1 was 25 years old, 4 patients were 26 years old, 1 patient was 27 years old, 4 patients aged 28 and 2 patients were 29 years old.

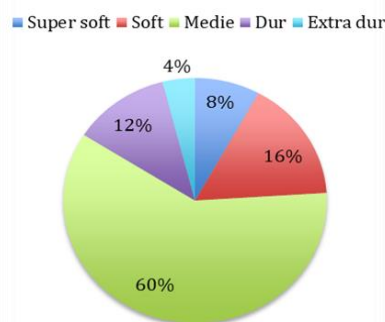


Figure 5. Percentage of different types of toothbrushes bristle used in the study

Between the brush used 2 were super soft, 4 were soft, 15 were average, 3 hard and one extra hard.

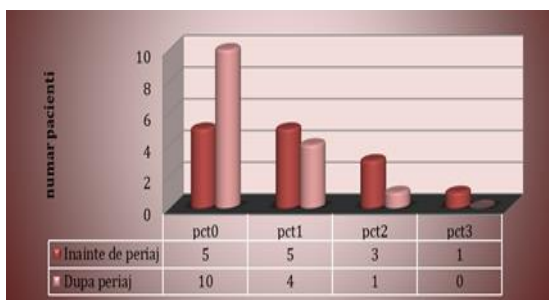


Figure 6. Evaluation of the ISL plaque index before and after brushing

Silness and Loe index before brushing before brushing was 0 for 5 people, 1 for 5 people, was 2 for 3 people and 3 for 1 person.

After brushing the Silness and Loe index was 0 for 10 patients, 1 for 4 patients, 2 for one patient and there was 3 for no patients.

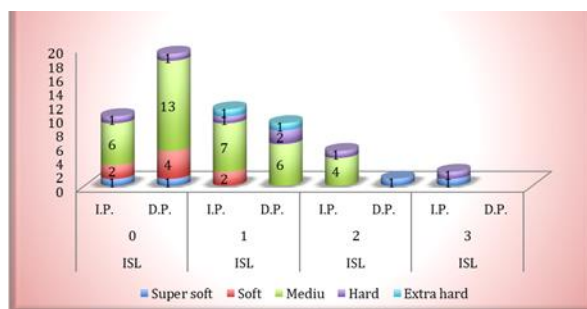


Figure 7. Before and after toothbrushing using different types of toothbrush bristle

When evaluating the ISL plaque index according to the hardness of the toothbrushes bristle, we found the following results:

-2 patients had super soft brush and these had SL 3 index before brushing and after 1.

-4 patients had soft brush and between these 2 had ISL 0 before brushing and 2 ISL = 1. All had after ISL brushing = 0.

- 15 patients had medium hardness brush and between these 4 had ISL = 2 before brushing, 6 had ISL = 1 and 5 had ISL = 0.

After brushing 13 they had ISL = 0 and 2 ISL = 1.

- 3 patients had a hard brush and before brushing they had respective ISL = 3, ISL = 2, ISL = 1.

After brushing 2 had ISL = 2 and 1 had ISL = 1.

- 1 patient had an extra hard brush and had before and after brushing ISL = 1.

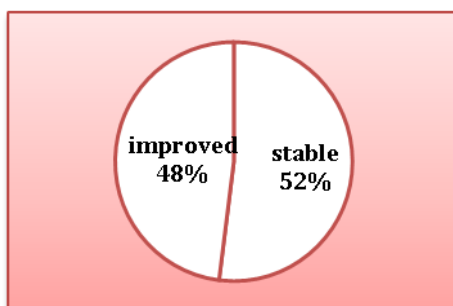


Figure 8. The percentage of patients with improved oral hygiene

I saw 13 colleagues who were stable and 12 who had improvement.

10 out of 13 stable colleagues from the beginning had plate index = 0.

After the correct brushing technique, it must be noted that it is important to use next to it and other mechanical cleaning methods: dental floss, interdental brushes, using interdental stimulators.

DISCUSSIONS

The outcomes of this investigation illuminate the influence of diverse toothbrush types on oral hygiene, assessed through the Silness Loe (ISL) plaque index. The array of toothbrush designs portrayed in Figure 1 illustrates distinctive features impacting interdental cleaning and plaque removal. The depicted cases in Figures 2, 3, and 4 vividly demonstrate the immediate effects of toothbrushing with varying bristle hardness on the plaque index. The demographic distribution of the study cohort (25 patients, predominantly men, aged 20 to 29) offers a snapshot of age and gender representation. While the sample size is modest, it provides insights into the oral hygiene practices of young adults pursuing dental medicine. The diversity in toothbrush bristle types (super soft, soft, average, hard, extra hard) reveals a spectrum of choices among participants. The prevalence of medium hardness brushes, favored by the majority, suggests a common preference, potentially influenced by a balance between efficacy and comfort. The assessment of the ISL plaque index before and after brushing unveils noteworthy enhancements across all categories. Particularly, patients using medium hardness brushes predominantly exhibited a transition from higher ISL scores to lower ones after brushing, indicating effective plaque removal. These findings align with existing literature underscoring the critical role of proper brushing techniques in sustaining oral health. The correlation between toothbrush hardness and ISL scores underscores the impact of bristle characteristics on plaque removal. Super soft and soft brushes demonstrated effectiveness, while medium hardness brushes showed varied outcomes. The study's noteworthy discovery lies in the efficacy of the extra hard brush in achieving and maintaining a low ISL score, underscoring its potential in specific oral care contexts. The evaluation of enhanced oral hygiene among participants following the adoption of correct brushing techniques reinforces the pivotal role not only of toothbrushes but also of complementary mechanical cleaning methods. The recommendation to integrate dental floss, interdental brushes, and stimulators alongside proper brushing emphasizes the holistic approach necessary for optimal oral hygiene. In conclusion, this study provides information about toothbrush types, brushing techniques, and oral hygiene outcomes. Further research with a larger and more diverse sample could augment the generalizability of these findings, contributing to the ongoing discourse on personalized oral care strategies.

CONCLUSIONS

After this evaluation it can be said that the type of toothbrush it is important but also the correct brushing technique play an important role in maintain a good oral health

After evaluation it was estimated that the best brush can be considered the medium hardness, with the tufts of different lengths and for removing the bacterial plaque and in view of the fact that we could find that the hard and extruded brushes cause gingiva and cause bleeding. It was also found that medium hardness brushes are the most chosen of the colleagues. Also an important role in the evaluation of plaques can be the time elapsed since the last dental scaling was done by a dentist.

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Pit and fissure sealants. Prevention by sealing



Olariu I.¹, Lile I.E.^{1*}, Vaida L.², Flueraș R.^{1,3}, Popovici R.A.³, Pitic (Cot) D.E.³, Freiman P.C.¹, Ilyes I.¹, Stana O.L.¹, Stana A.⁴, Hosszu T.¹

¹Western University "Vasile Goldis" of Arad, Faculty of Dental Medicine, Department of Dentistry

²University of Oradea, Faculty of Medicine and Pharmacy, Department of Dentistry

³Department I, Faculty of Dental Medicine, University of Medicine and Pharmacy "Victor Babeș", Timișoara, Romania

⁴Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

Correspondence to:

Name: Ioana Elena Lile

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldis”

Phone: +40 745305221

E-mail address: lile.ioana@uvvg.ro

Abstract

Aim and objectives; This study aimed to assess the caries-prevention benefit and to demonstrate the effectiveness of pit and fissure sealants in preventing caries and the management of early carious lesions.

Material and methods; the selection factors for performing the sealing procedure consisted in: the patient's ability to cooperate, age, dental status, depth of grooves and fosses, eating habits but also fluoride prophylaxis in the past and present.

Results; The glass ionomer sealant was less retentive when compared to resin sealants. The caries incidence between the glass ionomer and resin-based sealants was not statistically significant.

Conclusions; Pit and fissure sealant is an effective means of preventing pit and fissure caries in primary and permanent teeth.

Keywords: grooves, fosses, prophylactic means, oral hygiene, occlusal face, preventive filling, tooth decay, temporary and permanent molars

INTRODUCTION

It is known that in the first year after the eruption, a molar can store plaque in the retention areas. They are sensitive to caries due to the retentive relief, the increased permeability of the tissues after the eruption, the low fluoride content and the increased sensitivity to acid attack. [1] Sealing teeth is among the 4 methods of preventing dental careies, along with general and local fluoridation, food hygiene and oro-dental hygiene. It is known that sealing the teeth participates, by mechanically blocking them, in increasing the resistance of hard dental structures to caries attack, representing the best prophylactic method to prevent the formation of occlusal caries. [2]

Sealing is an effective method of preventing occlusal caries of molars and premolars. It prevents food retention, and thus the deposition of bacterial plaque at this level. The process consists in applying a sealing material represented either by a glass ionomer cement with or without fluorine release or by a fluid composite material on the occlusal surfaces, transforming them from deep grooves into shallow, smooth grooves. [3] The process is minimally invasive, short-lived, time-consuming and low in cost. Sealing is practiced in children, on 6 and 12 year old molars, but it can also benefit children with mental problems or low socio-economic level. [4]

A preventive restoration is the method by which the treatment of a minimal occlusal caries is combined with the sealing of grooves and fosses. All these methods are non-invasive because they are processes that are part of prophylaxis. [5]

In the first year after the eruption, a molar stores plaque in the retention areas, they are sensitive to caries due to retentive relief, still increased tissue permeability after the eruption, low fluoride content and high sensitivity to acid attack. [6] The first stage of caries begins with the two independent bilateral lesions, which occur in the enamel of the cusp slopes, near the occlusal groove. It continues its development comprising the walls of the groove, continuing towards the prismatic structure, and then extending.

Due to the union of the two lesions at the base of the occlusal groove, its demineralization takes place. It was found that the demineralization of the walls of the groove occurs before its base, due to the existence of an organic body that has the ability to stop acidic metabolites of dental plaque at the base of the groove, the acid attack being slowed. [7] The evolution of the lesion is influenced by the increased amount of protein at the base of the groove, acting as a barrier in the advancement of caries ensuring remineralization. [8]

The very high incidence of carious processes in the molars in general, both permanent and temporary, requires the application of methods - different depending on the degree of coronary destruction, radical or curative. Molars generally play a special role in both temporary and permanent dentition but are particularly sensitive to caries. For these reasons, a number of methods have been tried to prevent the occurrence of caries at this level. An important role was played by the methods of preventing dental caries by administering fluoride-based products locally. [9-11] However, it has been shown that fluoride provides a more representative selective protection at the level of smooth surfaces and only partially at the level of occlusal faces. At their level, due to the difficult relief, inside them there are permanent food debris, microorganisms and air, difficult, even impossible to remove with the help of mechanical brushing, thus favoring the appearance of carious lesions. These areas with high cariogenic potential have been studied since ancient times. Currently, an important role in caries prophylaxis plays the method of sealing groves and fosses with sealing materials such as glass ionomer cements or composites, able to protect the tooth especially for the period of migration to the occlusion plane. Sealing groves and fosses is a method of

preventing tooth decay in the grooves and occlusal fosses, but also in the fosses on the vestibular and oral surfaces of the molars and orals of the upper incisors. In essence, it is a method of isolating them from the environment by applying and maintaining by a mechanical bond a resinous material on the enamel surface, previously demineralized. [13-15]

In conclusion, in the first 3 years after the eruption, it is good to achieve an efficient sealing of the occlusal surfaces of the molars in order to prevent their carious processes. Today, sealing grooves and fosses is the most important method of preventing tooth decay. Preventive fillings are an alternative method for limited carious processes that replace both past amalgam fillings and composite fillings. [16, 17]

Aim and objectives

The aim of this study is comparing the retention and caries preventive effect of the glass-ionomer fissure sealant and resin-based fissure sealant.

MATERIAL AND METHODS

There is a discussion of the appearance of caries secondary to sealing, and the objective of this paper is to explain the ambiguities regarding this topic. For example, if the sealing is performed on a completely clean surface, without incipient carious lesions and without retention of bacterial plaque, and the conditions of a proper isolation are fulfilled, the sealing will be long lasting. The success of a seal depends on the strictness with which the dentist observes the working technique but also the instructions for use recommended by the manufacturers. Although the working technique is relatively simple, each step must be performed very carefully, without compromise, so that the adhesion of the material to the tooth surface is the desired one. The technique of sealing pit and fosses with composite resins has the following sequence of steps: cleaning the tooth surface (fig. 1), isolation (fig. 2), acid etching (fig. 3), washing and drying, preparation of the sealing material (depending on the presentation method), application of the sealing material (fig.5), verification of the sealing, control in occlusal relation (fig.6), and periodic controls.

In conclusion, in the first 3 years after the eruption, it is good to achieve an efficient sealing of the occlusal surfaces of the molars in order to prevent their carious processes. When the caries process occurs at the level of temporary teeth or baby teeth, as they are also called, permanent teeth are also prone to bubbling.



Figure 1. Professional brushing of the occlusal surface



Figure 2. Isolation of the prosthetic field



Figure 3. Acid enamel etching



Figure 4. Application of the adhesive followed by light curing



Figure 5. Application of sealing material



Figure 6. Occlusion check after sealing



Figure 7. Final form of sealing

The 6-year-old molar has a special importance in the development of occlusal relationships and was highlighted by Angle who considered it the key to occlusion. Its eruption is a special morphological event, because by its early appearance, it simultaneously establishes the distal limit of the canine-premolar corridor but also the anterior limit of the molar corridor. He is also the reason for the second rise of the occlusion. The 12-year-old molar is located distal to the first molars and mesially to the mental molars. They are especially important in mastication.

For an integral dental arch, which fulfills the functions of mastication, phonation and aesthetics, prevention is particularly important. I chose as a method of prevention the sealing of grooves and fosses. It is an easy to practice, effective and non-invasive method.

We conducted this research on a number of 50 patients, aged 6-14 years. The selection factors for performing the sealing procedure consisted in: the patient's ability to cooperate, age, dental status, depth of grooves and fosses, eating habits but also fluoride prophylaxis in the past and present. The data obtained were notified in a chart containing the identity data, the general clinical and dental examination and the evolution over time. As a material we used light curing agents and we practiced light curing with ultraviolet light and also used even if at a lower number of seals and classic glass ionomer cement that contains a powder and a liquid the finished material resulting from mixing the two components. The external reaction obtained lasts 1-2 minutes.

The bacterial plaque and debris from the enamel surface was removed with a professional brush made with a special paste, after which I washed and dried it well with air spray. As a method of isolation we used cotton a roll, the rubber dam is being difficult to apply to a young patient. Next, the demineralization of the enamel was performed with a demineralization agent for 5-10 seconds. I washed the enamel surface with the air and water spray again. Finally, we applied the sealant to the tooth, evaluated the occlusion and recalled the patient for a periodic evaluation. A single application was performed, followed by periodic monitoring to determine the proportion and incidence of caries.

RESULTS

In the clinical research conducted in this study we targeted a group of 50 patients, aged between 6 and 14 years, of both sexes. The data obtained in this study are intended to inform both about the importance of dental hygiene from an early age and about the importance of sealing the grooves and deep fosses of 6- and 12-year-old molars from the first months after the eruption. The group with ages (fig. 8) between 6 and 9 years of age had the greatest need to seal the 6-year-old molars in order to prevent the extension of carious lesions from the temporary teeth. For this reason the first molar is also considered the tooth with the highest indication of sealing. From the segment aged between 9 and 14 years, only 5 patients

presented grooves and fosses that allowed self-cleaning, the remaining 15 patients required the sealing of the second molars.

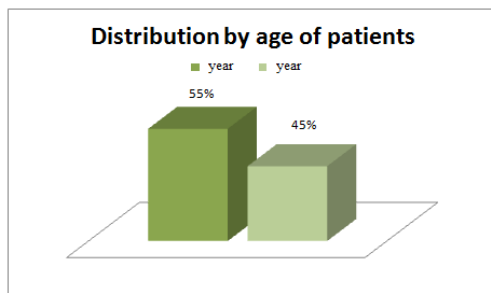


Figure 8. Distribution by age

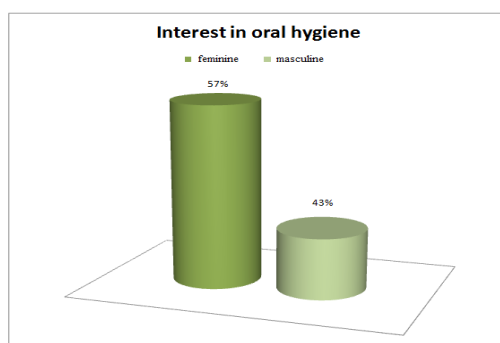


Figure 9. Interest in oral hygiene

From the total number of 50 patients, 21 were male and 29 were female. There were no significant differences in the depth of the grooves and fosses to be sealed. The occlusal surfaces of the first and second molars in girls and boys were also sealed. However, there was a greater concern for hygiene in females compared to males. (fig. 9) To make the seals we used composite materials and glass ionomer cement, which are the recommended materials for this work. We used glass ionomer cement in smaller quantities, predominating composite materials of different colors for children. (fig. 10)

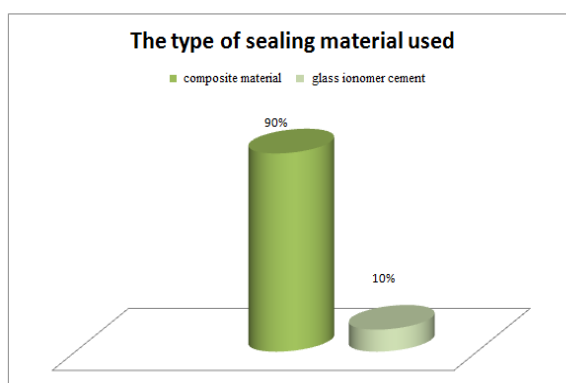


Figure 10. Type of sealing material

We applied the sealing material to all molars with occlusal surface on which narrow and deep grooves and fosses were clinically visible, which prevented a proper self-cleaning and sanitation. In the study we applied 15 seals to the upper first molar, 20 to the lower first molar, 9 to the upper second molar and 6 for the lower second molar. (fig. 11)

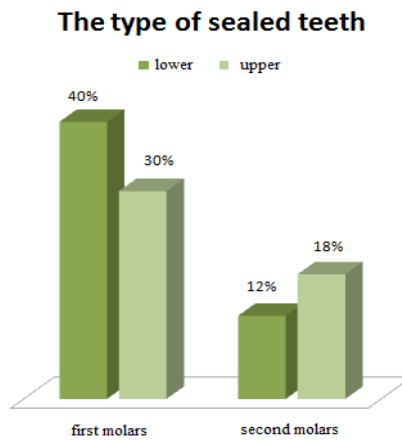


Figure 11. The type of sealed teeth

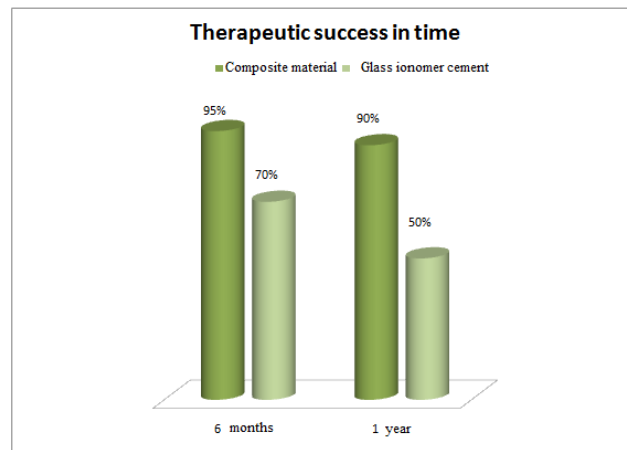


Figure 12. Therapeutic success timeline

Over time, the success rate (table 1) of glass ionomer cement was significantly lower than that of composite. At the control after 6 months, the composite was present in grooves and fosses in a proportion of 95%, while the glass ionomer cement proved a weaker resistance, being present in a proportion of only 70%.

Upon verification after one year, the composite was 90% present and the glass ionomer cement only 50%. (Fig. 13)

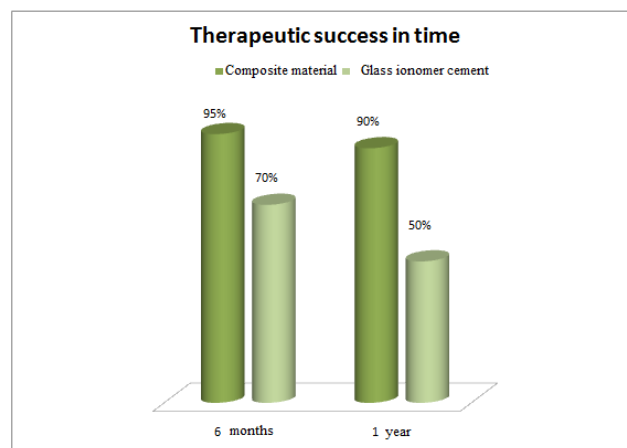


Figure 13. Therapeutic success rate by material

Table 1. Therapeutic success rate over time

Material type	Successes / duration	
	6 months	1 year
Composite material	95%	90%
Glass ionomer cement	70%	50%

By risk groups we can make a classification based on the degree of oral hygiene, the type of occlusion, the morphology of the teeth, we are especially interested in the depth and size of the grooves and fosses and last but not least the constitution of the enamel. While studying these aspects, we found patients with a low risk group of 20%, medium 55% and high of 25%. (fig. 14)

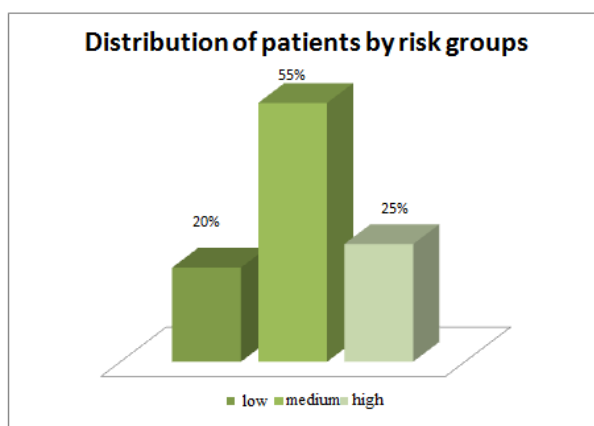


Figure 14. Risk groups

The efficient marginal closure and the degree of microbial permeability that is achieved after sealing is different depending on the layer of hard tooth substance in which the cavity expands. The efficiency is 60% in terms of enamel. Regarding enamel and dentin the efficiency is 30% and when the cavity has extended to the dentin the efficiency is only 10%. (fig. 15)

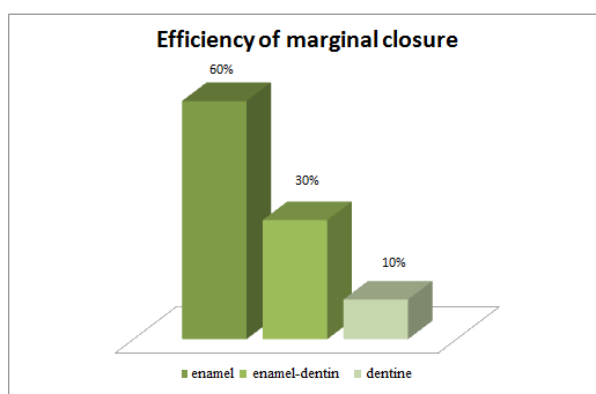


Figure 15. Efficiency of marginal closure

DISCUSSIONS

Because to the high prevalence of caries occurring on the occlusal surfaces, the impossibility of proper sanitation at the occlusal surfaces and the inefficiency obtained only by means of fluoridation at this level forced the search for another method to block or define

areas at high cariogenic risk. The procedure was applied after the eruption of permanent teeth with the aim of protecting them for life. [18]

Sealing materials are thin layers of composite or glass ionomer cement which are applied in the grooves on the occlusal surface of the first and second molars, to protect them from carious lesions. Most caries in children and adolescents occur at this level. Sealants protect the occlusal surface from tooth decay by keeping germs and food particles away from this area. This prophylactic procedure has been used for several decades, and is not considered a composite posterior restoration. The loss of sealing rate is about 5-10% per year which means that these teeth have the same incidence of risk as unprotected teeth. [19]

The success of an effective seal depends on the retention of the seal and the control at least 2 times a year. Thus, studies show that a seal could last up to 5-10 years. Caries affects the permanent tooth. Sealants protect it. They save time, money and the inconvenience of filling cavities. Sealing is the most effective way to prevent tooth decay in the grooves and fosses of the molars. The method consists in applying on the occlusal surface of the teeth, a thin layer of fluid composite or glass ionomer cement. The deep surface is thus transformed into a smoother one and favorable to self-cleaning. [19]

Isolation is an essential step for successful sealing. The most common reason for failure to seal may be incorrect insulation of the engraved enamel from saliva contamination. There were some parents who expressed concern that caries could form under seal. Sealing is performed on a clean surface, without carious lesions or bacterial plaque, only in this way the procedure will be successful. It is a simple, minimally invasive method that is practiced in a relatively short time. [20]

It is recommended that sealing be performed 6 months after the tooth eruption. Sealing should be done preferably on teeth with deep grooves and fosses, molars and premolars that prevent proper sanitization. Sealing is generally practiced on permanent teeth, but some authors say that it can also be done on temporary teeth that have an increased risk of caries. If the rules of oral hygiene are strictly observed, there are very good results over time. In case of failure due to loss of material, it can be reapplied whenever needed. Although sealants are lost over time, they provide ideal protection throughout the period of increased risk of caries. First molars have an increased incidence of caries which leads to their early loss, and by sealing them we prevent this.

CONCLUSIONS

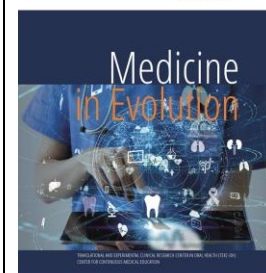
Pit and fissure sealant is an effective means of preventing pit and fissure caries in primary and permanent teeth. It is important to make an efficient sealing of the occlusal surfaces of the molars in the first years after the eruption, in order to prevent their carious processes. Today sealing is the most important method by which we can prevent tooth decay. The costs of a seal are significantly lower than a complete restoration, and the dental substance is preserved.

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The applications of propolis in oro-dental health



Pitic (Cot) D.E.¹, Trusculescu L.¹, Lile I.E.², Popovici R.A.^{1*}, Todor S.A.³, Popa M.⁴, Dinu S.⁴, Flueraș R.^{1,2}, Stana O.L.², Olariu I.²

¹Department 1, Faculty of Dental Medicine, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania

²Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

³Dentist doctor, private medical office, Oradea, Romania

⁴Department 2, Faculty of Dental Medicine, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania

Correspondence to:

Name: Amina Ramona Popovici

Address: Department 1, Faculty of Dental Medicine, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania, Piata Eftimie Murgu nr. 2, 30046 Timisoara, Timis County, Romania

Phone: +40 729130487

E-mail address: ramona.popovici@umft.ro

Abstract

Propolis is ranked among the few natural remedies that has still maintained its popularity over time due to its wide range of applications in both dentistry and medicine. Its extensive and wide variety of properties such as anti-inflammatory, antibacterial, antiviral, and antifungal have kept the attention and attention of many researchers. Most of the works on propolis are in vitro or animal studies. There is a clear need for human clinical studies to obtain the best benefits from this natural ingredient and to outline algorithms for its use in dentistry and other medical fields.

Propolis has demonstrated potential therapeutic effects on various oro-dental diseases due to its antimicrobial, anti-inflammatory, antioxidant, and immuno-modulatory properties. The present research aims to highlight the potential role of propolis in the treatment of dental caries, gingivitis and periodontal diseases, oral candidiasis, mouth ulcers, oral mucositis, or halitosis.

Keywords: gingivitis, propolis, oral micro-environment, antimicrobial, oral mucositis, halitosis

INTRODUCTION

The field of health has always emphasized the use of natural products for curing diseases rather than relying on conventional allopathic medicine. There are varieties of natural products used today in biomedical application in the treatment of a wide range of systemic diseases. These may include natural silk, [1,2] chitosan, [3,4] herbal tea [5] and miswak. [6] Propolis, a natural non-toxic resinous substance that exhibits antimicrobial, anticancer, antifungal, antiviral and anti-inflammatory properties, has gained attention in both cases. the dental and medical field. This waxy resinous substance comes from the Greek word "pro" (meaning outer wall) and "polis" (meaning city). This reflects the protective nature of the substance. [7,8] Propolis is one of the natural substances produced by bees for building and preserving their hives. It kills pathogens, protects the honeycomb from rain and, due to its adhesive nature, prevents foreign guests from entering the hive. [7]

This natural substance has a wide range of overlooked benefits. It is classified into twelve different types based on terrestrial location and physicochemical properties. However, only three different types of botanical origin have been identified. Propolis is considered the core and powerhouse of nutrients. [9] This resinous lipophilic material is sticky, soft, and flexible when exposed to heat, but tough and brittle when cold. [8] Propolis is primarily composed of resins (55–60%). Waxes and fatty acids contribute about 30–45%, and aromatic oil and pollen about 10–5%. [10] Other substances may include minerals, vitamins, and flavonoids. The biological activity of propolis is mostly related to flavonoids and hydroxycinnamic acid. [11]

Research has shown that it is difficult to standardize the chemical constituents and flavonoid content of propolis because it is dependent on the environment, the place of collection, its origin, and the type of plant pollen and bee species that produced the propolis. [10,12] The commercial availability of propolis is in the form of pills, topical cream, mouthwash, and toothpaste. [8]

The purpose of this study is to explore the properties and chemistry of propolis in relation to its biomedical and dental applications, the status and scope of propolis as well as its potential bio-dental applications.

To achieve these objectives, experimental research related to food supplements based on propolis was carried out. Food supplements manufactured by FAVISAN were used in the scientific research.

Properties and chemical structure of propolis

The chemical variability of propolis is due to the different origin of plants, i.e., climatic, and geographical location, flora at the collection site and bee species. [12,13] For propolis production, bees use secretions from different plants as well as substances discharged from plant wounds, i.e., lipophilic materials from leaves, leaf buds, resins, gums, and matrices. [14,15] Therefore, there is striking chemical variability in the composition of propolis, especially from tropical regions. Kujumgiev et al. [16] compared the antibacterial, antiviral, antifungal and anti-inflammatory properties of propolis from different origins and concluded that they all showed significant properties, including important antiviral properties. Similarly, Popova et al. [17] reported the same findings when comparing the biological activity of propolis with geographical origin.

The chemical constituents of propolis include chrysin, galangin, pinocembrin, pinobaskin which is found in a temperate climate. These are flavonoids without ring B substituents. The major component of tempered propolis is caffeic acid phenethyl ester (CAPE). [14] Similarly, the chemical composition of propolis originating from tropical regions

includes prenylated phenylpropanoids (eg, artemillin C, while propolis found in Pacific and African regions contains geranyl flavanones as characteristic compounds. [14, 18]

Applications of propolis in dentistry

Mouthwashes are used as commercial antiseptics and used as a home remedy for better oral hygiene. These mouthwashes can be both cosmetic and therapeutic. Therapeutic mouthwashes reduce the number of bacteria, have anti-plaque effects, act as an astringent, and help reduce gingivitis and carious lesions. [19-21] One study evaluated the effect of propolis mouthwashes by comparing plaque scores and gingival index in the initial time and at a value of five. day interval. Chlorhexidine mouthwashes were more effective compared to propolis extract mouthwashes. [22] Furthermore, the effect of propolis mouthwash on gingival fibroblasts showed less cytotoxicity than chlorhexidine mouthwash. Ozan et al. and Arsalan et al. concluded that propolis mouthwashes were not as effective as chlorhexidine mouthwashes in preventing caries. gram-negative bacteria in the planktonic state and can be used as an alternative to chlorhexidine to avoid its side effects. Studies are needed to find the effects of propolis on biofilms. [19]

Research has shown that mouthwashes containing propolis in an aqueous alcohol solution heal intra-oral surgical wounds; therefore, it plays a role in epithelial repair after tooth extraction and exerts anti-inflammatory effect on orofacial pain. etiology of most oral diseases. Propolis-based toothpastes should be used as adjuncts to other substances in subjects at higher risk of periodontal problems. [23]

Dental hypersensitivity is defined as a sudden and brief pain arising from tactile, osmotic, thermal, or other stimuli from exposed dentin. [24] There are various theories for dental hypersensitivity. Among these theories, the hydrodynamic theory is considered the most acceptable and relevant. Propolis is proposed to reduce dentinal hypersensitivity by decreasing the hydraulic conductance of dentin. [25,26]

A recent study by Hussain et al. showed that propolis, when used in the treatment of post-bleaching dentin hypersensitivity, gave convincing results. [26] Similarly, another study by Hongal et al. showed contrasting results when Indian propolis was compared with Recaldent™. Recaldent™ has shown significant results in reducing dentinal hypersensitivity. [27] Similarly, when 5% propolis extract was compared with potassium nitrate in reducing dentinal hypersensitivity, no difference was observed between the two groups. The use of propolis as a natural desensitizer is still a vague concept and requires further verification by research. [28]

An in vitro and in vivo study showed that propolis has a strong anti-inflammatory effect and can be used as a pulp coating agent. Flavonoids and caffeic acid are the main ingredients in propolis, responsible for the anti-inflammatory response by inhibiting lipoxygenase and the arachidonic pathway. [29,30] In addition, flavonoids and caffeic acid ensure the acceleration of the immune system by enhancing phagocytic activity. [8,29] There are numerous studies. over the years that have demonstrated the anti-inflammatory effects of propolis. [29,31,32,33] Bachiega et al showed that cinnamic acid and coumaric acid in propolis inhibit IL-6 and IL-10 but encourage the production of IL-8 by macrophages. [34] The anti-inflammatory effect of propolis depends on the potential dose and route of administration.

The efficiency of propolis use in oral health

In this study, we aimed to evaluate the effectiveness of the use of propolis-based products in oral health, as well as the verification of oral health habits, oral assessment and screening for gingivitis, periodontitis, and oral cancer.

The method used was the prospective observational study carried out between October 2022 and March 2023. The research was carried out in 3 medical offices. A total of 42

participants were selected, who after the oral assessment were divided into two equal groups of 21 patients each, the test group and the control group, with approximately the same oral health status, in order to avoid random error. The products given to the patients in the test group were the following: Favifresh – mouthwash with propolis, Favifresh – mouthwash with propolis and organic mint and Propolis mouth spray.

The socio-demographic characteristics of the groups are similar as can be seen in the table below.

Table 1. Socio-demographic characteristics of the groups

Variable	Group no. I - test		Group no. II - control	
Age	Medium age = 32,6 yrs ± 12,5 yrs Minimum = 19 yrs Maximum = 54 yrs		Medium age = 31,8 yrs ± 12,7 yrs Minimum = 19 yrs Maximum = 53 yrs	
Sex				
Men	11	52,38%	11	52,38%
Women	10	47,61%	10	47,61%
Residence				
Urban	18	85,71%	16	76,19%
Rural	3	14,38%	5	23,8%
Studies graduated				
Gimnasium	6	28,57%	7	33,33%
Highschool	9	42,85%	8	38,09%
College	6	28,57%	6	28,57%

The data obtained from completing the questionnaires and oral assessments were entered into a database in Microsoft Excel 365, where they were processed descriptively, and the comparison test used was the online chi square Chi Square Calculator 2x2. it was considered statistically significant at $p < 0.05$.

Comparative analysis of the effect on the presence of gingivitis

For the group I-test group the chi-square statistic is 9.7222. The p -value is 0.001821. Significant at $p < 0.05$. The chi-square statistic with Yates correction is 7.875. The p -value is 0.005012. Significant at $p < .05$.

Table 2. Comparative analysis of the effect on the presence of gingivitis for group I

	inițial	final	Marginal Row Totals
gingivitis +	17 (12) [2.08]	4 (9) [2.78]	21
gingivitis -	7 (12) [2.08]	14 (9) [2.78]	21
Marginal Column Totals	24	18	42 (Grand Total)

For group II-control the chi-square statistic is 1.0027. The p -value is 0.31667. Not significant at $p < 0.05$. The chi-square statistic with Yates correction is 0.4456. The p -value is 0.504421. Not significant at $p < 0.05$.

Table 3. Comparative analysis of the effect on the presence of gingivitis for group II

	inițial	final	Marginal Row Totals
gingivitis +	16 (14.5) [0.16]	13 (14.5) [0.16]	29
gingivitis -	5 (6.5) [0.35]	8 (6.5) [0.35]	13
Marginal Column Totals	21	21	42 (Grand Total)

From the above data we can conclude that food supplements with Propolis or oral hygiene products based on Propolis significantly influence the presence of gingivitis after 3 months of use.

Analysis of the cause of the difficulty in mastication symptom

For group I-test the chi-square statistic is 0.1414. The *p*-value is 0.706879. Not significant at $p < 0.05$. Chi-square statistic with Yates correction is 0. *p*-value is 1. Not significant at $p < 0.05$.

Table 4. Analysis of the cause of the difficulty in mastication symptom for group I

	initial	final	Marginal Row Totals
mastication pain +	5 (4.5) [0.06]	4 (4.5) [0.06]	9
mastication pain -	16 (16.5) [0.02]	17 (16.5) [0.02]	33
Marginal Column Totals	21	21	42 (Grand Total)

For group II-control the chi-square statistic is 0.1232. The *p*-value is 0.725625. Not significant at $p < 0.05$. Chi-square statistic with Yates correction is 0. *p*-value is 1. Not significant at $p < 0.05$.

Table 5. Analysis of the cause of the difficulty in mastication symptom for group II

	initial	final	Marginal Row Totals
mastication pain +	6 (5.5) [0.05]	5 (5.5) [0.05]	11
mastication pain -	15 (15.5) [0.02]	16 (15.5) [0.02]	31
Marginal Column Totals	21	21	42 (Grand Total)

From the above we can conclude that food supplements with Propolis or oral hygiene products based on Propolis do not influence the difficulty in mastication after 3 months of use.

The comparative analysis of the accusation of the **toothache symptom** compared to the end in the two groups revealed a chi-square statistic of 0.4667 on the I-test group. *p*-value of 0.494525. Not significant at $p < 0.05$. The chi-square statistic with Yates correction is 0.1167. The *p*-value is 0.732678. Not significant at $p < .05$.

Table 6. Toothache symptom in group I

	initial	final	Marginal Row Totals
toothache +	7 (6) [0.17]	5 (6) [0.17]	12
toothache -	14 (15) [0.07]	16 (15) [0.07]	30
Marginal Column Totals	21	21	42 (Grand Total)

In the control group II, the chi-square statistic is 0.4286. The *p*-value is 0.512691. Not significant at $p < 0.05$. The chi-square statistic with Yates correction is 0.1071. The *p*-value is 0.743421. Not significant at $p < 0.05$.

Table 7. Toothache symptom in group II

	initial	final	Marginal Row Totals
toothache +	8 (7) [0.14]	6 (7) [0.14]	14
toothache -	13 (14) [0.07]	15 (14) [0.07]	28
Marginal Column Totals	21	21	42 (Grand Total)

Following the conducted study, we can say that food supplements with Propolis or oral hygiene products based on Propolis do not significantly influence tooth pain after using them during the research period.

Comparative analysis of gingival bleeding symptom accusation

Measurements performed on the group I-test lot showed that the chi-square statistic is 11.9576. The *p*-value is 0.000544. Significant at *p* < 0.05. The chi-square statistic with Yates correction is 9.8824. The *p*-value is 0.001669. Significant at *p* < 0.05.

Table 8. Comparative analysis of gingival bleeding symptom accusation in group I

	initial	final	Marginal Row Totals
bleeding +	18 (12.5) [2.42]	7 (12.5) [2.42]	25
bleeding -	3 (8.5) [3.56]	14 (8.5) [3.56]	17
Marginal Column Totals	21	21	42 (Grand Total)

For the II-control group the chi-square statistic is 0.4667. The *p*-value is 0.494525. Not significant at *p* < 0.05. The chi-square statistic with Yates correction is 0.1167. The *p*-value is 0.732678. Not significant at *p* < 0.05.

Table 9. Comparative analysis of gingival bleeding symptom accusation in group II

	initial	final	Marginal Row Totals
bleeding +	16 (15) [0.07]	14 (15) [0.07]	30
bleeding -	5 (6) [0.17]	7 (6) [0.17]	12
Marginal Column Totals	21	21	42 (Grand Total)

From the above data we can say that food supplements with Propolis or oral hygiene products based on Propolis influence the presence of gingival bleeding after 3 months of use.

Analysis of the symptom of bad breath (halitosis)

For the I-test group the chi-square statistic is 6.0352. The *p*-value is 0.014023. Significant at *p* < 0.05. The chi-square statistic with Yates correction is 4.434. The *p*-value is 0.035229. Significant at *p* < 0.05.

Table 10. Analysis of the symptom of bad breath (halitosis) in group I

	initial	final	Marginal Row Totals
halitosis +	9 (5.5) [2.23]	2 (5.5) [2.23]	11
halitosis -	12 (15.5) [0.79]	19 (15.5) [0.79]	31
Marginal Column Totals	21	21	42 (Grand Total)

In the II-control group, the chi-square statistic is 0.525. The *p*-value is 0.468717. Not significant at *p* < 0.05. The chi-square statistic with Yates correction is 0.1312. The *p*-value is 0.71714. Not significant at *p* < 0.05.

Table 11. Analysis of the symptom of bad breath (halitosis) in group II

	initial	final	Marginal Row Totals
halitosis +	6 (5) [0.2]	4 (5) [0.2]	10
halitosis -	15 (16) [0.06]	17 (16) [0.06]	32
Marginal Column Totals	21	21	42 (Grand Total)

From the above data we can conclude that food supplements with Propolis or oral hygiene products based on Propolis influence the presence of bad breath after 3 months of use.

CONCLUSIONS

From the study undertaken by us, it could be observed that, using products based on propolis, the presence of gingival bleeding and bad breath decreased statistically significantly. On organic causes such as toothaches, they had a positive influence, greater than that of classic products, but not statistically significant.

Propolis is a natural biomaterial for oral health that needs human clinical studies to be able to get the best benefits from this natural ingredient. There is a great need for outlining algorithms for its use in dentistry as well as in other medical fields.

Propolis and its phenolic and flavonoid constituents have many therapeutic uses in dentistry, oral health, and medicine. Wide therapeutic uses due to its antibacterial, antiviral, antifungal, anti-inflammatory and anti-carcinogenic properties have been demonstrated in various in vitro, in vivo and ex vivo studies as well as in human clinical trials. However, there is a great need to standardize the content of phenolic acids and flavonoids in propolis to obtain the best therapies and drugs.

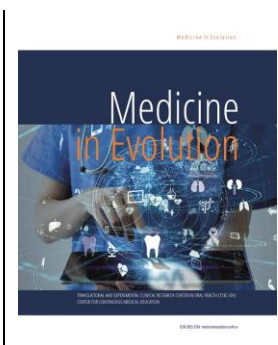
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Oral hygiene compliance in orthodontic patients



Popa M.¹, Lile I.E.^{2*}, Vaida L.³, Dinu S.¹, Freiman P.C.², Marian D.², Cojocaru C.², Ilyes I.², Stana O.L.², Stana A.⁴, Hosszu T.²

¹Department 2, Faculty of Dental Medicine, University of Medicine and Pharmacy "Victor Babeş", Timișoara, Romania

²Western University "Vasile Goldis" of Arad, Faculty of Dental Medicine, Department of Dentistry

³University of Oradea, Faculty of Medicine and Pharmacy, Department of Dentistry

⁴Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

Correspondence to:

Name: Ioana Elena Lile

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldis”

Phone: +40 745305221

E-mail address: lile.ioana@uvvg.ro

Abstract

Aim and objectives; The aim of this study was to highlight the importance and conscientiousness of proper hygiene with the help of prophylactic means in fixed and mobile oro-dental therapy, as just wearing the orthodontic appliance is not enough without being accompanied by proper oral hygiene.

Material and methods; the orthodontic appliance itself along with its components represent retention areas and additional obstacles to achieving proper hygiene. The accumulation of food debris and bacterial plaque creates an environment conducive to the multiplication of bacteria, leading to carious lesions, gingival inflammation and the appearance of halena. In order to prevent this we followed 3 steps oral hygiene lessons. Precisely for this reason, on the occasion of this research, the following objectives will be pursued: knowledge and correct use of methods for cleaning fixed and mobile braces; correct understanding and occupation of all ways to sanitize the oral cavity; knowledge of the food influence on the success of orthodontic therapy. Patients should understand that without proper hygiene associated with orthodontic therapy, which involves the use of oral aids and orthodontic appliances, the desired results cannot be achieved.

Results; In a percentage of 19% of the wearers of fixed dental appliances, the bacterial plaque of grade 3 was noticed, in a percentage of 31% of grade 2, in a percentage of 38% of grade 1 and in a percentage of 12% of grade 0, fact resulting in patients wearing fixed orthodontic appliances having more difficult oral hygiene

Conclusions; The study suggests that participants who received a post-treatment communication reported higher level of oral hygiene compliance than participants in the control group.

Keywords: orthodontic appliances, oro-dental hygiene, prophylactic means, oral health, periodontal disease, objective clinical examination

INTRODUCTION

The patient during orthodontic treatment should be more careful about oral hygiene, nutrition and microbial plaque removal technique because the orthodontic appliance retains more plaque than the free tooth surface and of course involves great responsibility and constant effort during orthodontic treatment. [1]

Maintaining proper hygiene is absolutely necessary to get an adequate result at the end of treatment. Often, the presence of poor hygiene in orthodontic appliances leads to the formation of visible marks on the surface of the teeth, especially around the brackets, gathering a thick film with negative repercussions on dental and oral health. [2]

One of the consequences of poor oral hygiene is the appearance of tartar deposits, leading to bad breath and noticeable gingivitis, manifested by increased volume, spontaneous gingival bleeding and brushing. It seems that dental inflammation, meaning gingivitis, influences dental movements by increasing the period of wearing the orthodontic appliance. [3] In order to obtain adequate results, it is very important to place a major emphasis on this aspect, namely the dialogue with the patient about oral hygiene and its importance in the context of orthodontic treatment. In this case, the research aims to improve the appearance of the dialogue in order to explain in the most accurate and clear way to allow the patient to understand the doctor's message in the way that he himself can perform the correct technique in the best conditions, brushing during the day. [4, 5]

The patient will have to consciously realize the importance of a rigorous and demanding oro-dental hygiene, respectively all the elements from which he will be able to benefit from what it means to maintain an adequate oral hygiene. Another important factor is the information and training of the patient on the adjuvant methods of oral hygiene, such as brushes between the teeth, floss and mouthwash. [6] Bacterial plaque control in young patients wearing orthodontic appliances is essential to maintain healthy gums and get the best results, because in the case of an inflamed and bloody periodontium significantly reduces the progress of orthodontic treatment and increases the period of maintenance of the orthodontic appliance in oral cavity. [7] That is why preventing dento-maxillary anomalies means knowing the causes and mechanisms of action, instituting the most effective prophylactic measures from early childhood, paying full attention to interceptive orthodontics and applying prophylactic means at all ages. [8]

Bacterial plaque control in young patients wearing orthodontic appliances is essential to maintain healthy gums and get the best results, because in the case of an inflamed and bloody periodontium significantly reduces the progress of orthodontic treatment and increases the period of maintenance of the orthodontic appliance in oral cavity. [9] That is why preventing dento-maxillary anomalies means knowing the causes and mechanisms of action, instituting the most effective prophylactic measures from early childhood, paying full attention to interceptive orthodontics and applying prophylactic means at all ages. [10]

Aim and objectives

The aim of this study is to highlight the importance and need for proper hygiene with the help of prophylactic means in fixed and mobile orthodontic therapy, because the mere wearing of braces is not enough without being accompanied by proper oral hygiene.

Specific objectives:

- ✓ Knowledge and correct use of cleaning methods for fixed and mobile braces;
- ✓ Understanding and correct occupation of all ways to sanitize the oral cavity;
- ✓ Knowing the food influence on the success of orthodontic therapy.

MATERIAL AND METHODS

The study was performed on a number of 30 patients aged between 8 and 25 years, in both sexes, cases were selected that showed the appearance of bacterial plaques located in patients wearing orthodontic appliances. However, the retention of this plaque is favored by the wearing of the orthodontic appliance that prevents the routine maneuvers of oral hygiene, being the first phenomenon that can lead to decline by the patients of a correct maintenance of oral hygiene.

Patients were divided into 2 categories, men and women, from which 3 other subgroups were selected divided as follows:

- *Patients with good oral hygiene* who have not received oral hygiene instructions from their doctor;

- *Patients with poor oral hygiene* who have received instructions from the doctor on oral hygiene techniques;

- *Patients with poor oral hygiene* who did not follow the instructions received from the doctor and voluntarily gave up the applications.

The data collected were recorded in a clinical file: identity data, age, initial clinical situation, periodontal status, degree of gingival inflammation, indices of bacterial plaque initial and after treatment. The first group did not receive instructions from the doctor and maintained proper oral hygiene. The second group received oral hygiene instructions from the doctor on the brushing technique and the use of adjuvant brushing techniques, meaning interdental brushes, dental floss and mouthwash. The third group voluntarily refused to apply this therapy due to factors that negatively influence the maintenance of proper oral hygiene, the presence of brackets, rings and elastics that prevent the perfect penetration of the regular toothbrush complicating the maneuvers.

The study was carried out in three stages:

- Oral examination;

- Dental hygiene lesson for patients wearing fixed and mobile orthodontic appliances (consisting of 3 weekly lessons);

- Oral re-examination (after three months).

At the oral examination we followed:

- White spots of dental demineralization

- Education lesson 1

- BIP score for estimating the level of bacterial plaque

Oral hygiene lesson 1

Purpose: orientation for the removal of bacterial plaque

Description - The formation and composition of bacterial plaque, the relationship with oral disease and especially its connection with the patient's condition. It is performed using a highlighting agent (fig. 1, 2, 3,), which is a training method that can highlight to the little patient what needs to be done. Bacterial plaque is invisible on most teeth without staining. The words were not enough to convince the children and make them believe that the bacterial colonies are on their teeth and that the multitude of microorganisms are the agents responsible for the bacterial plaque.



Figure 1. Bacterial plaque 1



Figure 2. Bacterial plaque 2



Figure 3. Bacterial plaque 3

Oral hygiene lesson 2

Purpose: oro-dental hygiene in patients with fixed orthodontic appliances.

Description: virtual display, demonstrations on the model, complete kit presentation in order to obtain proper hygiene.

During the presentations we noticed:

- Activation of the dental brace screw at regular intervals, specified by the orthodontist;
- Explaining the importance of wearing braces, for the entire recommended duration and in accordance with the instructions received from the orthodontist;
- Guidance to a correct diet of subjects wearing fixed dental appliances such as: strict elimination from the diet of sticky foods that are deposited on the tooth surface, but also on the orthodontic appliance, hard foods that can lead to deformation of the braces and rupture of the plastic portion afferent.

Oral hygiene lesson 3

Proper education for a correct cleaning, through direct presentation and exemplification of the products used in dental hygiene, for patients wearing orthodontic appliances as follows:

- Brushing the orthodontic appliance
- Use of the interdental toothbrush
- Using dental floss
- Use of oral irrigator

- The importance of using mouthrinse, mouthwash
- Proper nutrition of people wearing orthodontic appliances

RESULTS

In a percentage of 19% of the wearers of fixed dental appliances, the bacterial plaque of grade 3 was noticed, in a percentage of 31% of grade 2, in a percentage of 38% of grade 1 and in a percentage of 12% of grade 0, fact resulting in patients wearing fixed orthodontic appliances having more difficult oral hygiene (fig. 4)

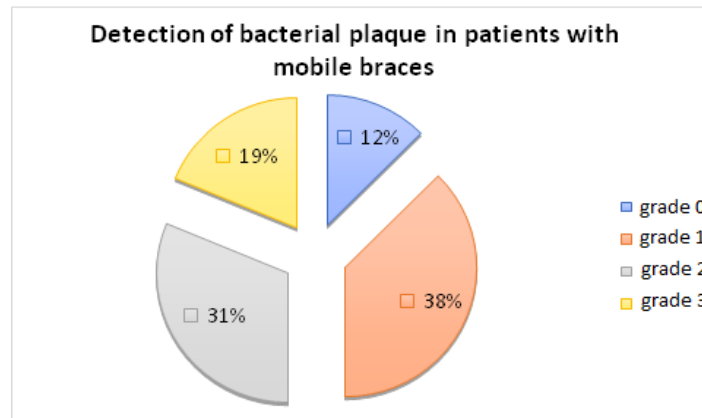


Figure 4. Detection of bacterial plaque

Compared to the initial examination of dental plaque, after 3 months a real improvement in the status of oral hygiene can be found, so there are no subjects with grade III dental plaque, and subjects with grade II dental plaque have decreased significantly, also the percentage of subjects without dental plaque increased by 30%. Continued oral cleaning and proper application of oral cleaning techniques will improve the oral hygiene status of patients wearing mobile orthodontic appliances. A good determination in close connection with a sustained oral hygiene training both in children wearing mobile braces and in their parents or relatives give positive effects.

The problems found in the analyzed subjects were white spots or enamel demineralizations in a number of 13 subjects in the group of 30, of which 8 were wearing a fixed orthodontic appliance for 2 years, or even more. White spots or demineralizations are usually highlighted when removing the orthodontic appliance, and for their treatment or prevention it is recommended to apply fluoride gels or varnishes. During orthodontic treatment, it is recommended that toothbrushing be performed with fluoride-containing toothpastes and frequent rinses with fluoride-rich mouthwashes. (fig. 5)

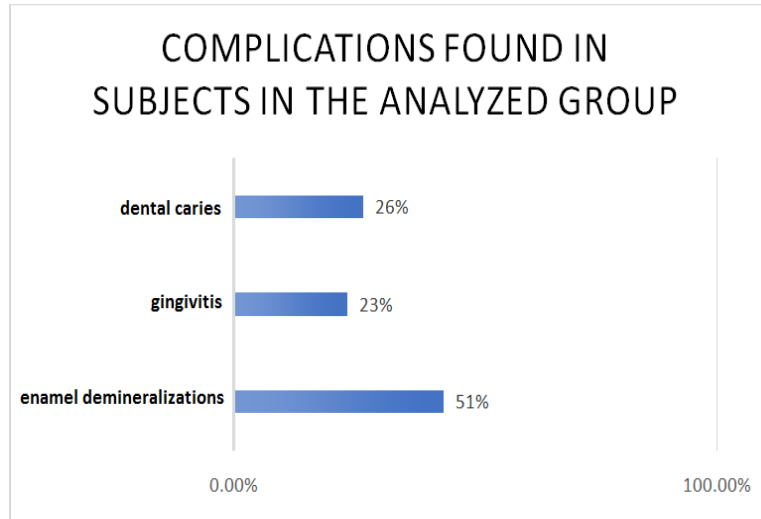


Figure 5. Complications found in subjects in the analyzed group

More than 50% of the subjects in the analyzed group have been wearing orthodontic appliances for a year, a year and a half, a number of 7 patients have been wearing orthodontic appliances for more than 2 years, a number of 5 subjects have been wearing orthodontic appliances for at least 6 months, and a number of 2 patients have been wearing braces for about 3 years. (Fig. 6)

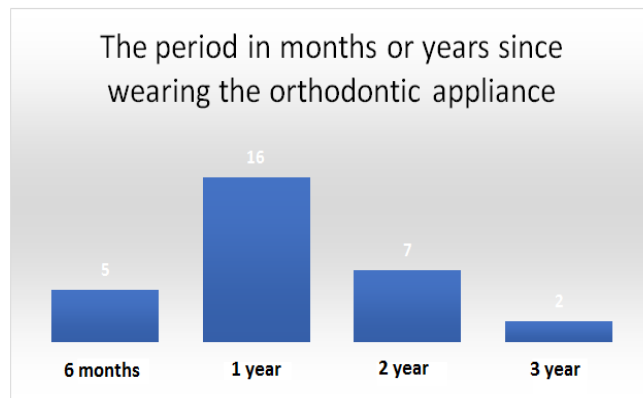


Figure 6. The period in months or years since wearing the orthodontic appliance

The brushing statistics in the analyzed group are relatively good because a number of 13 subjects brush their teeth twice a day, and a number of 11 subjects brush their teeth after each meal, only a number of 2 subjects declare that they perform occasional dental brushing, resulting in the equivalent of 2-3 weekly toothbrushes. A percentage of 53.33% of the subjects choose the electric toothbrush, a percentage of 26.66% of the patients prefer the manual toothbrush and a percentage of 20% perform the toothbrushing with the orthodontic toothbrush, special with "V" groove. (Fig. 7)

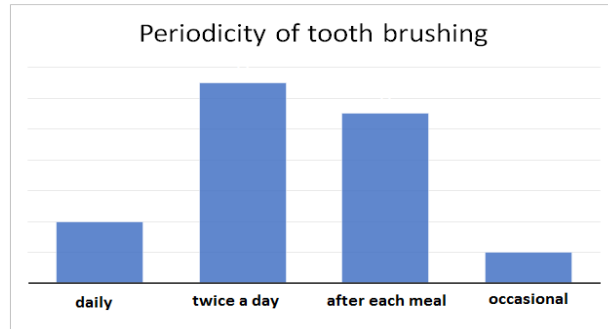


Figure 7. Periodicity of tooth brushing

The most common problems were in subjects who used the manual toothbrush, then in the toothbrush with "V" brushes. Subjects using electric toothbrushes had significantly fewer problems than those using manual toothbrushes $p = 0.005$. (fig. 8, 9)

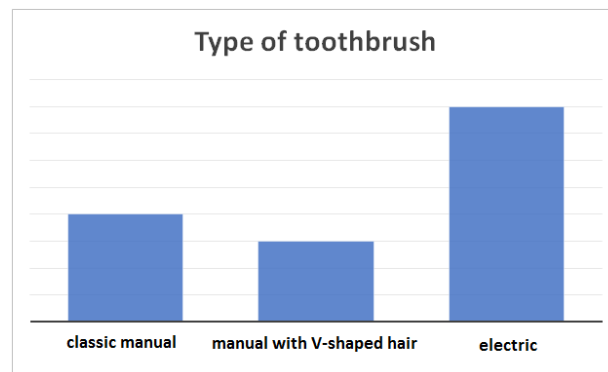


Figure 8. Type of toothbrush

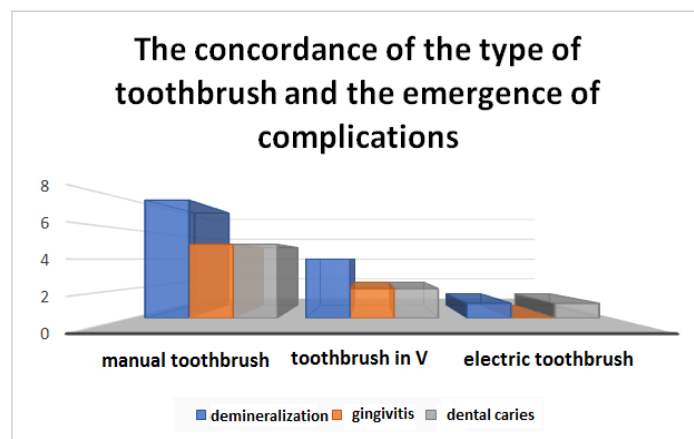


Figure 9. The concordance of the type of toothbrush and the emergence of complications

A percentage of 90% of the subjects from the analyzed group use dental floss at least once a day, which would not be relatively okay if we were talking about subjects wearing orthodontic appliances, but we can discuss the fact that a percentage of 40% of the subjects stated that they use dental floss after every meal, 33.33% use dental floss twice / day and only 10% never use dental floss. (Fig. 10)

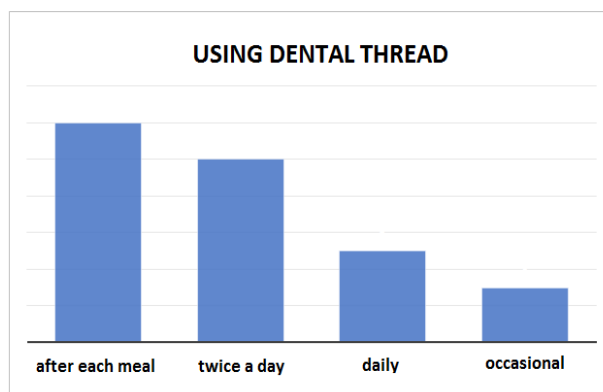


Figure 10. The use of dental thread

A percentage of 90% of the subjects in the analyzed group perform rinsing at least once a day with mouthwash, which would not be okay if we were talking about subjects wearing orthodontic appliances, so we can say that a percentage of 26.67 % of the subjects state that they perform rinses after each meal, a percentage of 43.33% rinse twice a day, and only 10% do it occasionally. (Fig. 11)

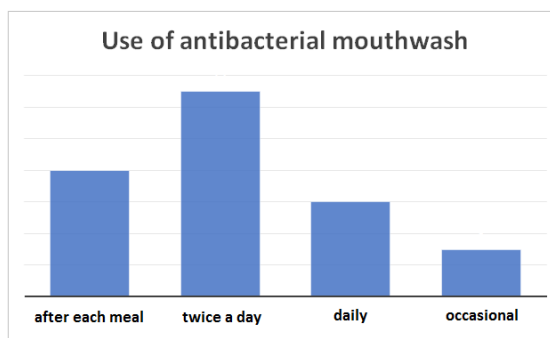


Figure 11. The use of antibacterial mouthwash

A percentage of 16.67% of the analyzed subjects state that they use the interdental brushes after each meal, or whenever it is necessary. (fig. 12). A percentage of 43.33% of patients use it in the morning and evening, a percentage of 16.66% use it daily, especially in the evening before bedtime, and a percentage of 23.33% use it occasionally. 20% of the subjects also use fluoride gel in combination with interdental brushes, but claim that their brackets come off. 16.66% use interdental brushes together with fluoride toothpaste. (fig. 13, 14)

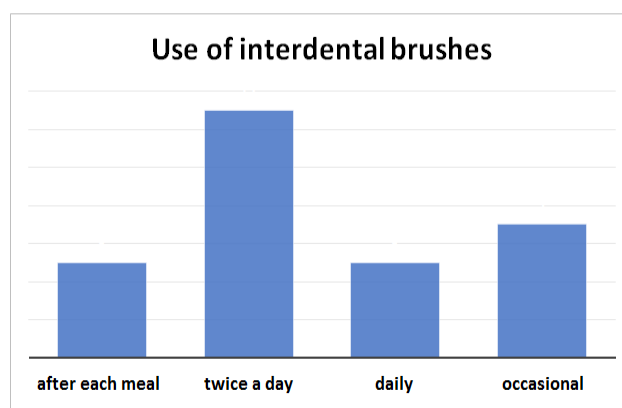


Figure 12. The use of interdental brushes

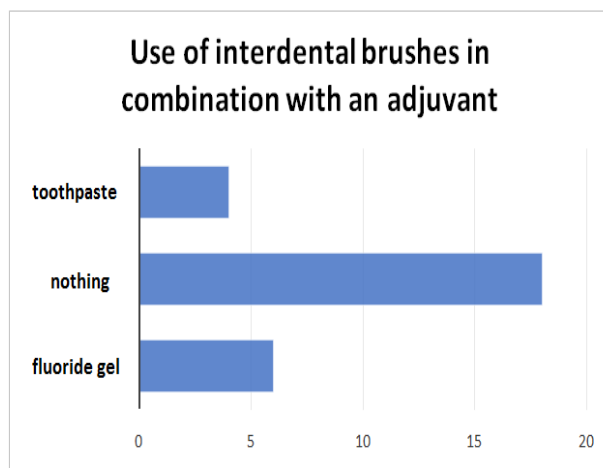


Figure 13. The use of dental brushes in combination with an adjuvant



Figure 14. The use of mouthwash

A percentage of 6.66% of patients use the oral irrigator after each meal, a percentage of 20% of them use it 2 times / day, usually in the morning and evening, a percentage of 16.66% use it daily, a percentage of 23.33% do it 2-3 times a week and a percentage of 33.33% do not use the oral irrigator at all. From the image below it is found that subjects who use the oral shower have fewer problems than those who do not use it at least daily, the difference was observed to be statistically significant $p = 0.005$. (fig. 15)

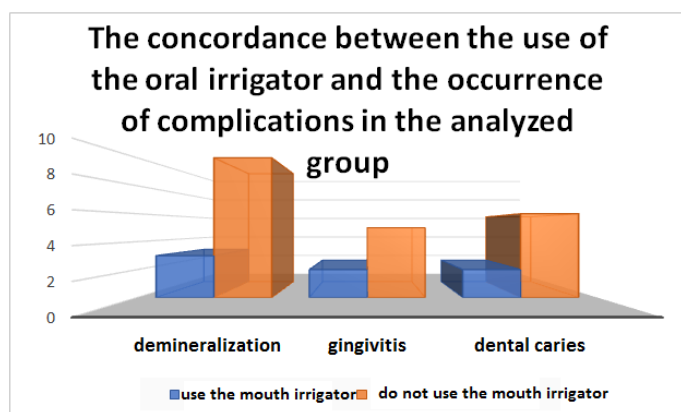


Figure 15. The concordance between the use of oral irrigator and the occurrence of complications

Professional cleaning has a major role in sanitizing orthodontic appliance wearers. A percentage of 40% of the subjects state that they have done professional brushing twice before, a percentage of 23.33% once, a percentage of 6.66% three times, and a percentage of

3.33% of or it was needed. In addition to professional toothbrushing in 83.33% of subjects, descaling was performed, where needed. (Fig. 16)

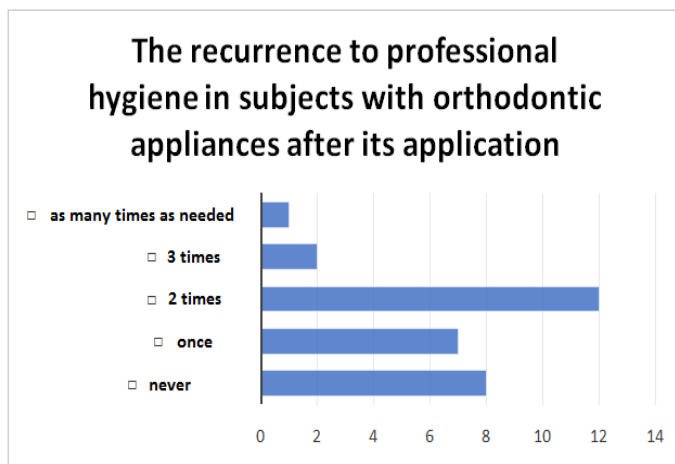


Figure 16. The recurrence to professional hygiene in subjects with orthodontic appliances

The information on correct sanitation for subjects wearing orthodontic appliances shows that 93.33% of subjects say that they have documented with the help of the Internet, with the aim of performing a correct toothbrushing, using the floss, sanitizing the device dental by watching videos on the You-Tube channel. A percentage of 86.66% state that part of the information regarding the correct sanitation was done through communication with family members or friends who wear a fixed dental appliance and a percentage of 73.33% of the subjects were informed by orthodontist and nurse or dental prophylaxis. (fig. 17)

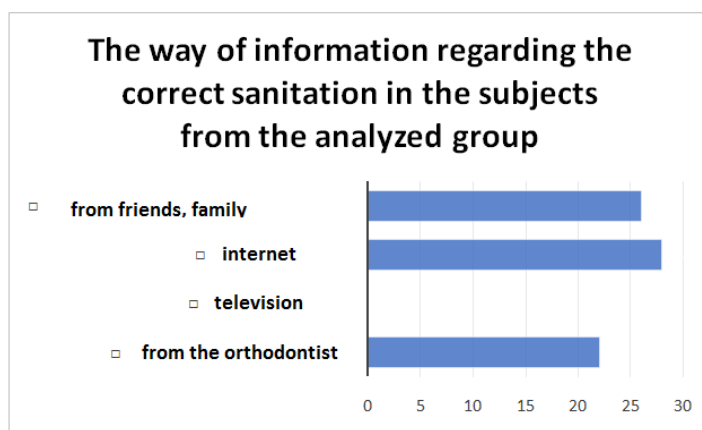


Figure 17. The way of information regarding the correct sanitation in the subjects from analyzed group

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DISCUSSIONS

Enamel demineralization, which occurs in orthodontic braces, occurs in the form of white spots that may disappear due to surface abrasion or due to repeated deposits of mineral deposits after treatment. Modern procedures for examining white spots are: optical caries monitor, quantitative laser fluorescence and light-induced fluorescence (QLF), digital imaging with optic fiber transillumination and computer analysis of digital photographs. [11]

It should be noted that the remineralization of enamel after removal of the orthodontic appliance should be a priority for the orthodontist and influence the use of fluoride preparations to prevent the destruction of the tooth in the altered area. Training patients on proper oral hygiene is especially important to combat complications after orthodontic treatment.[12]

The oral irrigator with antibacterial substances is fundamental for maintaining dental health and for avoiding complications after orthodontic treatment. The gingival stimulator has a particularly important role in combating gingivitis. Manual toothbrushing is inferior to electric brushing, and manual brushing can highlight the preponderance of orthodontic toothbrush with groove. The use of interdental brushes in combination with fluoride gels is beneficial in preventing complications after orthodontic treatment, but it should be noted that fluoride gel detaches the brackets, which means that long-term use is not recommended. [13]

Fluoride treatment is imperative to be used immediately after the removal of braces, from the moment it was noticed that the demineralization of the enamel is increased. The use of antibacterial and anti-inflammatory mouthwash is important for proper hygiene of the oral cavity. The use of the dental floss after each meal also reduces the degree of deposition of dental plaque. Motivation and training of patients at each medical check-up, in order to maintain optimal oral hygiene around braces is fundamental to achieve a full effect of fluoride. It is recommended to brush daily with fluoride toothpaste twice a day and use interdental brushes to remove bacterial plaque around the brackets. [14] Daily use of mouthwash with fluoride (0.05% sodium fluoride) or rinsing with mouthwash with essential oils may be prescribed. Carrying out oral prophylaxis when necessary and repeating the explanations during each appointment for patients who do not meet the requirements. Use of local fluoride in the form of varnishes, around the brackets of non-compliant or high-risk patients, at an interval of six months. Cementing modified CIS strips with high quality resins and using sealing solutions that remove fluoride around the brackets. Educating patients about proper nutrition is especially important in combating the appearance of carious lesions during orthodontic treatment.

CONCLUSIONS

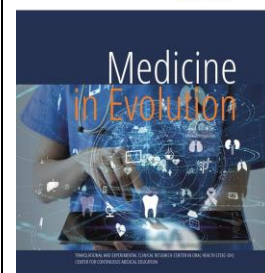
The study suggests that participants who received a post-treatment communication reported higher level of oral hygiene compliance than participants in the control group.

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A rare case of osteoid osteoma of mandible. Case report



Precup A.I.¹, Bumbu B.A.¹, Costea C.P.¹, Daina M.D.², Moldovan I.³, Todor L.¹

¹Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania

²Faculty of Medicine and Pharmacy, University of Oradea, Romania

³AI Dent Center Cluj-Napoca

Correspondence to:

Name: Bogdan Andrei Bumbu

Address: Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania, December 1st Square no.10, 410068 Oradea, Bihor County, Romania

Phone: +40 770207463

E-mail address: bogdanbumbu@uoradea.ro

Abstract

Osteomas are benign, slow-growing osteogenic tumors rarely occurring in the craniofacial bones. Osteoid osteoma is a benign tumor of the bone which has seldom been described in the jaws. It was first described as a distinct clinical entity by Jaffe in 1935. Lichtenstein defined osteoid osteoma as a "small, oval or roundish tumor like nidus which is composed of osteoid and trabeculae of newly formed bone deposited within a substratum of highly vascularized osteogenic connective tissue." The most interesting clinical feature of osteoid osteoma is the exquisite pain produced by a very small lesion, never greater than one centimeter in diameter. It accounts for 3% of all primary bone tumors, and about 10% of benign bone tumors. About 80% of cases of osteoid osteoma occur in long bones, while less than 1% occur in jaws. Here, a case of osteoid osteoma of the mandible in a 47-year-old female patient is presented with a literature review.

Keywords: Osteoid osteoma, mandible, nidus, radio opacity

INTRODUCTION

Osteoid osteoma was first described as a distinct clinical entity by Jaffe in 1935 [1]. It is a benign tumor of bone which has seldom been described in jaws. Jaffe and Lichtenstein have suggested that the lesion is a true neoplasm of osteoblastic derivation, but other have reported the lesion occurs as a result of trauma or inflammation [2]. Jaffe refers to the osteoid osteoma as distinct denoting the lesion's small self-limiting nature. Green et al. reviewed the literature and reported the total number of cases of osteoid osteoma of the jaws to be 7 of these 4 have occurred in the mandible and 3 in the maxilla (one in the antrum) [2].

MATERIAL AND METHODS

A 47-year-old female patient was presented to the Emergency County Hospital Bihor with swelling in the vestibular area of the body of the mandible, region 44, 46 measuring approximately 2 x 2 cm in size, asymptomatic with no numbness of the area, lower lip and right mental area. We considered this a good sign. The swelling was hard in consistency and tender on palpation. During the intraoral clinical examination, it was found that the appearance and coloring of the mucosa is normal (Figure 1). CBCT radiological examination shows in the right lateral mandibular region a well-defined oval-shaped radiopacity surrounded by a thin radiolucent border (Figure 2). We consider the teeth 44, 46 to be extracted. Mentally the patient was very fragile because she thought her disease was malignant, that was one of the reasons she postponed her visit to the specialist. The patient had poor oral hygiene. With an extraoral examination, no submandibular lymph nodes are palpable. The patient had no relevant medical and family history.



Figure 1. Clinically the aspect and the coloration of the mucosa is normal

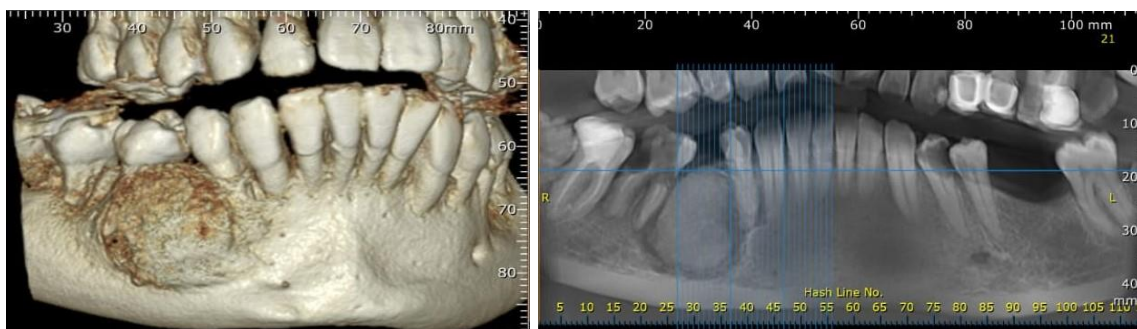


Figure 2. CBCT sections region 44,46 showing a well-defined oval shaped radiopacity surrounded by a thin radiolucent rim

Routine blood investigations were carried out and all the values were in normal limit. Surgical resection of the lesion along with the extractions 44 and 46 were performed in general anesthesia. The curettage of the lesion was done properly with conservation of the inferior alveolar nerve which was pushed by the tumor bone caudally to the basilar of the mandible (Figure 3). The excised specimen was submitted for histopathological examination (Figure 4).



Figure 3. Surgical exploration and excised specimen

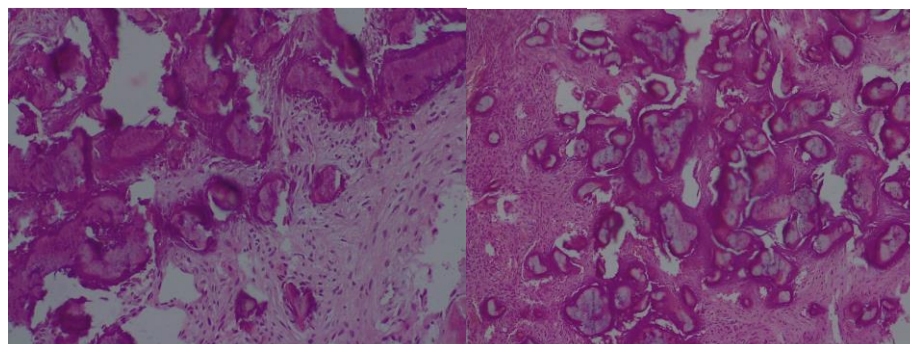


Figure 4. Thin hazardous bone lamella infiltrating the fibrovascular stroma

RESULTS

The postoperative course was uneventful, and the patient is still being followed. The perioperative regimen of antibiotics and anti-inflammatories was followed. From a psychological point of view, she was optimistic and relieved after receiving the histopathological result. The suture was removed after 7 days. The postoperative evolution was favorable (Figure 5).



Figure 5. Ten days after suture removal

DISCUSSIONS

Osteoid osteoma is a benign lesion consisting of a round nidus. It accounts for 3% of all primary bone tumors, and about 10% of benign bone tumors. About 80% of osteoid osteoma occur in long bones, while less than 1% occurs in jaws. Osteoid is most frequently observed in the second and third decades of life, more commonly in males than females, at a ratio approximately 2:1. Mild pain is the principal symptom as in the present case [3-7]. Osteoid osteoma was described as a specific entity by Jaffe in 1935. Jaffe described a type of nidus which appeared as a hard osseous core composed of densely set trabeculae of newly formed bone which was atypical. Jaffe perceived the initial notable changes in this lesion as an increased vascularity and destruction with replacement by new atypical bone following resorption of the destroyed tissue. The stroma consisted of osteogenic connective tissue containing numerous blood channels. A cortical lesion which produced this bony replacement stimulated the overlying periosteum to lay down new bone of fairly normal architecture [8].

There is general agreement in the literature that the treatment of choice for osteoid osteoma is the complete removal of the nidus. It is reported that osteoid osteoma does not recur after complete removal of the nidus [9].

Patients with osteomas should be evaluated for Gardner's syndrome. This syndrome is an autosomal dominant disease characterized by gastrointestinal polyps, multiple osteomas, skin and soft tissue tumors and multiple impacted or supernumerary teeth. Intestinal polyps are predominantly adenomas and may progress to malignancy in almost 100% of patients [10,11].

CONCLUSIONS

Correct diagnosis of osteoid osteoma is based on the elements of clinical semiology together with the imaging findings. A wrong radiological technique or a misinterpreted radio-clinical approach inevitably leads to an incorrect diagnosis and treatment. To confirm diagnosis, the anatomopathological examination is required.

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Methods of prophylaxis and management of complications following wisdom tooth extraction



**Riviş M.¹, Nica D.F.¹, Bonta D.F.^{2*}, Todor S.A.³, Lile I.E.⁴, Popa M.¹,
Dinu S.¹, Stana O.L.⁴, Flueraş R.⁴, Vasca E.M.⁴**

¹Department 2, Faculty of Dental Medicine, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania

²Department of Dental Medicine, Faculty of Medicine and Pharmacy, University of Oradea, Romania

³Dentist doctor, private medical office, Oradea, Romania

⁴Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania

Correspondence to:

Name: Dan Florin Bonta

Address: University of Oradea, Faculty of Medicine and Pharmacy, Department of Dental Medicine, 10 1
December Sq., 410068, Oradea, Romania

Phone: +40 766611693

E-mail address: bontadan2006@yahoo.com

Abstract

The extraction of wisdom teeth is considered a routine surgical intervention for the dentist, and the complications associated with them are frequent. Complication rates following the extraction of wisdom teeth range from 4.6% to 30.9% with an average of approximately 10%. The incidence of these complications varies depending on local and general factors, the age and general health of the patient, as well as the experience of the operator.

Postoperative complications caused by wisdom molar extraction can be reduced by a thorough clinical and radiological examination during the preoperative stage and by following the principles of extraction in correlation with the local and general status of the patient. The best way to solve the accidents and complications associated with the surgical extraction of the wisdom tooth is prevention.

Keywords: Wisdom tooth, extraction, complications, prophylaxis

INTRODUCTION

Tooth extractions are common in patients of all ages [1]. Removal of wisdom teeth is a common dental procedure aimed at preventing various complications and maintaining oral health [2].

In some cases, the extraction of third molars (M3) can be difficult due to technical difficulties, or other favorable factors: age, sex, smoking, medical history, antithrombotic medication, oral contraceptives, poor oral hygiene, presence of pericoronitis, type of impact, the relationship of the third molar to the inferior alveolar nerve, surgical time, surgical technique, surgeon experience, use of perioperative antibiotics, topical antiseptics, intra-socket medications, and anesthetic technique [3,4]. Reported complication rates for third molar (M3) extraction range from 4.6% to 30.9% with a mean of approximately 10% [4,5].

The incidence of postoperative complications following wisdom molar extraction can be reduced by a pre-extraction clinical and radiological evaluation and by following the principles of extraction in correlation with the general and local status of the patient [6]. The risks of complications are lower for maxillary wisdom teeth than for mandibular wisdom teeth [4,7,8].

Aim and objectives

The aim of this work is to improve the treatment of patients who have post-operative complications following wisdom tooth extraction by establishing the treatment attitude and behavior in correlation with its evolution.

The objective of this paper is to research, through a systematic review type study, comparing multiple studies, the complications following the extraction of wisdom teeth, but also to reduce their incidence.

MATERIAL AND METHODS

In this systematic mini-review study, the relevant articles were selected by searching the specialized literature in three bibliographic databases: MEDLINE, Science Direct and Google Academy.

In order to obtain a compliant search procedure, MeSH terms were used in the search engines of the data sources - by combinations of two or three words that allow a more complex search, eliminating typos, these being: "Third Molar", "Third Molar Complications", "Removal of Third Molar", "Extraction of Third Molar", "Third Molar Surgery", "Complications After Third Molar Surgery" or "Complications of Third Molar Extraction".

The inclusion criteria aimed to select articles that research the incidence of postoperative complications after the extraction of wisdom teeth and to identify risk factors for establishing the treatment attitude and behavior in correlation with its evolution.

In order to be selected, articles must comply with the following rules: they must be cross-sectional studies, prospective or retrospective cohort studies or systematic reviews; not to be older than 12 years; scientific articles developed in English and edited in specialized literature; studies to analyze postoperative complications following the extraction of wisdom teeth and to identify risk factors for establishing the method of prophylaxis and management of associated complications. Studies in which wisdom tooth extraction is not among the topics covered, studies older than 12 years, scientific articles that analyze dental extractions without clearly differentiating the information and results between the two, studies, articles, scientific papers or guidelines that do not met the FDI criteria to evaluate postoperative complications, were excluded.

929 articles were retrieved in a special software for bibliographic reference management (Mendeley, Zotero 4.0, EndNote Basic, George Mason University).

Initially, article analysis was performed by reading the titles and abstracts to eliminate studies that did not meet the inclusion criteria, then the studies were assessed in full. After reading the titles, 858 were eliminated (they were not appropriate to the chosen theme or were duplicated during archiving), the abstracts of the remaining 71 articles were analyzed, 56 of them were collected, finally 15 studies meet the inclusion criteria.

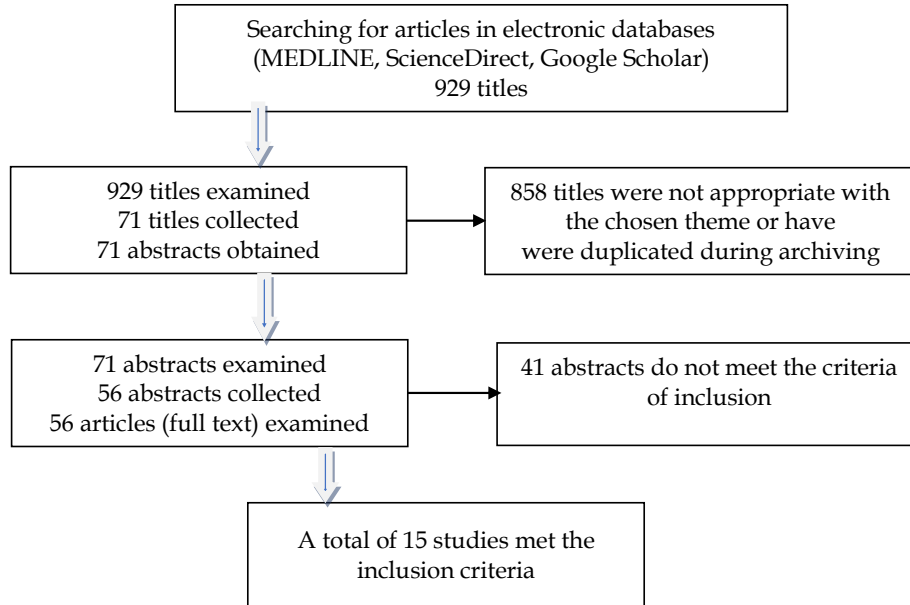


Figure 1. Selection of articles

The 15 studies that correspond to the inclusion criteria were examined and presented, then the data was selected by running a table in Microsoft Excel (Table 1), which contains:

- number of the article in the bibliography;
- material and method;
- results.

The conclusions of the study were obtained after comparing the results of each article.

Table 1. Studies that evaluated postoperative complications caused by the extraction of wisdom teeth

No. Ref.	The method used	Result
4	In this study, all patients who underwent wisdom tooth odontectomy under general anesthesia at the Sultan Qaboos University Hospital in Muscat, Oman, between January 2007 and December 2017, were included. Age, sex, indication for extraction, wisdom teeth extracted, procedure and complications were recorded.	A total of 1116 wisdom teeth were extracted (56% mandibular and 44% maxillary), and the majority (67.7%) were from female patients. The mean age at extraction was 24±5 years, and the majority of patients (77.7%) were 20–29 years old. Intraoperative and postoperative complication rates were 3.7% and 8.3%, respectively. Intraoperative complications included tuberosity fracture (1.2%), root fracture (1.1%), hemorrhage (0.7%), soft tissue injury (0.5%), and injury to adjacent teeth (0.2%). Postoperative complications were paresthesia (7.2%), swelling/pain/trismus (0.6%), and alveolitis (0.5%). Paresthesias were temporary in 41 patients and permanent in 4 cases. A significant relationship was observed between those aged 30–39 years and alveolitis (P=0.010), operative difficulty and postoperative complications (P=0.001).

No. Ref.	The method used	Result
9	<p>In this study, patients with included lower wisdom teeth were examined. The impaction position of the lower wisdom tooth was classified according to Winter's classification. The mandibular wisdom molar odontectomy was performed by the same surgeon under local anesthesia. Operative time was measured from the time the incision was made to the completion of the suture. Postoperative complications evaluated were pain, swelling and trismus.</p>	<p>120 patients aged 19-42 were treated. Patients aged 35 to 42 years had a lower pain score (p=0.5) on day 1. Trismus was significantly less in younger patients on days 2 and 5 (p=0.007 and (p=0.01), respectively). Pain, swelling and trismus increased with operative difficulty. Distoangular impaction position was associated with a higher VAS (Visual Analog Scale) pain score on days 1 and 2 (p=0.01, 0, 0.04). Distoangular and horizontal impaction positions are associated with a greater degree of swelling and trismus. The vertical impaction position was associated with the lowest degree of swelling and trismus.</p>
10	<p>In this study, specialized literature was researched to reduce the incidence of postoperative complications after the extraction of wisdom teeth. Numerous topics were investigated, including patient age, flap type, the effect of smoking, use of antibacterial mouthwashes, preemptive analgesia, and the role of antibiotics and corticosteroids in healing.</p>	<p>The advancing age of the patient increased the rate of complications. The results of the studies regarding the flap type are contradictory. Systematic research proves that smoking cessation reduces postoperative complications. The role of preventive analgesia has not been studied in wisdom tooth odontectomy. The use of chlorhexidine mouthwashes in the prevention of alveolitis and local infection has been studied, but meta-analyses have not proven their effect. Antibiotics have been shown to prevent alveolitis and local infection. Also, corticosteroids reduce postoperative trismus and swelling; the role of steroids in reducing pain has not been proven.</p>
11	<p>5 electronic databases (1999-2016) were searched to identify relevant studies [Cochrane Library (4 April 2016 and 29 April 2016), MEDLINE (4 April 2016 and 29 April 2016), EMBASE (4 April 2016 and 29 April 2016), EconLit (4 April 2016 and 29 April 2016) and NHS Economic Evaluation Database (4 April 2016)]. Studies comparing prophylactic extraction of the included lower wisdom tooth and standard treatment were included. Clinical outcomes considered were pathology associated with wisdom molar inclusion, postoperative complications after extraction, and adverse effects of treatment. Cost-effectiveness outcomes included UK costs and health quality-of-life measures. In addition, the review group constructed a de novo economic model to compare the cost-effectiveness of a prophylactic wisdom tooth extraction strategy versus standard treatment.</p>	<p>The clinical review selected 4 cohort studies and 9 reviews. In the 2 studies that reported postoperative complications, no serious complications were reported. Pathological changes due to inclusion of asymptomatic mandibular wisdom teeth were reported by three studies. In these studies, the rate of odontectomy for the included mandibular wisdom tooth ranged from 5.5% to 31.4%; this variation may be explained by the different follow-up periods (1-5 years). The findings of this review are consistent with findings from previous systematic reviews. 2 published cost-effectiveness studies were identified. The authors of both studies concluded that there is currently no economic evidence to support the prophylactic extraction of included lower wisdom teeth. The results generated by the evaluation group's lifetime economic model indicated that the cost-effectiveness ratio per quality year for comparing a prophylactic extraction strategy and standard treatment is £11,741 for 20-year-olds with molars of asymptomatic lower minds included. The cost per person associated with prophylactic extraction is £55.71, with an annual gain of 0.005 per person. The cost-effectiveness ratio for each quality-adjusted life-year was found to be robust when a series of sensitivity analyzes were performed.</p>
12	<p>In this prospective study, patients requiring wisdom tooth extraction were analyzed and were examined four times during treatment in the context of the study. Data were collected by pre-, peri- and postoperative (days 3 and 10) surveys. Uni- and multivariable logistic regression was used to assess the probability of postoperative pain</p>	<p>In total, 6010 patients with a mean age of 25.2 (± 11.2) underwent 6347 surgical interventions for the extraction of 15357 wisdom teeth. Postoperative complications were pain, trismus, and swelling, all of which were transient, with postoperative reduction on days 3 to 10. Increasing patient age was associated with increased pain, trismus, and</p>

No. Ref.	The method used	Result
	on day 3 and 10 according to several local and general risk factors (age, sex, indication for extraction, operative technique, anesthesia and clinician experience).	swelling and a greater risk of injury to the inferior alveolar nerve. Postoperative complications of extraction were more frequent in patients over 25 years old. Other risk factors for postoperative complications were female sex, depth of inclusion and experience of the clinician.
13	In this study, a retrospective matched-pair analysis was performed comparing patients aged at least 65 years (group A) with a control group of patients aged 15 to 20 years (group B). Age group was a risk factor in this study. Outcome variables were general health as defined by the modified Charlson score (MCS) and the American Society of Anesthesiologists (ASA) score, general surgical risks caused by antithrombotic or anticoagulant medication, and specific local surgical risks and complications.	Patients in group A had more comorbidities, indicating higher MCS and ASA scores (P<.001). Older patients with antithrombotic treatments (P<.001), had higher rates of ankylosis (P<.001) and proximity to anatomical structures (P<.001) presented more intra- and postoperative complications (P<. 001), thus increasing the degree of difficulty and operative time of the wisdom molar extraction (P<.001).
14	In this study, relevant articles were selected through a search of the PubMed, Scopus and Cochrane databases using the search terms: "three molars" sau "teeth of wisdom", "complications" and "age", "recovery", "infections", "periodontal diseases", "complications of the temporomandibular joints", "nervous involvement", "oro-sinus communication" and "mandibular fracture".	Relevant studies were identified and are reported for the following complications and their relationship to patient age: 1) healing time; 2) incidence of fractures; 3) infection rates; 4) periodontal damage; 5) nerve involvement; 6) complications of the temporomandibular joint; 7) nerve damage; and 8) oro-sinus communications.
15	In this study, the specialized literature of the last 25 years was searched in the PubMed database using the keywords: affected third molar, age, tooth wisdom, age and postoperative complications, age and inflammatory reaction of the tissue, tooth extraction and age. In addition, hand searches of key texts, references, and reviews relevant to the study were conducted.	The influence of age on postoperative complications after wisdom tooth odontectomy was associated with other local and general factors. The studies reviewed showed that no specific age demonstrated increased morbidity. Pain, swelling and trismus were the most common complications associated with advancing age.
16	In this study, 100 patients were selected, 54 female and 46 male, aged between 18 and 42 years. Wisdom molar odontectomy was performed with osteotomy and full-thickness mucoperiosteal flap. Pain, swelling and trismus were evaluated preoperatively on days 2 and 7 postoperatively. Data were analyzed using SPSS and significance testing was performed using Chi-square (x ²) test and unpaired t-test.	Statistical analysis of the data indicated that pain, trismus, and swelling were more reduced in younger patients than in older patients when preoperative and postoperative results were compared.
17	In this cross-sectional study, complications after odontectomy of wisdom teeth were investigated on a sample of 210 patients. The risk factors were general (age and sex), and local.	210 patients had a total of 605 molars extracted. The mean age of the sample was 21.6±9.2 years, with 1.4 females to 1 male. Postoperative complications were recorded in 54 extractions of wisdom teeth. The most common complications were infection (42.6%), followed by root fractures (11.1%) and swelling (11.1%). Complications were influenced by 3 factors: age over 25 years (p=0.002- OR 2.21), location (p=0.006- OR 2.36), osteotomy (p=0.002- OR 3.03) and molar sectioning (p=0.00002 - OR 3.59).
18	In this systematic review type study, the specialized literature was searched in the bibliographic databases MEDLINE (PubMed), Embase and Cochrane Library. Scientific papers had to meet the following criteria to be included in	A total of 37 studies were included for qualitative analyses. Available data have shown that the asymptomatic impacted wisdom tooth frequently causes pathologies associated with the advancing age of the patient. Carious lesions and periodontal

No. Ref.	The method used	Result
	the study: be systematic reviews or meta-analyses. Relevant reports were selected using inclusion and exclusion criteria. Pathology related to the inclusion of wisdom teeth included carious lesions, periodontal involvement, second molar root resorption and pericoronitis. The methodological quality of each study was reviewed using a pathology-specific tool to assess the risk of complications.	damage were common, especially in partially erupted wisdom teeth and impacted lower wisdom teeth in mesio-position.
19	In this prospective cohort study, patients who presented for odontectomy of the lower wisdom molar included in position A, class I were selected. For 1 year, between July 2014 and June 2015, a total of 40 patients were enrolled in the study. Assessment of patient variables and radiographic variables was done preoperatively. Depending on the duration of the operative time, the patients were divided into three groups: Group I, Group II and Group III. Postoperative complications such as swelling, trismus and pain were evaluated in each patient.	Among the six risk factors analyzed in the study were local factors: anatomic morphology of the wisdom molar, interarcade opening, external oblique ridge and were found to be factors influencing the operative time. Swelling, trismus, and pain were significant among groups and were related to operative time.
20	In this study, the patients who required the odontectomy of the lower wisdom molar in our institution between January 2007 and December 2008 were selected. The data related to the patients were obtained, such as: the impaction position of the wisdom molar, the indication and degree of difficulty of the odontectomy based on the Pederson criteria. Postoperative pain, swelling, and trismus were assessed on day 1, day 2, day 3, day 5, and the first week. A p value of less than 0.05 was considered significant.	150 patients aged 16 to 38 years (25.9 ± 4.47) met the inclusion criteria. Males were 66 (44.0%) while females were 84 (56.0%), resulting in a male-female ratio of 1:1.3. Age, gender and degree of difficulty index did not influence pain and trismus during the postoperative evaluation period ($p > 0.05$). Postoperative swelling was not influenced by gender, but patients over 25 years of age with a higher degree of difficulty presented more facial swelling.
21	In this prospective study performed by three surgeons who extracted 354 mandibular wisdom teeth over a 4-year period (1994-1998). Data on patient, dental, and surgical variables were collected as patients were treated. Difficulty of extraction was estimated preoperatively using radiographic features and compared intraoperatively.	The univariate analysis identified the following factors that prolong the operative time and increase the operative difficulty: advancing age of the patient, ethnicity, male patients, overweight patients, wisdom molar inclusion depth, wisdom molar horizontal impaction position, unfavorable disposition of the roots, the proximity of the inferior alveolar canal. Multivariate analysis showed that increasing age ($P = 0.014$), overweight patient ($P = 0.024$), ethnicity ($P = 0.019$), depth of inclusion ($P = 0.001$), bone impact ($p = 0.008$) and unfavorable disposition of roots ($P = 0.009$) were the independent risk factors for extraction difficulty.
22	This study was conducted in Triveni Institute of Dental Sciences, Hospital & Research Centre, Bilaspur, Chhattisgarh. All wisdom molar odontectomies that were performed between April 2016 and March 2017 were retrospectively analyzed and included in the study. The presence of postoperative complications, such as pain (more than 3 days), paresthesia, mandibular fracture, alveolitis, hemorrhage, trismus, or swelling, together with the patients' data and the type of impaction, were observed. Data were tabulated using SPSS software. Variables were analyzed and P value less than 0.05 was considered significant.	There were 117 men and 113 women who underwent transalveolar wisdom tooth extraction. The average age of women was 47.21 ± 12.2 years, and of men 48.32 ± 11.5 years. In our study, pain was the most common, observed in 57.4% of patients. Pain was followed by swelling which was observed in 42.2% of patients. Trismus ranked third, being observed in 23.2% of patients. There was a significant difference in the level of pain among the three age groups with pain most commonly seen in the 20s (21.6%) and least commonly seen in those aged between 20 and 40 years old (15.2%).

RESULTS

Of the 15 articles collected, 13% were descriptive studies, 53.33% were cohort studies (of which 33.33% were prospective and 20% were retrospective), 33.33% were reviews.

All the studies analyzed the postoperative complications following the extraction of wisdom teeth, but in 33.33% of them only the lower wisdom tooth was analyzed (since in general the odontectomy of the upper wisdom tooth encountered fewer operative difficulties than the lower one), and in 13 % of them were also analyzed for intraoperative complications.

In 60% of the studies it was demonstrated that among the most frequent postoperative complications were pain, swelling and trismus. According to the analyzed studies, it was found that the postoperative complications caused by wisdom molar extraction are 80% more frequent in patients over 25 years old, compared to patients up to 25 years old, and in 60% of the studies some authors highlight the advantages of extraction prophylactic treatment of asymptomatic wisdom teeth in young patients, preferably before the age of 25, although the studies analyzed showed that no specific age demonstrates an increased morbidity.

The articles selected in the study were distributed as follows: 26.66% in Europe (1 in Great Britain, 2 in Belgium and 1 in Germany), 20% in America (1 in Connecticut, 1 in San Francisco and 1 in Brazil), 6.66% in Africa (Nigeria) and 46.66% in Asia (2 in Saudi Arabia, 1 in Bangladesh, 3 in India and 1 in Iraq) (Figure 2).

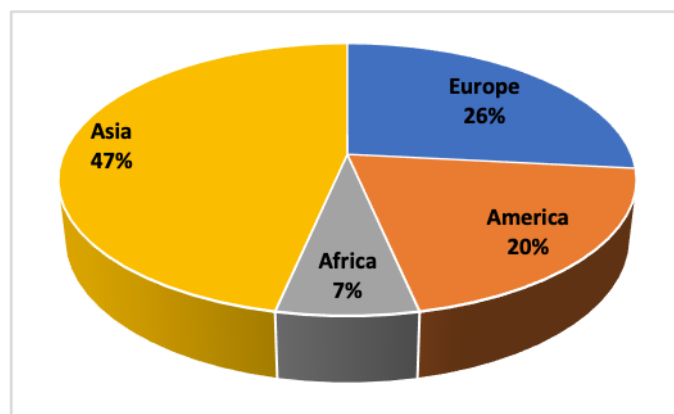


Figure 2. Graphic representation of the distribution by continent regarding the interest in scientific research of postoperative complications caused by the extraction of wisdom teeth

In 73% of the analyzed studies, it was demonstrated that, in addition to the age factor, the postoperative complications following the wisdom molar extraction are also caused by the operative difficulty that can be assessed preoperatively radiographically, given the position and depth of inclusion of the wisdom molar. Extraction of asymptomatic wisdom teeth up to the age of 25 years associated with preventive antibacterial and analgesic therapy decreased the frequency of post-extraction alveolitis and reduced the healing period of patients, in 20% of the studies.

DISCUSSIONS

Severity of pain, degree of swelling and trismus are the main indicators of postoperative complications in patients caused by wisdom tooth odontectomy [9]. There is a significant influence of age on postoperative morbidity after wisdom tooth odontectomy. A greater degree of trismus and facial swelling was recorded in elderly patients. This finding is in agreement with some studies. Bruce et al, while investigating the role of age on postoperative morbidity associated with mandibular wisdom teeth, found that patients over 35 years of age experienced more swelling and trismus [23]. Chiapasco et al believe that the

correlation between age and postoperative complications could be related to the increase in bone density, which can lead to an increase in the degree of operative difficulty [24].

The type of inclusion dictates the degree of difficulty of extraction and therefore the severity of postoperative complications. It appears that the difficulty encountered in descending order was distoangular, horizontal, vertical, and mesioangular. Chiapasco et al in their study reported a complication rate of 6.5% in association with distoangular impaction, as opposed to 2.7% with vertical impaction. They concluded that this observation could be an increase in the degree of operative difficulty that is associated with this type of inclusion [24].

Given the ongoing discussion about prophylactic wisdom tooth extraction, the overall aim of some studies was to gain insight into the current indications for wisdom tooth extraction and the postoperative recovery process associated with this type of oral surgery [12]. The study demonstrated significant associations between patient age and the occurrence of immediate and persistent postoperative morbidity. The ability to recover from surgery decreases as we age and the risk of postoperative complications increases. Complication rates increase due to changes in bone physiology, deterioration of systemic physiologic conditions, and potentially prolonged operating time and increased operative difficulty. In addition, the incidence of indications for symptomatic wisdom tooth extraction increased with age. Asymptomatic wisdom molar involvement eventually leads to associated pathologic changes such as carious lesions, severe second molar periodontitis, pulpal or periapical pathology, root resorption, and development of an odontogenic cyst or tumors. Symptoms such as trismus and swelling are related to invasiveness, operative difficulty and, consequently, the duration of the surgical procedure [12].

Risk factors associated with overall complications in the present study were age over 25 years, third molar location, depth of inclusion, and molar morphology such as root divergence [17]. The study showed that patients over the age of 25 were 46% more likely to develop complications than those under this age. In one study, the older patient group (over 30 years old) showed a higher degree of swelling compared to the younger patient group (under 30 years old). This increase in complication may be associated with changes in bone density. In relation to tooth location, our results confirm the common clinical observation that mandibular wisdom teeth are more difficult to extract than their maxillary counterparts. Due to the fact that the density of the bone cortex is higher at the level of the mandibular arch and the presence of the inferior alveolar canal [17].

One study found that depth of inclusion was correlated with prolonged operative time and increased operative difficulty in wisdom tooth extraction. The results of this study suggested that age over 25, tooth location, depth and position of inclusion as well as root divergence was associated with a higher risk of complications. This information is important both in evaluating the indications for wisdom tooth extraction and in formulating informed consent [17].

The wisdom tooth has been widely discussed and has been the subject of over 10,000 medical articles. However, no consensus therapeutic guidelines have been developed regarding the management of wisdom teeth. Because of the controversy discouraging prophylactic extraction of wisdom teeth, the aim of this systematic review was to analyze the occurrence of pathologies associated with the inclusion of asymptomatic wisdom teeth. However, it is important to mention that the absence of symptoms does not equal the absence of pathologies, which have been repeatedly demonstrated by Dodson and Marciani. Due to the differences in methods and the different age categories examined in the included studies, large variations in the prevalence of pathologies were found. Data on the long-term effects of wisdom tooth inclusion have remained limited. The average follow-up time was only 4 years, which is insufficient to make accurate predictions about the development of pathologies in the future [18].

Several international guidelines on the clinical management of wisdom teeth have been reported to assist clinicians in making treatment decisions. These included the United Kingdom NICE 2000 guidelines, SIGN 2000 and the 2012 KCE Report. The guidelines, in the main, were against the prophylactic extraction of wisdom teeth due to the lack of clinical evidence that the included wisdom teeth will develop associated pathologies over time. With this argument, the guidelines therefore concluded that retention systematically outperforms extraction, despite the fact that there is no evidence to suggest that these teeth would remain free of pathology and symptoms. In the current ongoing disagreement, clinicians have largely relied on their own experience in making clinical decisions. Thus, great variation continued to exist among clinicians in their assessment and beliefs about the need for wisdom tooth extraction [18].

The level of surgical difficulty had no significant effect on postoperative pain and trismus, but had a variable effect on facial swelling, which was found to be significant on postoperative day 7. The result of this study differs from those of Benediktsdottir et al. [25] and Yuasa and Sagiura who reported a significant association between high preoperative Pederson index and high VAS pain score [26].

Preoperative assessment of surgical difficulty is fundamental to planning the extraction of the impacted wisdom tooth. The study evaluated the effect of factors on operative difficulty, some of these factors are demographic (age and sex) and others are dental factors (impaction, angulation and location of the included molar). Renton et al. [27] and Gbotoloran et al. [28] observed that surgical difficulty increased with increasing age of the patient.

Yuasa et al. [29] and Park [30] studied additional factors (depth of inclusion, relationship to the mandibular ramus, relationship to the mandibular canal, unfavorable root morphology, root divergence and periodontal space) which complicates the operative difficulty of the included wisdom molar odontectomy.

The third molar, also known as the wisdom molar, is the last tooth to develop in the maxillary arches. These molars remain impacted most frequently due to the lack of space. The clinician should have knowledge of the possible complications so that he can identify the high-risk patient group and manage any complication, and should also evaluate preoperative radiographic investigations such as (OPG) to determine bone height alveolar, peri-apical intra-oral radiographs (to determine the angulation of the included teeth) and Cone Beam Computed Tomography (to assess the relationship with the neighboring anatomical structures in the three planes) and other blood tests to determine the glycemic status along with the time of bleeding and coagulation which will reduce postoperative bleeding associated with healing complications. It has been shown that postoperative complications caused by wisdom tooth extraction generally occur between the ages of 18-25 years. The incidence of complications following wisdom tooth extraction has been reported to range from 2.6% to 30.9%. Pain and swelling are one of the most common complications. Trismus occurs as a result of trauma and inflammation of the masticatory muscles and is difficult to manage without mouth-opening exercises. The swelling is maximum on days 2-3 postoperatively and disappears after 7 days. Postextraction alveolitis is another major complication that causes severe pain 3-5 days after extraction. The incidence of postextraction alveolitis varies between 1%-30% [19].

Torres et al. [31] found that the use of panoramic radiography does not allow clinicians to accurately predict the operative difficulty of the extraction of the lower wisdom tooth regardless of their level of experience. Ghaeminia et al. [32] evaluated the role of cone beam computed tomography (CBCT) in the management of patients with included lower wisdom teeth at high risk of inferior alveolar nerve injury and found that CBCT provides

optimal risk assessment and more accurate surgical planning, in comparison with panoramic radiography [33].

Valmaseda et al. showed that the incidence of complications after wisdom tooth extraction was 10% [34]. Avendano et al. showed that the overall complication rate was 15.62% and the most common complication was pain, its incidence was 57.3% [35]. In a study by Azam et al. the incidence of pain was 28% after wisdom tooth extraction [36]. Benediktsdottir et al. showed mild pain in 53% cases, severe pain in 47% cases, and severe pain even after one week postoperatively in 15.2% cases [25]. The most frequent complications after the extraction of wisdom teeth were pain, swelling and trismus [37].

The position and depth of the inclusion provides a predictability of the operative difficulty of the extraction of the wisdom tooth and, therefore, the severity of the inflammatory reaction of the postoperative tissue. The most common inclusion position was the mesioangular position followed by horizontal, vertical and distoangular. To reduce the incidence of postoperative complications, it is essential to analyze the degree of operative difficulty [19].

CONCLUSIONS

The most frequent postoperative complications caused by the extraction of wisdom teeth reported in the specialized literature were pain, swelling and trismus.

The risks of complications are lower for maxillary wisdom teeth than for mandibular wisdom teeth, this is due to the fact that the cortex of the mandible has a higher density and also due to the presence of the lower alveolar canal.

In the majority of studies, age was a significant risk factor in the influence of postoperative complications, these being increased with increasing age due to the increase in bone density and the deterioration of systemic physiological conditions, which can lead to an increase in the degree of operative difficulty, which argues the recommendation extraction of the wisdom tooth until the age of 25.

Among the risk factors associated with the postoperative complications of the extraction of the wisdom tooth were identified the age over 25 years and the operative difficulty given by the depth and position of inclusion of the wisdom tooth as well as its root morphology, and in this sense in order to avoid possible postoperative complications, preoperative radiological examination (OPG, bitewing, CBCT) as well as odontectomy of the wisdom molar in the stage of formation (when only $\frac{1}{3}$ or $\frac{2}{3}$ of the root is formed) is essential to avoid the development of an unfavorable root morphology.

Regarding the controversy of the prophylactic extraction of wisdom teeth or the preservation of asymptomatic wisdom teeth, the average follow-up time of the included wisdom teeth was only 4 years, which is insufficient to make accurate predictions on the development of pathologies in the future, and in the continuing contradiction, the clinicians' decisions were largely based on their own.

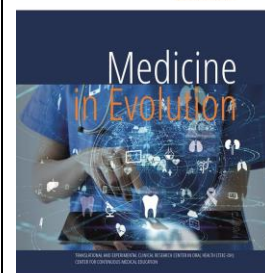
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The impact of good oral habits



Stana A.¹, Lile I.E.^{2*}, Dancea V.², Vaida L.³, Stana O.L.², Fluieras R.^{2,4}, Popovici R.A.⁴, Marian D.¹, Ilyes I.¹, Berari A.¹, Hosszu T.²

¹Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

²Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania

³Department of Dentistry, Faculty of Medicine and Pharmacy, University of Oradea, Romania

⁴Department I, Faculty of Dental Medicine, University of Medicine and Pharmacy "Victor Babeş, Timișoara

Correspondence to:

Name: Ioana Elena Lile

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldis”

Phone: +40 745305221

E-mail address: lile.ioana@uvvg.ro

Abstract

At the present time worldwide, although attempts are being made to reduce the number of smokers through various methods, they still exist smoking not only the traditional cigarette but also opting for various other forms of cigarettes such as electronic cigarettes or vaping. The present study investigates the relationship between different types of cigarettes and their effect on periodontal tissues that may lead to periodontal disease. The study included a number of 120 patients diagnosed with periodontal disease and tries to highlight or explore the correlation between smoking habits and the degree of periodontal damage according to smoking habits. Research results show that there is a significant link between conventional or electronic smoking and periodontal disease that is aggravated by the frequency and duration of cigarette smoking. The study also shows the importance of completely giving up both electronic and traditional smoking.

Keywords: smoking, dental plaque, periodontal disease, electronic smoking, oral health

INTRODUCTION

The dental plaque is a complex of bacteria located on the surface of the teeth, and it is fixed in a matrix of bacterial and salivary polymers. Tooth brushing with fluoridated toothpaste is considered to be the "milestone" of caries prevention. The regular use of fluoride medications for oral cavity is the key element in successful caries prevention [1]. Topical use of fluorides, such as toothpastes, mouth rinses, gels, and varnishes, has been shown to decrease caries prevalence and caries experience [2]. The effectiveness of fluoride toothpastes in caries prevention depends on the formulation and fluoride concentration [3]. Studies have shown that tooth brushing twice daily with fluoridated toothpaste is associated with sociodemographic factors, fluoride knowledge, and attitudes towards regular dental care [4]. The use of fluoridated toothpaste has been promoted in China since 1989, but the oral hygiene behaviors of Chinese adolescents are still undesirable [5]. Theobromine-containing toothpastes have also shown enamel remineralization effects and can be considered effective agents in preventing early enamel lesions.

Dental plaque, a complex bacterial biofilm adhering to tooth surfaces, plays a pivotal role in the intricate dynamics of periodontal disease and dental caries. In the context of periodontal disease, the mere presence of plaque initiates a transformative ecological shift within the oral microbiome, fostering an imbalance in acidogenic and aciduric bacteria. This intricate microbial imbalance significantly fuels the progression of the disease [6]. Moreover, plaque undergoes a qualitative shift, intensifying in bacterial complexity and adopting a more anaerobic milieu, thereby further exacerbating the impact on periodontal tissues [7]. On the flip side, dental caries emerges as a consequence of acidogenic bacteria residing in plaque, orchestrating an acidic onslaught that demineralizes tooth enamel [8]. The intricate composition of plaque, particularly the prevalence of specific bacterial species, has emerged as a key factor intricately linked to the onset and severity of dental caries [9]. Additionally, the intricate interplay of poor oral hygiene practices and the prevalence of xerostomia (dry mouth) significantly contributes to the intricate web of factors influencing the development and progression of both periodontal disease and dental caries [10].

Maintaining oral health ideally involves dental brushing after each meal, yet many individuals opt for brushing only in the morning and evening. Research indicates that the frequency of toothbrushing might not notably impact the prevention of dental caries, with marginal differences observed between infrequent and regular brushers [11]. Moreover, investigating the timing of toothbrushing concerning meals and dietary acid intake revealed that brushing immediately after an acid challenge warrants further exploration [12]. It is noteworthy that toothbrushing behavior may vary based on age, occupation, and geographic location [13]. While the recommendation is to brush after each meal, additional research is essential to comprehensively grasp the optimal timing and frequency of toothbrushing for sustaining oral health.

In the pursuit of optimal oral health, adhering to a precise brushing technique is essential. This involves dedicating a minimum of 2 minutes to brushing, with 30 seconds allocated to each hemiarcada, ensuring comprehensive coverage of the vestibular, oral, and occlusal surfaces of the teeth. Additionally, the tongue should be brushed, and ancillary methods such as mouthwash and dental floss should be incorporated [14]. Also a good practice for oral health is to use toothpaste formulas that have been proven to be highly effective [15].

However, prevailing trends in the general population reveal an average brushing time closer to 45 seconds [16]. Notably, the removal of plaque increases with extended brushing times, with a 180-second duration eliminating 55% more plaque than a 30-second interval.

The use of dentifrice, while a common practice, does not significantly enhance plaque removal during brushing [17].

Ensuring proper toothbrush care is imperative, necessitating replacement every three to four months or sooner if the bristles become frayed [18]. The merits of an increased brushing duration, such as the recommended 2 minutes, extend beyond mere plaque removal, showcasing benefits in fluoride delivery and overall oral health. Alarming statistics indicate that only 25.2% of participants meet the criteria for appropriate brushing habits, underscoring the urgent need for comprehensive oral hygiene education [19]. This highlights the integral role of tooth brushing in effective dental education programs and underscores the multifaceted factors influencing biofilm removal and the risk of carious lesions. Associating oral hygiene practices with a nutritious diet emerges as a key strategy in mitigating this risk.

The impact of smoking habits on dental plaque is noteworthy. Research indicates that the utilization of electronic smoking systems, such as electronic nicotine delivery devices (ENDDs) and vape cigarettes, can influence dental plaque microflora, reducing its resident population and increasing the excretion frequency of opportunistic streptococci like *S. pneumoniae* and *S. pyogenes* [20]. Moreover, smokers may experience alterations in dental plaque characteristics, making it rougher and more susceptible to adhering food debris and germs, thereby facilitating plaque formation [21]. The accumulation of dental plaque, especially on the lower anterior lingual tooth surface, is associated with smoking [22].

While dentists play a role in aiding patients in smoking cessation, their approach to these conversations may face limitations [23]. In the broader context of oral health, the evolution of oral disorders hinges on various factors, encompassing not only dietary and hygiene habits but also the nuanced aspects of patient behaviors. The critical role of dental education programs, implemented early in life and focusing on effective tooth brushing methods, cannot be overstated [24-25]. Achieving optimal oral health requires an understanding of the multifaceted factors influencing biofilm removal, emphasizing the interplay of brushing efficiency, frequency, techniques, tools, and the quality of toothpaste. Furthermore, associating oral hygiene practices with a nutritious diet emerges as a pivotal strategy in reducing the risk of carious lesions.

Aim and objectives

The objective of this research is to determine the most efficient brushing technique for effectively eliminating bacterial plaque, thereby fostering a comprehensive understanding among students. Simultaneously, our investigation encompasses three distinct varieties of dental floss, delving into their effectiveness in eradicating bacterial plaque from the intricate interproximal spaces—areas where conventional brushing may encounter limitations. This exploration not only focuses on the efficacy of plaque removal but also scrutinizes the accuracy of the specifications provided by the manufacturer for each type of dental floss. Through this multifaceted approach, we aim to provide valuable insights that can contribute to the refinement of oral hygiene practices for optimal plaque control and to enhance the education of students.

MATERIAL AND METHODS

The study includes 120 patients between the ages of 15 and 35 following the rules of medical ethics. The 120 patients were divided into 2 groups, group A of non-smokers and group B of smokers in group B. The females, 65 individuals are nonsmokers, constituting 40.00% of the total, while 25 individuals are smokers, representing 20.83%. For males, there are 55 nonsmokers, accounting for 45.83% of the total, and 10 smokers, making up 15.38%.

The percentages are calculated based on the total number of individuals in each gender category.

The patterns in the distribution of smoking habits across genders reckon a closer examination. Among females, a substantial 40.00% proudly identify as nonsmokers, surpassing their male counterparts at 45.83%. This divergence aligns with broader societal norms, where smoking rates typically tread lower within the female demographic. Within the female cohort, a prevailing 40.00% adhere to a non-smoking lifestyle, indicative of a robust trend. Yet, the 20.83% who embrace smoking form a distinct subset, warranting meticulous exploration into the nuanced factors that propel smoking initiation among females. This investigation is pivotal for tailoring interventions and educational programs that precisely target smoking reduction within this demographic. On the male front, the landscape unfolds differently. A higher percentage of males, at 15.38%, proudly wear the smoker's mantle in comparison to their female counterparts. Despite the majority (45.83%) choosing the path of non-smoking, the presence of a notable proportion of male smokers underscores the enduring challenge of tobacco consumption among men. Unraveling the intricate threads that weave into smoking behavior within this male cohort becomes paramount for devising effective strategies aimed at both preventing and curtailing smoking.

In essence, this data not only illuminates the gender-specific nuances of smoking behavior but also underscores the imperative need for tailored public health interventions. Deciphering the multifaceted factors steering smoking habits among both females and males is the cornerstone for crafting targeted initiatives that effectively grapple with the complex challenges entwined with tobacco use in diverse gender groups.

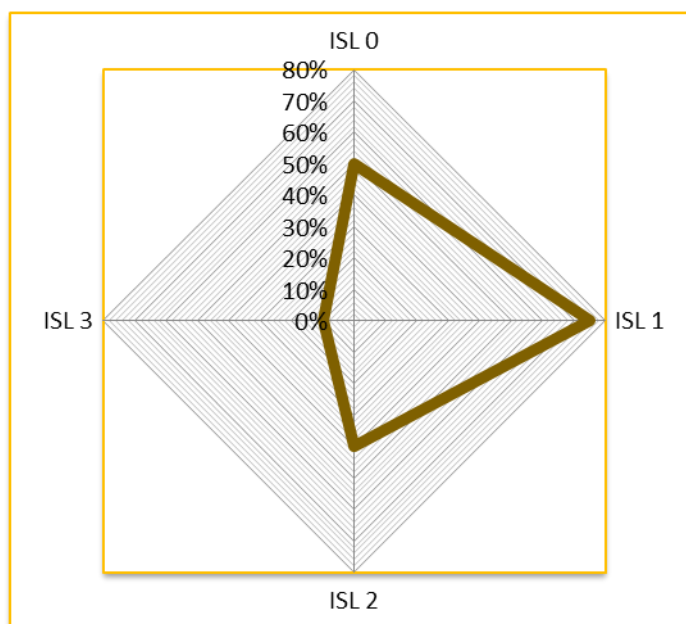


Figure 1. ISL plaque index

Silness and Loe plaque index (ISL) was analysed among individuals included in the study and revealed a multifaceted landscape of oral hygiene. ISL 0 had 23.53% of the individuals in the study which exhibits an optimal oral hygiene status with no visible plaque, a positive indicator, suggesting a noteworthy portion of the population maintains effective plaque control. ISL 1 had the majority of individuals, constituting of 40.00%, which demonstrated the presence of plaque deposits without visible accumulation, suggesting the need for attention to oral hygiene practices, although the plaque is not yet visibly problematic. ISL 2 prevalence was 30.59% exhibiting moderate plaque accumulation,

indicating an intermediate level of oral hygiene, with room for improvement in brushing techniques and overall plaque control. ISL 3 present at 5.88%, representing a smaller segment, presented an abundance of plaque, requiring focused attention and intervention to address the heightened plaque accumulation, as it may contribute to oral health issues if left unaddressed (Fig.1).

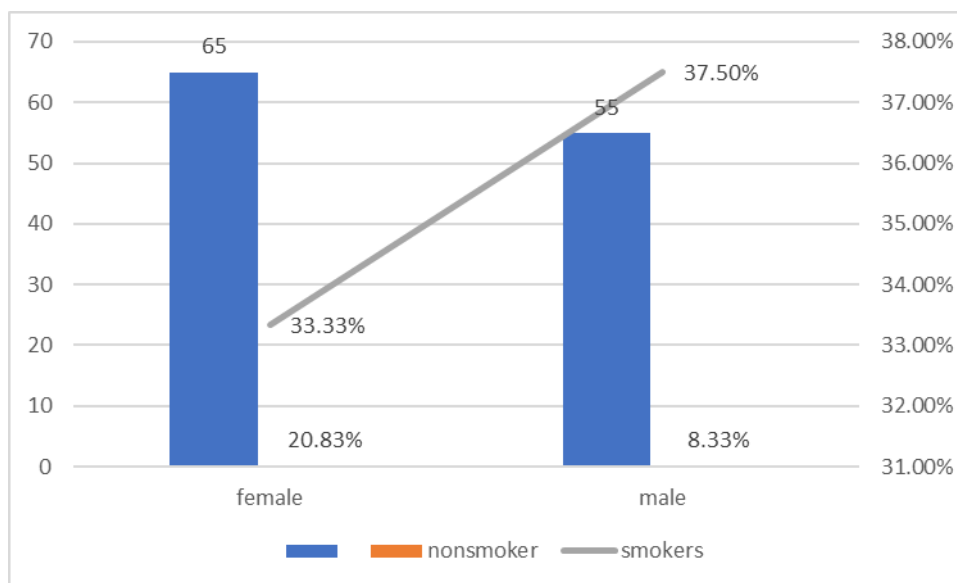


Figure 2. Distribution of smokers and nonsmokers in the group

The Silness and Loe plaque index (ISL) data among nonsmokers and smokers provides insights into the oral health status so that no plaque (ISL 0) had 10 individuals nonsmokers in percent of 28.57% showing a slightly higher percentage than smokers that had a percent of 23.53% consisting in 20 individuals. Smokers have a higher percentage of 40% in category of ISL 1 (plaque only detectable with probe) compared to nonsmokers in percent of 42.86%. In category of ISL 2 (moderate plaque), nonsmokers exhibit a higher percentage (22.86%) in this category compared to smokers (30.59%). Abundance of Plaque (ISL 3) had the smallest proportion in both groups, with nonsmokers at 5.71% and smokers at 5.88%.

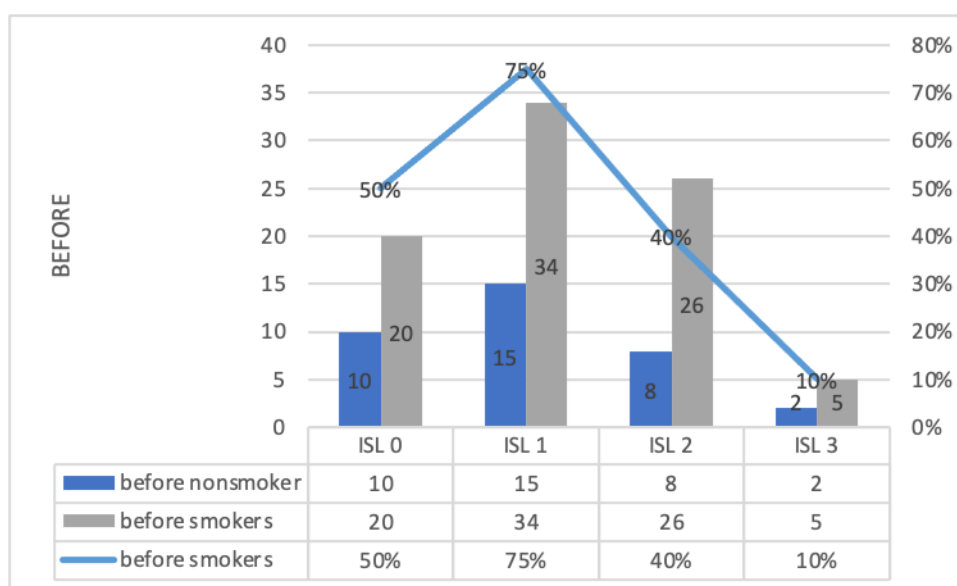


Figure 3. Initial plaque accumulation

Overall plaque accumulation shows that the combined percentages of individuals with plaque (ISL 1, ISL 2, and ISL 3) are 71.43% for nonsmokers and 70.59% for smokers. The difference is minimal, suggesting a comparable prevalence of plaque accumulation in both groups, resulting that the overall prevalence of plaque is relatively similar between nonsmokers and smokers. Both groups showed a considerable percentage for the presence of moderate plaque (ISL 2). This may indicate a common area for improvement in oral hygiene practices for both nonsmokers and smokers. (fig.3)

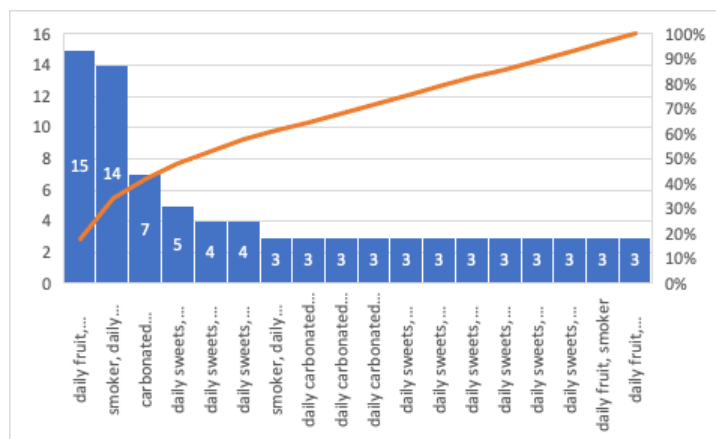


Figure 4. Lifestyle habits

The study included research on specific lifestyle habits for exploring the potential repercussions on oral health. From the 85 people that are smokers, the prevalence of individuals who smoke and consume coffee daily is noteworthy, totaling 14 individuals. This combination raises concerns for heightened oral health issues, given that smoking is a well-established risk factor for periodontal diseases, and when coupled with coffee, known for its staining properties, it could exacerbate dental concerns. A subgroup of individuals who smoke, have daily coffee intake, and engage in frequent alcohol consumption consists of 3 individuals., this combination has been linked to an increased risk of periodontal diseases and other oral health issues, and the interaction among these habits may synergistically impact oral health. The data also indicates a substantial group of individuals of 7, who daily consume carbonated drinks, smoke, and have daily coffee intake which poses a potential triple threat to oral health, as carbonated drinks are associated with dental erosion, smoking is a recognized risk factor for periodontal diseases, and coffee can contribute to staining. Also individuals reporting daily carbonated drinks, snacks between meals, daily fruit consumption, smoking, daily coffee intake, and frequent snacks constitutes a group of 3 individuals, having an impact on oral health, having potential in increasing plaque formation and cavities due to frequent snacking and sugary beverage consumption (Fig.4).

Furthermore, the data highlights that the biggest group of individuals, 15 in number, reported being smokers and daily coffee consumers, underscoring the prevalence of these habits in the studied population, which may have the potential consequences on oral health, as both smoking and excessive coffee consumption can contribute to issues such as tooth staining, gum disease, and compromised overall oral health (Fig.4). In summary, the data emphasizes the necessity for targeted oral health interventions and education, especially among individuals with combinations of habits that may pose higher risks.

For all individuals that were included in the study, an instruction was given for the application of an appropriate brushing technique. Bass's brushing technique was applied. Also the individuals were informed about the harmful effects of smoking alone or in combination with any other bad habits, and how it reflect on oral health.

The results for the Silness and Loe plaque index (ISL) after applying Bass's brushing technique among nonsmokers and smokers reveals important insights into the impact on oral health, so that the number of individuals with no plaque (ISL 0) significantly increased after the intervention. Nonsmokers now have 19 individuals in percent of 63.33%, showing a considerable improvement from the initial 28.57%. Smokers also experienced an increase to 41 individuals (52.50%) from the initial 23.53%. For ISL 1 (Plaque Only Detectable with Probe) both nonsmokers and smokers show a decrease in this category, with 14 individuals (46.67%) among nonsmokers and 37 individuals (47.50%) among smokers. The most substantial decrease is observed in the category of ISL 2 (Moderate Plaque), nonsmokers decreased to 2 individuals (6.67%), and smokers decreased to 7 individuals (9.00%) (Fig.5).

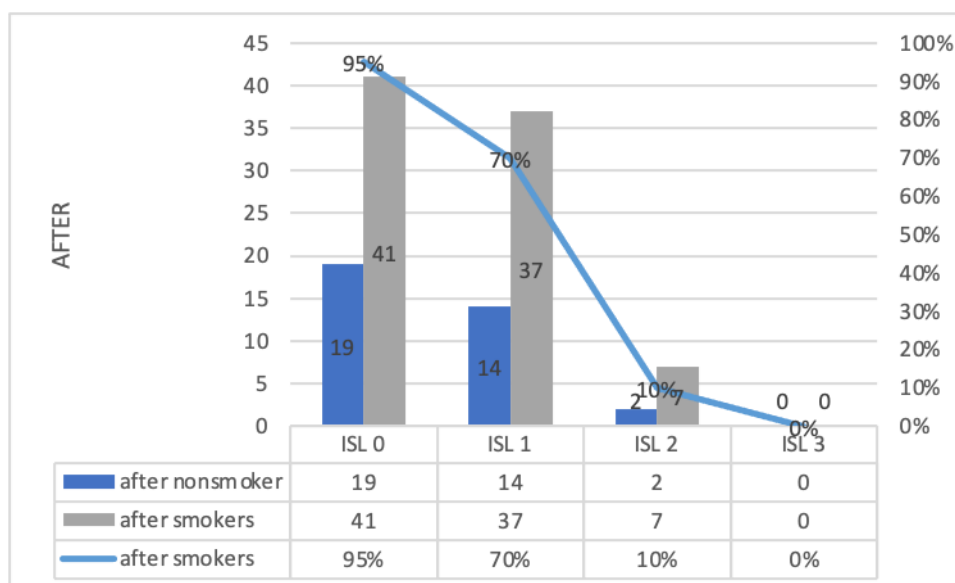


Figure 5. The results after applying good oral habits

After applying Bass's brushing technique, no individuals in either group fall into the ISL 3 category, indicating a successful elimination of abundant plaque in both nonsmokers and smokers. The combined percentages of individuals with plaque (ISL 1, ISL 2) significantly decreased for both nonsmokers (53.33% to 13.33%) and smokers (72.50% to 56.50%) (Fig.5). The data suggests a substantial improvement in oral health for both nonsmokers and smokers after the intervention. The increase in the number of individuals with no plaque and the reduction in moderate plaque suggests the effectiveness of the intervention.

DISCUSSIONS

The data suggests a varied distribution across different ISL categories, indicating diverse oral hygiene statuses within the studied population. The prevalence of ISL 1 suggests a common existence of plaque deposits, emphasizing the importance of regular oral care practices to prevent further accumulation. The presence of individuals in ISL 2 and ISL 3 categories indicates a need for targeted interventions to enhance oral hygiene practices and reduce plaque levels. The significance of regular oral hygiene practices and the potential benefits of tailored interventions to address varying degrees of plaque accumulation among individuals is important

The observed gender-specific smoking patterns have implications for public health initiatives. Tailoring anti-smoking campaigns to address gender-specific motivations and challenges that could enhance their effectiveness. Understanding societal norms and

perceptions surrounding smoking in different genders is crucial for developing targeted interventions that resonate with specific populations.

It's crucial to consider individual factors, such as oral hygiene practices, dietary habits, and other lifestyle factors, to better understand the observed differences in plaque distribution. Targeted oral health education programs could focus on promoting effective plaque removal techniques, without taking into account smoking status. This could include emphasizing the importance of brushing, flossing, and routine dental check-ups.

To gain a deeper understanding, further investigation into the specific oral health behaviours and practices of both nonsmokers and smokers would be beneficial.

CONCLUSIONS

In conclusion, while there are some variations in plaque distribution, the overall prevalence of plaque is comparable between nonsmokers and smokers. This analysis provides a foundation for developing targeted oral health interventions that address common areas of plaque accumulation for both groups.

While there are differences in the starting points, both nonsmokers and smokers show consistent improvement, highlighting the effectiveness of the intervention across different smoking statuses.

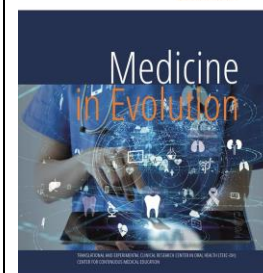
This discussion prompts further exploration into the specific oral health outcomes associated with these diverse lifestyle patterns, ultimately contributing to more personalized and effective oral care.

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Dynamic strategies for mechanical dental plaque removal



Stana O.L.¹, Lile I.E.^{1*}, Freiman P.¹, Vaida L.², Popovici R.A.³, Oalriu I.¹, Stana A.⁴, Marian D.¹, Ilyes I.¹, Berari A.¹, Hosszu T.¹

¹Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania

²Department of Dentistry, Faculty of Medicine and Pharmacy, University of Oradea, Romania

³Department 1, Faculty of Dental Medicine, University of Medicine and Pharmacy "Victor Babeş", Timișoara,

⁴Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania

Correspondence to:

Name: Ioana Elena Lile

Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldis”

Phone: +40 745305221

E-mail address: lile.ioana@uvvg.ro

Abstract

In order to maintain an adequate oral and dental health, oral hygiene is an important factor, and its implementation by appropriate methods and techniques it is imperative for the removal of the bacterial plaque. The removing of the bacterial plaque it is done by mechanical methods, the use of toothpaste and toothbrush must be supplemented by the use of dental floss. In this study, we measure the effectiveness of the use of the toothbrush and the auxiliary means for the toothbrush, in particular we analyzed the dental floss. Thus, the study participants were divided into several groups. Initially the bacterial plaque was revealed, and then they were asked to use several methods of removing the bacterial plaque, either by brushing, using dental floss or using a combination of these. Through the Quigley and Hein plaque index, the final results were evaluated by comparing them with the initial ones and by showing which method is the most efficient. Each of the two bacterial plaque removal techniques provided optimal plaque removal results, but the dental brushing succeeded in removing the dental plaque from the vestibular, oral and occlusal surfaces of the teeth, and the dental flap removed the plaque from the proximal surfaces of the plaque. Although many of our patients use only one of the two methods, especially only brushing without using dental floss, the combination of the two gives the best results, and the practicing dentist should insist on recommending the use of the two methods together.

Keywords: bacterial plaque, dental health, dental floss, toothbrushing, gingivitis

INTRODUCTION

Bacterial plaque-induced gingivitis is a prevalent oral challenge affecting individuals across the lifespan—children, teens, and adults alike. In certain populations, the prevalence of gingivitis in adults can soar to 100% [1][2]. The manifestation of gingivitis runs the gamut, with some experiencing a mild form of inflammation while others contend with a more severe presentation [3]. Intriguingly, the presence of subgingival microorganisms like *C. gingivalis*, *P. intermedia*, and *P. micros* has been discerned in individuals grappling with gingivitis, hinting at their potential role in driving the condition's development and progression [4]. Also, between vitamin D deficiency and gum disease, like gingivitis, has been shown in a study [5]. Nurturing solid oral hygiene practices, involving the faithful ritual of regular brushing and flossing, emerges as a cornerstone in the battle against gingivitis. Yet, the landscape of potential solutions warrants deeper exploration. Research avenues beckon to unravel the efficacy of adjunctive treatments, such as the traditional use of miswak, in elevating periodontal health among those navigating the challenges of gingivitis.

The importance in prevention, early diagnosis, treatment of gingivitis in adults is necessary to prevent the transformation in to advanced periodontal disease. The role of dental plaque in transforming periodontal disease has been emphasized in several studies. the best method is prevention, used for diagnosis and treatment in the early stages. [6]

Prevention can be done by daily by brushing and using dental floss to remove the bacterial plaque before inflammation develops. mechanical brushing remains the primary method for maintaining satisfactory oral hygiene and it is the cheapest method for most people. The toothbrush has been declared for the most effective prevention method that can be used by the patient at home. Mechanical brushing with a toothbrush stands as the foremost and most efficient technique in upholding optimal oral hygiene [7]. This method is not only cost-effective but also easily executable by individuals within the comfort of their homes [8]. Brushing serves the crucial purpose of eradicating bacterial plaque before it can lead to inflammation, thereby diminishing the risk of oral diseases [9].

Furthermore, the utilization of dental floss is strongly advocated to address plaque in interdental areas where the reach of a toothbrush may be less effective. The utilization of dental floss is strongly advocated to address plaque in interdental areas where the reach of a toothbrush may be less effective. Dental floss is the only way to remove interproximal plaque biofilm that can accumulate between teeth [10]. Flossing teeth is usually recommended because toothbrushes do not effectively clean bacterial plaque from interproximal spaces alone [11]. In a study comparing plaque control efficacy, interdental brushes were found to be slightly better in reducing interproximal plaque accumulation in patients with gingivitis compared to dental floss [12]. Another study compared the clinical efficacy for plaque removal between dental floss with soft ellipsoidal knots and conventional floss and found that floss with knots showed similar efficacy to remove plaque, especially among patients with less experience of flossing [13]. The appropriate interproximal cleaning aid, including dental floss, is determined by the ease of use, the size of the interproximal space, and the individual's acceptability and motivation [14]. The adoption of these preventive measures, when integrated into a routine, significantly contributes to the maintenance of robust oral health and acts as a deterrent against the onset of oral diseases.

Dental floss plays a fundamental role in oral hygiene because it removes the plaque between the tooth and under the gingival areas where it cannot be reached but the brush; these are the areas of the tooth where the carious process and periodontal disease begin. Dental floss serves a critical role in upholding oral hygiene by adeptly eliminating plaque from regions inaccessible to a toothbrush, particularly between teeth and beneath the gums—

where the onset of caries and periodontal disease may initiate [15] [16]. The design of dental floss represents a domain warranting further investigation, given its relatively limited exploration [17]. Distinct types of dental floss exhibit diverse morphological properties and performance characteristics, underscoring the need to grasp these nuances before suggesting a specific variant to patients [18]. Moreover, the landscape of dental floss has witnessed innovative strides. Notable among these is a dental floss designed to integrate seamlessly with other dental hygiene devices, offering users a comprehensive suite of oral hygiene solutions [19]. Another inventive development involves a specialized dental floss device crafted to simplify and enhance the cleaning of interdental gaps, thereby improving cleaning efficacy while saving time and effort. This underscores the dynamic evolution of oral care technologies, enhancing traditional oral hygiene practices.

Effective removal of interproximal plaque is pivotal for upholding gingival and preventive health. Research indicates that gingival inflammation can manifest within a span of 10-21 days if subgingival dental plaque remains on the tooth surface [20]. Plaque prevention emerges as a potent strategy for both treating and preventing periodontal diseases, positioning it as a vital element in the primary management of gingival and periodontal conditions [21]. Diverse devices and techniques, such as the evidence-backed Bass intrasulcular technique of toothbrushing, and the application of dental floss or dental tape, have demonstrated effectiveness in plaque removal [22]. Moreover, the utilization of mouthwashes, such as extracts from *Mimusops elengi* and Chlorhexidine, has proven effective in chemical plaque control and the treatment of gingivitis [23]. In essence, the maintenance of proper oral hygiene practices, including the regular elimination of interproximal plaque, stands as a fundamental prerequisite for preserving gingival and preventive health.

While most toothbrushes are not inherently designed to effectively tackle interproximal plaque, necessitating the use of supplementary products like dental floss [24], there have been notable strides in toothbrush design aimed at enhancing plaque removal. Research indicates that toothbrushes with smaller head sizes, reduced filament diameters, larger cutting heights, softer filaments, and greater interdental-height differences prove more efficacious in plaque removal [25]. Additionally, interdental brushes have shown a slight edge over dental floss in reducing interproximal plaque accumulation, particularly in patients with gingivitis [26]. Short-headed toothbrushes boasting a higher bristle count have demonstrated comparable efficacy to conventional toothbrushes, with the added benefit of being preferred by subjects [27]. Moreover, rotating-type interdental toothbrushes have exhibited a commendable plaque elimination rate even with fewer reciprocal movements [28]. These findings underscore the existence of toothbrush options specifically engineered to effectively address interproximal plaque, potentially lessening the reliance on dental floss.

Aim and objectives

This study is focused on delving into and tackling the challenges within traditional toothbrush design concerning the efficient elimination of interproximal plaque. This often results in depending on additional products like dental floss. Our goals encompass scrutinizing toothbrush design inadequacies, investigating auxiliary plaque removal products, contrasting the effectiveness of diverse plaque removal tools, exploring patient preferences and adherence, and putting forth suggestions for achieving optimal plaque removal. The research strives to emphasize the importance of proficient interproximal plaque elimination for sustaining gingival and preventive health. In essence, the study aspires to provide valuable perceptions that can guide enhancements in oral hygiene practices and refine strategies for plaque elimination.

MATERIAL AND METHODS

The primary aim of this investigation is to conduct a comparative analysis of the eradication of bacterial plaque through the utilization of a toothbrush and a dental floss. The aforementioned study was carried out within the premises of the Aurel Vlaicu Polyclinic, encompassing the active participation of a total of 28 students. These students comprised both males and females, falling within the age range of 20 to 30 years.

To ensure equitable distribution, the 28 students were divided into three groups, with two groups consisting of 9 individuals each, and one group encompassing 10 students (fig.1).

Within this research endeavour, the Quigley Hein dental plaque index method was employed for the evaluation of plaque.

This particular assessment method entails assigning a score ranging from 0 to 5 to each non-stored surface of the teeth, excluding the third molars. A score of 0 is designated when no visual traces of plaque are present, while a score of 1 is assigned when separate sections of plaque are observed. Furthermore, a score of 2 is given when a uniform amount of plaque, less than 1mm in thickness, is detected on the tooth. In cases where a band of plaque wider than 1mm is present, but covers less than one-third of the tooth's crown, a score of 3 is recorded. Similarly, if the plaque covers at least one-third but less than two-thirds of the crown, a score of 4 is assigned. Lastly, if the plaque covers two-thirds or more of the crown, a score of 5 is allotted.

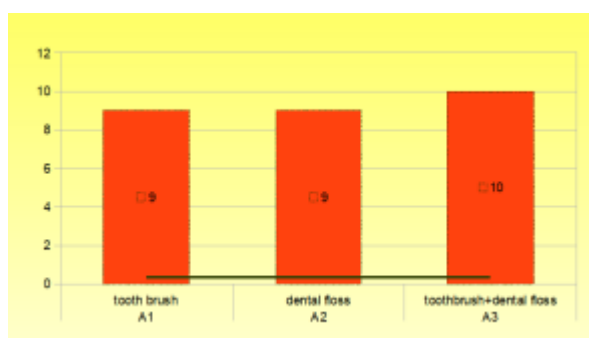


Figure 1. The groups included in the study

RESULTS

The initial group exclusively used the toothbrush, while the subsequent group solely utilized the dental floss, and the ultimate group was instructed to utilize both. The materials employed in this investigation included the toothbrush, dental floss, and erythrosine, which served as a plaque detector, enabling a macroscopic estimation of the quantity of residual plaque present on the teeth (fig. 1).

Following the consumption of a complete breakfast, each respective group was directed to adhere to the subsequent procedure: the initial group employed solely the toothbrush, the second group employed solely a dental floss, and the last group was instructed to employ both. In order to facilitate the analysis of the outcomes, the initial group was denoted as A1, the second group as A2, and the third group as A3.

The initial group, denoted as A1, successfully eliminated bacterial plaque residues in two-thirds of the teeth (Quigley index = 3). In actuality, as depicted in the illustration, residual plaque can still be observed in the interproximal region of the tooth (fig. 2).



Figure 2. Residual plaque observed in the interproximal region

The second group, by means of employing dental floss, successfully eradicated the remnants of bacterial plaques in the three inferior regions, specifically in the gingival toothbrush alongside the auxiliary tools and interproximal areas. However, it is evident that they were unable to cleanse the dental plaque on the oral, lingual/palatal, and occlusal surfaces through tooth brushing, particularly with the use of dental floss (fig. 3).



Figure 3. Quigley Hein dental plaque index = 4

The dental plaque was successfully eliminated in a satisfactory manner by the third group. They achieved complete removal of the bacterial plaque from all tooth surfaces. The Quigley index recorded a value of 0 (fig. 4).



Figure 4. Quigley Hein dental plaque index = 0

The initial group successfully eradicated 60% of the plaque, whereas the second group managed to eliminate merely 30-40%. Conversely, the third group achieved a removal rate of approximately 90% of the bacterial plaque. It is noteworthy that a significant proportion of

adults, approximately 75%, suffer from gingivitis due to the misconception that using a toothbrush alone can eliminate all bacterial plaque. This study demonstrates that the sole means of effectively eliminating a substantial quantity of plaque, exceeding 90%, is to combine the utilization of a specific method.

DISCUSSIONS

The findings of this study demonstrate distinct outcomes based on the oral hygiene means of removing bacterial plaque employed by different groups. Here is a summary of the results:

Group A1 that exclusive used the Toothbrush effectively eliminated bacterial plaque residues in approximately two-thirds of the teeth. The Quigley index yielded a value of 3, indicating satisfactory removal in the majority of regions. Residual plaque was still evident in the interproximal region of the tooth.

Group A2 that exclusive used the dental floss successfully eradicated bacterial plaque remnants in the three lower regions, specifically in the gingival, toothbrush-accessible areas, and interproximal zones. Unable to cleanse dental plaque on the oral, lingual/palatal, and occlusal surfaces through tooth brushing, particularly when dental floss was employed. The Quigley index recorded a value of 4, signifying incomplete removal in specific facial and surface areas.

Group A3 that used simultaneous the toothbrush and dental floss achieved complete removal of bacterial plaque from all tooth surfaces. The Quigley index recorded a value of 0, indicating optimal cleanliness with no observable plaque residues.

In conclusion, the combined utilization of both a toothbrush with a dental floss in group A3 proved to be the most efficacious technique, leading to complete plaque removal from all tooth surfaces. The individuals that used either a toothbrush or dental floss exhibited limitations in accessing specific areas, thus underscoring the significance of a comprehensive approach to oral hygiene.

This study highlights several important aspects that significantly improve our understanding of oral hygiene practices. In the combined use of toothbrush toothpaste and interdental floss as used by group 3 in the present study, this combination was shown to be the best in terms of plaque removal from all dental surfaces. Some studies show that the use of tooth brushing but also the application of correct techniques for removing bacterial plaque is effective in maintaining a proper oral health condition [29-30]. The importance of adopting a comprehensive technique of an oral hygiene routine is also emphasized by an improved strategy of plaque removal.

The exclusive use of toothpaste and toothbrush as used by group A1 or the exclusive use of interdental floss as used by group A2 shows certain limitations in removing plaque from certain areas which causes plaque to remain on certain tooth surfaces. This highlights the fact that limited use of plaque removers rather than their full use results in insufficient plaque removal.

New avenues of research in this regard are opened by this study in order to improve and optimize oral hygiene practices. Further studies should also be done to bring innovations and improve oral hygiene practices supporting proper plaque removal.

CONCLUSIONS

In conclusion, this study shows us and emphasizes the fact that a combined use of the means to remove bacterial plaque (paste and toothbrush and interdental floss) have clearly superior effects than the use of one alone. The individualization of plaque removal techniques

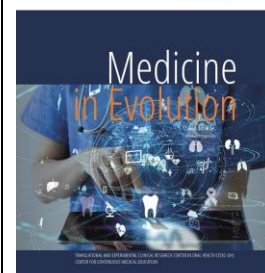
emphasizes the complexity of plaque removal strategies, emphasizing the need to approach complex strategies. The third group managed to remove about 90% of the bacterial plaque. Most adults suffer from gingivitis because they believe that using the toothbrush can remove all the bacterial plaque. As this study shows, the only way to remove an adequate amount of plaque, or more than 90%, is to combine the various methods of removing bacterial plaque.

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Preclinical evidence on the potential of silibinin in liver cancer therapy



Geamantan A.^{1,2}, Marcovici I.^{1,2}, Macasoi I.^{1,2}, Dehelean C.^{1,2}

¹Faculty of Pharmacy, "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania.

²Research Center for Pharmaco-Toxicological Evaluations, Faculty of Pharmacy, "Victor Babes" University of Medicine and Pharmacy, Timisoara, Romania

Correspondence to:

Name: Geamantan Andreea

Address: Eftimie Murgu Square No. 2, 300041 Timisoara, Romania

Phone: +40 767781047

E-mail address: andreea.geamantan@umft.ro

Abstract

Liver cancer is a public health problem worldwide, hepatocellular carcinoma (HCC) constituting 90% of cases. Although research is in continuous development, the prognosis of this type of cancer remains unfavorable, as selective treatments with low toxicity are necessary. Silibinin is a flavonoid recognized for its hepatoprotective effect, antioxidant and anti-inflammatory properties, and also for its proven effectiveness in cancer treatment when administered individually or in association with conventional therapies.

Keywords: silibinin, liver cancer, synergism, cancer cell lines

INTRODUCTION

Liver cancer is a global public health problem and hepatocellular carcinoma (HCC) constitutes the majority of cases. Advances and research in the medical-pharmaceutical field are continually developing, but the prognosis for this type of cancer remains unfavourable for many patients. The mechanisms of hepatocarcinogenesis are varied and quite complex, but fibrosis is known to be the precancerous stage of HCC, thus approximately 80% of HCC develops in fibrotic or cirrhotic liver [1]. Current treatments for liver cancer depend largely on the specific stage and type of neoplasm, and include surgeries - for HCC the most effective is liver resection; radiotherapy - with poor results because the liver's tolerance to radiation is low; and chemotherapy - involving doxorubicin, 5-fluorouracil and other agents [2]. However, cancers are progressing rapidly and resistance to treatment is increasingly common, and more and more therapeutic alternatives are needed. In addition, adverse reactions and toxicity of conventional therapies are common and often unbearable for the patient. For this, natural compounds are an alternative due to their lower adverse reactions, silibinin being a compound with many biological properties that can be considered as an agent with therapeutic potential. Silibinin is extracted from the seeds of the milk thistle plant (*Silybum marianum*), is part of the flavonolignan class, known for its hepatoprotective, antioxidant properties and currently intensively researched for its anticancer benefits through various mechanisms of action. In several studies, silibinin has been proven effective against several types of cancers including liver, prostate, skin, breast, colon, lung and bladder cancers. The prevention and efficacy exhibited by silibinin on cancer types has been explored using either in vivo studies in rodents or in vitro experimental models such as different cell cultures, the anticancer activity of this compound being mainly related to its ability to induce cell cycle arrest and/or apoptosis [3].

Aim and objectives

This review aims to highlight the most recent advances made concerning the efficacy of silibinin in liver cancer treatment, administered both individually, and in combination with traditional chemotherapeutic drugs.

IMPACT OF SILIBININ IN PRECLINICAL EXPERIMENTAL MODELS ON LIVER CANCER

POTENTIAL OF SILIBININ IN LIVER CANCER

According to studies in the literature, silibinin is a phytochemical that has multiple actions on HCC, which derive from its ability to trigger apoptosis and cell cycle arrest, inhibit angiogenesis, reduce cell proliferation and metastasis, and exert antioxidant and anti-inflammatory effects. The activity of silibinin on HCC has been studied in several cell lines showing an effect of interest to researchers. Niki Vakili Zahir and associates evaluated the compound in vitro on the HepG2 (Human hepatocarcinoma cell line) and HUVEC (human umbilical vein endothelial cell line) cell lines. Silibinin cytotoxicity was significant on the HepG2 cell line, while for HUVEC cell viability reached 25% even after administration of the highest concentration of 200 µg/mL. Cytotoxicity was also dose and time dependent. In the same study, the types of cell death involved were investigated, for HepG2 cells apoptosis was evidenced by microscopic fluorescence while for the HUVEC line necrosis was reported [4]. In another evaluation conducted by Varghese et. al, the impact of silibinin on cell growth, viability, apoptosis and cell cycle progression was investigated on two HCC cell lines, HepG2 and Hep3B. The results obtained reported that both cell lines were inhibited by silibinin, with

the effect being particularly strongest observed on the Hep3B cell line, associated with the induction of cell death by apoptosis. In addition, the compound of interest caused G1 arrest in HepG2 cells, and both G1 and G2-M arrest in for Hep3B cells [5]. Also other studies have noted the antiproliferative effect of silibinin on the HepG2 cell line. Therefore, at concentrations of 0-250 µg/mL, cell viability gradually decreased, with the strongest effect at the highest dose used. When silibinin was tested on normal rat hepatocytes, at concentrations of 125 µg/mL the compound induced very weak cytotoxicity, which slightly increased at higher concentrations [6]. Wei Cui and collaborators studied the impact of silibinin on nude mice bearing HuH7 xenografts. The results demonstrated that silibinin inhibits cell proliferation, cell cycle progression and PTEN/P-Akt and ERK signaling, and also can induce apoptosis-associated inhibition of survivin phosphorylation, these effects leading to a dose-dependent reduction of HCC xenograft growth [7]. John J Lah and associates demonstrated on multiple cell lines that silibinin significantly reduced the growth of human hepatoma cells (i.e., HuH7, HepG2, Hep3B and PLC/PRF/5). Cell growth reduction for HuH7 was associated with significant up-regulation of p21/CDK4 and p27/CDK4, induction of apoptosis correlated with down-regulated survivin and upregulated caspase-3 and -9 [8].

The *in vitro* results of silibinin in various cancer cell lines are promising and of interest to the oncology field, thus making the compound the focus of attention for many researchers and thus pointing to further studies needed for a clinical approach to the compound.

USE OF SILIBININ IN LIVER CANCER THERAPY IN COMBINATION WITH CONVENTIONAL THERAPIES

Due to the high resistance of HCC to treatments and its frequency, ranking third worldwide in terms of mortality, researchers have also turned their attention to the association between herbal agents and current conventional therapies. Li et al evaluated the combination of doxorubicin, an anthracycline chemotherapeutic extensively used in oncology, and silibinin, a non-toxic phytotherapeutic agent, on orthotopic rat models of HCC. Silibinin associated with doxorubicin showed a synergistic effect, inducing cell proliferation inhibition, G2-M arrest and apoptosis in HepG2 cells. In addition, simultaneous treatment with the two compounds showed an approximately 40% increase in apoptotic cell death, which was 3-fold greater than the action of the compounds individually [9]. Essential oils of *Silybum marianum* have been investigated in combination with 5-fluorouracil (5-FU) in HCC both *in vivo* and *in vitro*. Each preparation resulted in decreased H22 cell viability compared to controls. *S. Marianum* essential oils alone or in combination with 5-FU reduced cell invasion and migration, and angiogenesis-related proteins were significantly reduced both *in vivo* and *in vitro*. Furthermore, each treatment increased phospho-NF-κB (p65) and NF-κB (p65) protein levels. The results showed that this combination of *S. Marianum* and 5-FU prolonged survival in a mouse model of HCC compared to treatments administered individually [10]. Silibinin was in another study evaluated in combination with sorafenib, a kinase inhibitor drug approved for the treatment of advanced primary liver cancer. Results showed that silibinin combined with sorafenib induced cell death through apoptosis and potently inhibited the proliferation of HCC cell lines. It was also found that this combination inhibited the formation and the self-renewal of HCC stem cells by down-regulating the expression of stemness-related proteins such as the Homeobox NANOG protein. The study demonstrated that silibinin improves the efficacy and potency of sorafenib in therapy [11]. Considering that current treatments require improvement in all cancers, silibinin has been tested in combination with different chemotherapeutics in several cancers. Combination therapy is becoming recognised for the fact that the use of cytotoxic agents together with natural chemopreventive agents have different mechanisms of action with non-overlapping toxicity, the latter generally showing much lower toxic effects.

DISCUSSIONS

Liver cancer is currently a health challenge, with its incidence increasing worldwide. It is estimated that by 2025 more than 1 million people will be affected by this type of cancer. HCC is the most common form, with hepatitis B virus infection being the most important risk factor for the development of HCC [12]. Current therapies need improvement as resistance to treatments is increasing. In addition, the need for compounds with increased selectivity and low toxicity is imperative. Silybinin is the main compound in silymarin, and is recognised to have beneficial biological activities in several areas of health. Its beneficial effects have also been recognized in diseases such as Alzheimer's and epilepsy, as well as in cardiovascular diseases [13–15]. In recent decades, attention has also focused on the impact of silibinin in liver cancer. It is recognized and has been shown in numerous experimental studies to have antitumor effects imprinted by apoptosis induction, cell cycle arrest, angiogenesis inhibition, antioxidant and anti-inflammatory properties; basic properties in terms of the compound's mechanism and activity in cancers. Used individually, silibinin produced reduced cell proliferation on various cell lines, decreasing cell viability of tumour cells [4,5]. The exploration of the potential use of flavonoids has driven research into its use in combination with conventional therapies with known chemotherapeutic agents used in clinical practice. Sorafenib, doxorubicin, 5-fluorouracil or cisplatin are chemotherapeutic compounds with which silibinin had a synergistic effect, potentiating their activity against liver cancer [9,10,16]. Both used individually and in combination with agents recognized in currently used therapies, silibinin has proven efficacy in different forms of cancer.

CONCLUSIONS

Silibinin, already recognized in many studies for its antioxidant and anti-inflammatory properties, has demonstrated its effectiveness on liver cancers through multiple results obtained in preclinical experiments. The need for compounds with selectivity and limited toxicity, propels silibinin to future studies due to its therapeutic potential. Further research of this compound, both individually and in association with chemotherapy drugs is necessary for the complete understanding of all the mechanisms underlying the observed anti-tumor actions.

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The journal publishes general reviews, studies and clinical, epidemiological, experimental and laboratory research, clinical case presentation, papers from the history of medicine, reviews, scientific and technical state-of-the-art articles, medical informations and opinions. Only papers which have not been published or sent for publishing in other journals are accepted. The authors are responsible for the opinions expressed in the papers. *The paper must be edited both in Romanian and in English; the English version will be supervised by our collaborator Dana Brehar-Cioflec, MD, PhD; typed on white A₄ paper and on CD, DVD or Memory Stick.*

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Original studies must include a structured abstract of maximum 150 words, containing the following titles and informations: Aim and objectives; Material and methods; Results; Conclusions; Key words: give 3-5 key words; The abstract will be translated into an international circulation language.

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RESULTS [Book Antiqua, 11, bold, left alignment]

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Organize conclusions which emerge from the study. In the end state: a) contributions to be acknowledged but which do not justify paternity right; b) thanks for technical support;

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The content of a case report must be divided into three parts:

Introduction - It must include a maximum of 15 typed rows (half page). Here, the main medical problem is summarized in order to place the case in a specific domain.

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