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THE INFLUENCE OF ORAL HYGIENE AND DIETARY HABITS ON THE SUCCESS OF THE BLEACHING OF ENDODONTICALLY TREATED TEETH

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Abstract: Introduction: In the tooth bleaching process, the primary focus is often placed on selecting an adequate bleaching technique and optimal agent concentration, while the significance of daily oral hygiene during and after the bleaching treatment is frequently underestimated. The quality of oral hygiene, along with the dietary habits of patients, plays a significant role in the success and long-term stability of the achieved tooth color. This study aimed to investigate the influence of oral hygiene, smoking, and the consumption of colored beverages on the success of bleaching endodontically treated teeth.
Materials and methods: The study included 30 endodontically treated teeth. In the first group, teeth were bleached using the walking bleach technique (10 teeth); in the second group, the in-office technique was used (10 teeth); and in the third group, teeth were bleached with a combined technique (10 teeth). Bleaching was performed using 30% carbamide peroxide and 35% hydrogen peroxide. All teeth were restored with the nanohybrid composite material Tetric EvoCeram (Ivoclar, Liechtenstein). Based on oral hygiene and dietary habits, patients were classified as having good/moderate/poor oral hygiene, as smokers/non-smokers, and as consumers/non-consumers of colored beverages. Before and after the bleaching treatment, the color of all teeth was determined using the Vita Classic shade guide. For statistical analysis, bleached teeth were analyzed based on the scale from the study by Ari et al.
Results: Based on Fisher's exact test results, a statistically significant difference ($p<0.05$) in bleaching success was established among teeth with good, moderate, and poor oral hygiene. However, no statistically significant difference was found between smokers and non-smokers, or between consumers and non-consumers of colored beverages.
Conclusion: The effectiveness of non-vital tooth bleaching is affected by the oral hygiene of the patients. However, smoking and colored beverage consumption had no impact on the success of the bleaching process.

Keywords: carbamide peroxide, hydrogen peroxide, oral hygiene, smoking, colored beverages, nanohybrid composite

1. INTRODUCTION

Effective oral hygiene practices are fundamental to maintaining oral health, representing a key factor in preventing and treating various dental conditions. Individual oral hygiene is influenced by numerous factors, including patient motivation and knowledge of proper dental hygiene [1]. Socioeconomic status, psycho-emotional state of the patient, and demographic characteristics like age and gender significantly influence the level of motivation [1-3]. Beyond health benefits, the desire for an aesthetically pleasing smile increasingly serves as a strong motivator for maintaining oral hygiene [1, 4-6].

In modern dentistry, aesthetic aspects have gained prominence, placing tooth color at the center of smile perception. As a result, tooth bleaching has emerged as a highly favored dental procedure [7-10]. Successful bleaching of endodontically treated teeth requires a precise and careful approach to achieve desired aesthetic results without compromising the structural integrity of the tooth [7-9]. The bleaching process for non-vital teeth primarily relies on hydrogen peroxide and carbamide peroxide, applied in substantial concentrations. Hydrogen peroxide is a strong oxidizing agent that directly decomposes into water and free oxygen radicals, which are responsible for the bleaching process. Oxygen radicals permeate the porous structures of enamel and dentin, engaging with the organic molecules that cause tooth discoloration. These radicals proceed to chemically break down the intricate, long-chain pigments, converting them into smaller, colorless molecular units. This process reduces light absorption within the tooth, consequently enhancing its brightness. When carbamide peroxide encounters water, it converts into hydrogen peroxide, which acts as the main bleaching agent, simultaneously releasing ammonia, carbon dioxide, and urea. Urea contributes to a mild alkaline environment, assisting in pH balance and potentially moderating any undesirable effects of hydrogen peroxide [7-10].

During the bleaching process, the attention is mostly paid to selecting the optimal concentration of the agent and the adequate bleaching technique, while the importance of daily oral hygiene during and after the bleaching treatment is often underestimated [11-13]. The quality of oral hygiene, along with patient hygiene-dietary habits such as smoking and consuming colored beverages, plays a significant role in the immediate success and long-term stability of the achieved tooth color. Although internal bleaching effectively removes intrinsic discolorations, the external tooth surface remains susceptible to pigment resorption from the external environment [14].

In patients with good oral hygiene, chromogenic substances are less likely to adhere to clean and smooth tooth surfaces. Conversely, poor oral hygiene leads to the formation of soft and hard deposits, which provide an ideal substrate for the adhesion of pigments from food, cigarettes, and colored beverages. Cigarettes are one of the most potent sources of exogenous pigments that can drastically compromise bleaching results. They contain tar and nicotine, powerful dark-colored chromogenic substances that bind firmly to the enamel and dentin surfaces, causing stubborn dark stains [15]. These stains can form quickly, even on freshly bleached surfaces, significantly reducing the achieved tooth brightness. Long-term exposure to tobacco smoke can also lead to microscopic changes in the enamel structure, making it more porous and susceptible to pigment absorption [16]. Coffee and tea are beverages rich in tannins and chromogens that easily bind to the tooth surface. Red wine contains anthocyanins, exceptionally strong pigments, as well as tannins and acids that can weaken enamel and facilitate the binding of pigmenting substances to the tooth surface. Regular consumption of these substances can quickly lead to re-darkening of teeth, reducing bleaching efficacy [11, 13].

The objective of this study was to investigate the influence of oral hygiene and the consumption of cigarettes and colored beverages on the success of bleaching endodontically treated teeth.

2. MATERIALS AND METHODS

The research was conducted at the Faculty of Medicine, University of Banja Luka, Dentistry study program. All patients included in the study signed informed consent, having been thoroughly informed about the therapy itself, potential failure, and possible side effects. Patients were selected based on the presence of discolorations on non-vital and endodontically treated teeth. The study included 30 endodontically treated teeth from 26 healthy patients. One patient had three teeth bleached, two patients had two teeth each bleached, and 23 patients had one tooth bleached.

Inclusion criteria included patients of both sexes with good systemic and oral health, aged between 18 and 50 years, who voluntarily agreed to participate in the study and had at least one discolored non-vital incisor, canine, or premolar. The color of the discolored tooth had to be darker than A2 according to the Vita Classical shade guide. Exclusion criteria included pain, advanced periodontal disease, bone resorption, teeth with extensive carious lesions or large restorations that could not be conservatively reconstructed, periapical lesions, systemic diseases, pregnancy, lactation, orthodontic treatment, orofacial tumors, dental trauma or malformations, as well as moderate to severe fluorosis and tetracycline discoloration.

All patients who were smokers or consumed colored beverages were advised to quit smoking or reduce smoking and consumption of coffee, colored sodas, and red wine during the bleaching procedure. They were also advised not to smoke or consume colored beverages 30 minutes after the bleaching procedure.

2.1. Sample size calculation

A power analysis was conducted for repeated measures using the Wilcoxon test. The output parameters were: non-central parameter δ=2.57; critical value t=1.71; degrees of freedom Df=25.32; total sample size n=24; and actual power Ap=0.8. This study initially included eight cases per group, totaling 24 cases. To compensate for a dropout rate of approximately 15%-20%, the required total sample size for this study was 30 cases. Sample size calculation was performed using G*Power® Version 3.1.9.7 software.

2.2. Independent variables and patient categorization

The analysis of bleaching results was based on the patients' hygiene and dietary habits, including oral hygiene maintenance, smoking, and consumption of colored beverages. Results were also analyzed with respect to the applied bleaching technique and the agent used.

Patients were categorized into three distinct oral hygiene groups based on their clinical status: good oral hygiene (characterized by an absence of dental plaque, calculus, or gingivitis), moderate oral hygiene (presence of dental plaque, but without calculus and/or gingivitis), and poor oral hygiene (dental plaque, calculus, and gingivitis all present).

According to oral hygiene and dietary habits, patients were classified as:

- Patients with good/moderate/poor oral hygiene
- Smokers/non-smokers
- Consumers/non-consumers of colored beverages

The teeth were classified based on the bleaching approach employed: in-office, walking bleach, or combined methods, enabling further analysis. Based on the bleaching agent, teeth were divided into those treated with 30% carbamide peroxide and 35% hydrogen peroxide. The results of bleaching with respect to the patients' oral hygiene and dietary habits are presented for the entire sample.

2.3. Tooth preparation before bleaching

All patients underwent a clinical examination. Periapical radiographs were taken to verify the quality of root canal obturation. If inadequate obturation was observed on the radiograph, endodontic retreatment of the obturation was performed. For discolored non-vital teeth without previous endodontic treatment, endodontic treatment and definitive root canal obturation were carried out. Endodontic treatment included access cavity preparation, trepanation, odontometry, chemomechanical preparation of root canals with expanders and files (Kerr, Orange, CA, USA), and irrigants such as sodium hypochlorite (Patenting, Belgrade, Serbia), EDTA (Ultradent, USA), and physiological saline solution (Hemofarm, Serbia). Definitive obturation of the teeth was performed using gutta-percha points (Spident, Korea) and AH Plus resin-based paste (Dentsply Sirona, USA), employing the cold lateral condensation technique. Before initiating the bleaching procedure, two millimeters of the obturation material were removed from the canal at the cemento-enamel junction. Subsequently, the canal entrance was safeguarded with a glass-ionomer cement liner (Alfagal Base, Galenika, Serbia) to prevent penetration of bleaching agents into the endodontium or periapical damage, as well as penetration of endo sealer into the cervical part of the tooth.

2.4. Experimental procedure

Before initiating the bleaching treatment, the current shade of all teeth was determined using the Vita Classic shade guide (Vita Classic, Lumin Vacuum Shade Guide, Vita Zahnfabrik, Germany). The procedure was performed during the day under natural light. The tooth shade was determined by three dentists, and the shade agreed upon by at least two therapists was recorded.

In this investigation, bleaching agents were utilized at two varying concentrations: 35% hydrogen peroxide (Opalescence Endo 35%, Ultradent, USA) and 30% carbamide peroxide (VivaStyle 30%, Ivoclar, Liechtenstein). Depending on the bleaching technique, teeth were divided into three groups: walking bleach technique (10 patients), in-office technique (10 patients), and combined technique (10 patients). Teeth were selected by random choice.

For the walking bleach technique, an access cavity was prepared on the oral surface of ten teeth. 30% carbamide peroxide (VivaStyle 30%, Ivoclar Vivadent, Liechtenstein) was applied to the pulp chamber of five teeth, while 35% hydrogen peroxide (Opalescence Endo 35%, Ultradent, USA) was applied to the remaining five teeth. Following this, teeth were temporarily sealed with glass-ionomer cement (Fuji IX, GC, Japan), awaiting the subsequent treatment session.

For in-office bleaching, simultaneous external and internal tooth bleaching was performed. Before the treatment, the gingiva and soft tissues were protected with OpalDam (Ultradent, USA). On half of the teeth, 30% carbamide peroxide (VivaStyle 30%, Ivoclar Vivadent, Liechtenstein) was applied, while on the remaining five teeth, 35% hydrogen peroxide (Opalescence Endo 35%, Ultradent, USA) was applied. The bleaching agent was placed on both the vestibular surface of the tooth and in the tooth cavity for 15 minutes. Following the removal of the bleaching agent, a dry cotton pellet was inserted into the cavity, and the tooth was then temporarily sealed using FUJI IX (GC, Japan) until the subsequent session.

The combined bleaching technique involved the simultaneous application of the walking bleach technique and in-office bleaching. On the vestibular surface of five teeth, 30% carbamide peroxide (VivaStyle 30%, Ivoclar Vivadent, Liechtenstein) was applied, while on the remaining five teeth, 35% hydrogen peroxide (Opalescence Endo 35%, Ultradent, USA) was applied for 15 minutes. After the external bleaching was completed, the same agent was applied to the cavity formed on the oral surface of the tooth and left to react. The cavity was temporarily sealed, and a new bleaching procedure was performed four days later.

The bleaching procedure was repeated for all patients until the desired results were achieved or until the tooth color stopped changing after two consecutive treatments. The desired color was the color of the adjacent tooth, which we aimed to achieve through the bleaching process.

Upon completion of the treatment, a calcium hydroxide paste (Calyx, VOCO praeparate, Germany) was placed in the chamber of each bleached tooth for 14 days to neutralize the acidic environment and prevent root resorption. A nanohybrid composite restorative material, Tetric EvoCeram (Ivoclar, Liechtenstein), was used for the definitive restoration of the cavities.

After the completion of the bleaching process for all teeth, a new shade was determined based on the Vita shade guide. The shade agreed upon by at least two dentists was recorded. The analysis of statistical data for bleached teeth was performed using a modified scale adapted from Ari et al.'s study [8, 17]:

0 – the tooth was not bleached,

1 – the tooth was insufficiently bleached,

2 – the tooth was bleached, but the desired color was not achieved,

3 – the tooth was successfully bleached, and the desired color was achieved.

2.5. Statistical Analysis

The statistical analysis was performed using JASP 0.15.0.0. For categorical variables, Fisher's exact test was used to identify differences in teeth bleaching results depending on oral hygiene and dietary habits. Significance was recognized when $p<0.05$. The significance level was 5% (alpha = 0.05). All results are presented numerically and tabularly.

3. RESULTS

A total of 26 patients participated in the clinical part of the research, including nine men (34.62% of the total number of patients) and 17 women (65.38%

Table 1. *The success of bleaching depending on the patient's oral hygiene*

			Score				Total	p
			0	1	2	3		
Oral hygiene	Good	n	3	0	2	18	23	p<0.05
		%	13.0	0.0	8.7	78.3	100.0	
	Poor	n	0	0	2	1	3	
		%	0.0	0.0	66.7	33.3	100.0	
	Moderate	n	0	2	2	0	4	
		%	0.0	50.0	50.0	0.0	100.0	

n – number of teeth, p – statistical significance, 0 – the tooth was not bleached, 1 – the tooth was insufficiently bleached, 2 – the tooth was bleached, yet the desired color was not achieved, 3 – the tooth was successfully bleached, the desired color was achieved.

of the total number of patients), aged 21 to 47 years old. The average age was 31.3.

Of the total number of teeth in patients with good hygiene, 18 teeth were successfully bleached and the desired color was achieved (78.3%), two teeth (8.7%) were successfully bleached, but the desired color was not achieved, while in three teeth (13%) the bleaching was unsuccessful.

For patients with moderate hygiene, two teeth (50%) were insufficiently bleached, and the remaining two teeth (50%) were bleached but did not achieve the desired color. Notably, no teeth (0%) in this group were successfully bleached to the desired shade.

Of the total number of teeth in patients with poor hygiene, two teeth (66.7%) were successfully bleached, but the desired color was not achieved, while one tooth (33.3%) was successfully bleached and the desired color was achieved (Table 1).

Based on the results of the Fisher test, it was observed that there is a statistically significant difference ($p<0.05$) in the success of the treatment between teeth with good (78.3% of successfully bleached teeth with the desired color achieved), moderate (0%) and poor (33%) hygiene, i.e., there is a statistically significant dependence between dental hygiene and the success of tooth bleaching (Table 1).

Of the total number of teeth of patients who were smokers, one tooth (10%) was not bleached, three teeth (30%) were successfully bleached, but the desired color was not achieved, while six teeth (60%) were successfully bleached and the desired color was achieved. In non-smokers, two teeth (10%) were not bleached, two teeth (10%) were insufficiently bleached, three teeth (15%) were successfully bleached, but the desired color was not achieved, while in 13 teeth (65%) the bleaching was successful and the desired color was achieved (Table 2).

Based on the results of Fisher's exact test, no statistically significant difference was observed between smokers and non-smokers when it comes to bleaching success (Table 2).

Table 2. *The Success of Teeth Bleaching in Smokers and Non-Smokers*

			Score				Total	p
			0	1	2	3		
Smoker	Yes	n	1	0	3	6	10	p=0.783
		%	10.0	0.0	30.0	60.0	100.0	
	No	n	2	2	3	13	20	
		%	10.0	10.0	15.0	65.0	100.0	

n – number of teeth, p – statistical significance, 0 – the tooth was not bleached, 1 – the tooth was insufficiently bleached, 2 – the tooth was bleached, yet the desired color was not achieved, 3 – the tooth was successfully bleached, the desired color was achieved.

Table 3. *The Success of Bleaching in Patients Depending on the Consumption of Colored Drinks*

			Score				Total	p
			0	1	2	3		
Colored beverages	Yes	n	2	1	5	17	25	p=0.259
	%	%	8.0	4.0	20.0	68.0	100.0	
	No	n	1	1	1	2	5	
	%	%	20.0	20.0	20.0	40.0	100.0	

n – number of teeth, p – statistical significance, 0 – the tooth was not bleached, 1 – the tooth was insufficiently bleached, 2 – the tooth was bleached, yet the desired color was not achieved, 3 – the tooth was successfully bleached, the desired color was achieved.

Of the 25 teeth of patients who consumed colored drinks, two teeth (8%) were not bleached, one tooth (4%) was insufficiently bleached, five teeth (20%) were successfully bleached, but the desired color was not achieved, and in 17 teeth, bleaching was successful and the desired color was achieved (Table 3).

Of the total number of teeth of patients who did not consume colored drinks, one tooth (20%) was not sufficiently bleached, while one tooth (20%) was successfully bleached, but the desired color was not achieved, and in two teeth (40%) bleaching was successful and the desired color was achieved (Table 3).

Based on the results of the Fisher exact test, no statistically significant difference was observed between patients who consumed colored drinks and those who did not consume them (Table 3).

4. DISCUSSION

The study showed a difference in bleaching efficiency between patients with good, moderate, and poor oral hygiene. Tooth bleaching was most efficient in patients with good oral hygiene.

In patients with good oral hygiene, 78.3% of teeth were successfully bleached, in patients with poor oral hygiene 33.3%, and in patients with moderate oral hygiene none of the teeth was bleached to a desired color. Vlasova et al. have shown that professional tooth bleaching may become a significant motivational factor for maintaining a high level of personal oral hygiene to preserve the achieved bleaching results for a long time [1]. These findings are in line with results of this study for patients who maintained good oral hygiene. It is possible that these patients maintained their good habits during the study, thereby preventing the occurrence of new extrinsic discoloration. Conversely, inadequate oral hygiene in patients with moderate and poor oral hygiene led to the creation of extrinsic discoloration, which may have negatively affected the outcome of the bleaching treatment. Chromogenic substances, when deposited on the external surface of the tooth, most often lead to extrinsic discoloration. It may occur due to poor oral hygiene, as well as consumption of stain-promoting foods and drinks, and smoking [18].

During the bleaching process, tooth enamel may demineralize and the surface may become rough, inducing plaque formation and maturation. Gursoy et al. conducted a study assessing the impact of 35% hydrogen peroxide on post-bleaching plaque accumulation. Their findings indicated that, following three days of discontinued brushing, bleached surfaces exhibited reduced color change and less plaque accumulation when contrasted with unbleached areas [19].

Our study results showed no statistically significant difference between the efficiency of bleaching in smokers and non-smokers, or in consumers and non-consumers of colored drinks. In smokers, 60% of teeth were successfully bleached and the desired color was achieved, while in non-smokers, 65% of teeth were successfully bleached and the desired color was achieved. All smokers in our research were advised to quit smoking or at least reduce the amount of smoking during the bleaching process. They were also advised to avoid cigarettes and colored drinks for 30 minutes after the bleaching treatment. The importance of this advice was confirmed in a study by Públio et al., who subjected bleached enamel surfaces to prophylactic treatments with casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) and neutral fluoride. These treatments did not pre-

vent the accumulation of pigment when the bleached surfaces were exposed to cigarette smoke. However, the results of their research showed that bleached tooth enamel exposed only to artificial saliva for 30 minutes had the lowest level of discoloration induced by cigarette smoke. The authors suggest that as little as 30 minutes may be sufficient for enamel remineralization by saliva, thus preventing recurrent tooth discoloration by tobacco smoke [20].

Color stability after tooth bleaching is strongly tied to the patient's dietary habits, both during and after the bleaching process. The bleaching agents may change the texture and morphology of the enamel, leading to protein denaturation and loss of the organic component of the enamel and dentin. These changes may increase the appearance of extrinsic discoloration because pigment substances (coffee, Coca-Cola, red wine) are more adhesive to the changed tooth surface [21].

Our study showed no statistically significant difference between the patients consuming colored beverages and the patients not consuming colored beverages (coffee, Coca-Cola, tea, red wine). In patients who consumed colored beverages, 65% of teeth were successfully bleached, while in those who did not consume colored beverages, 40% of teeth were successfully bleached. Correia et al. obtained similar results. Testing the influence of seven different pigment substances on the change of color after bleaching, the authors found that only soy sauce produced repeated discoloration of the bleached tooth. Coffee, Coca-Cola, tea, chocolate milk, and red wine did not affect the tooth color [22].

Unlike these results, research by Karadas et al. did not show any statistically significant difference only in patients who did not consume coffee during home bleaching and one month later, compared to the control group. Tea, wine, and Coca-Cola, in particular, led to new extrinsic discolorations [21]. Camara et al. also demonstrated that drinking coffee throughout the bleaching treatment did not affect the color change. The reason for this is that the enamel allows only the passage of molecules with a small molecular mass through its structure. The high molecular mass of coffee pigments prevents their penetration into the robust, hard tooth tissue [23].

A study that was done by Hass et al. showed that Coca-Cola-based beverages did not affect the success of at-home vital tooth bleaching, but it did, however, record heightened sensitivity in the patients who consumed Coca-Cola during the bleaching process. Coca-Cola has an acid pH (2.53), so the authors of the study advise avoiding non-alcoholic Coca-Cola-based beverages when high concentrations of hydrogen peroxide are being used [24].

Although factors such as oral hygiene and dietary habits are important for the long-term stability of the achieved tooth color, the selection of adequate restorative materials also plays a significant role, especially after internal bleaching. In our study, Tetric EvoCeram, a nanohybrid composite material, was used for definitive restorations. The choice was based on its exceptional aesthetic and mechanical properties, which are vital for long-lasting results in the anterior region post-bleaching [25, 26]. The nanohybrid structure of Tetric EvoCeram, which combines nanofillers and hybrid fillers, enhances the material's optical and mechanical characteristics. The nanoparticles enhance polish retention and wear resistance in order for the material to be perfectly adapted to the newly whitened tooth shade. This nano-optimized material is critical in minimizing surface roughness, which directly reduces the risk of extrinsic pigment deposition and maintains the long-term success of the bleaching effect. Thus, employment of such advanced nanomaterials is included in offering the long-term durability and esthetic success of endodontically whitened teeth, which directly improves the long-term effect of oral factors on the success of the treatment [25-28].

A key strength of this study is its contribution to an area where literature is limited: the impact of patients' oral hygiene and dietary habits on the success of tooth bleaching, particularly for discolored teeth. Conversely, a primary limitation of the study is the inherent subjectivity of tooth color assessment performed with the Vita shade guide, a method recognized for its subjective nature. However, this method of color determination is frequently employed in numerous longitudinal studies tracking changes during bleaching treatments, as well as in daily clinical practice [7, 8, 29-31]. Meireles et al. consider the sensitivity of visual color assessment using the Vita guide to be 86.9% when compared to a spectrophotometer, which is considered the gold standard for color determination. These authors believe that visual assessment with the Vitapan Classical guide is a valid and reliable method for distinguishing between

light and dark shades [29]. In addition to these facts, it is important to emphasize that in this study, color was analyzed simultaneously by three dentists, and at least two dentists agreed on the determined shade.

5. CONCLUSION

The efficacy of non-vital tooth bleaching is influenced by the patients' oral hygiene. Nevertheless, smoking and the consumption of colored beverages showed no impact on the success of the bleaching process.

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УТИЦАЈ ОРАЛНЕ ХИГИЈЕНЕ И ХИГИЈЕНСКО-ДИЈЕТЕТСКИХ НАВИКА НА УСПЈЕХ БИЈЕЉЕЊА ЕНДОДОНТСКИ ЛИЈЕЧЕНИХ ЗУБА

Сажетак Увод: У процесу бијељења зуба највећа пажња се посвећује избору адекватне технике избјељивања и оптималне концентрације агенса, док је значај свакодневне оралне хигијене током и након третмана бијељења често потцијењен. Квалитет оралне хигијене, заједно са хигијенско-дијететским навикама пацијента, играју значајну улогу у непосредном успјеху и дугорочној стабилности постигнуте боје зуба. Циљ овог рада је био испитати утицај оралне хигијене те конзумирања цигарета и обојених пића на успјех избјељивања ендодонтски лијечених зуба.

Материјал и методе: У истраживање је укључено 30 ендодонтски третираних зуба. У првој групи зуби су бијељени шетајућом техником (10 зуба), у другој групи амбулантном техником (10 зуба), док су зуби у трећој групи бијељени комбинованом техником (10 зуба). Зуби су бијељени 30% карбамид пероксидом и 35% водоник пероксидом. Сви зуби су рестаурисани нанохибридним композитним материјалом Тетрик Евоцерам (Ивоклар, Лихтенштајн). Пацијенти су класификовани према оралној хигијени и хигијенско-дијететским навикама на: добру/умјерену/лошу оралну хигијену, пушаче/непушаче и конзументе/неконзументе обојених пића. Прије почетка и након завршетка третмана бијељења одређена је боја свих зуба примјеном Вита Класик кључа боја. За потребе статистичке анализе података, избијељени зуби су анализирани на основу скале из студије Арија и сарадника.

Резултати: На основу резултата Фишеровог теста је утврђено да постоји статистички значајна разлика ($p<0,05$) између успјеха бијељења и зуба с добром, умјереном и лошом хигијеном. На основу резултата Фишеровог егзактног теста није уочена статистички значајна разлика између пушача и непушача, као ни код конзумената и неконзумената обојених пића.

Закључак: Успјех избјељивања ендодонтски лијечених зуба зависи од оралне хигијене пацијента. Међутим, пушење и конзумација обојених пића нису имали утицај на процес избјељивања.

Кључне ријечи: карбамид пероксид, водоник пероксид, орална хигијена, пушење, обојена пића, нанохибридни композитни материјал.

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