

2. Analiza comparativă a metodelor evidențiază o eficiență cromatică superioară a albirii realizate în cabinet, caracterizată prin obținerea unor rezultate rapide și vizibile într-un timp redus. Albirea la domiciliu reprezintă o alternativă eficientă, asociată cu o incidență mai redusă a sensibilității dentare și cu un grad crescut de confort pentru pacient.
3. Ambele metode analizate s-au dovedit sigure și eficiente clinic, diferențele fiind determinate în principal de concentrația agentului oxidant, durata tratamentului și modul de monitorizare terapeutică.

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METHODS AND TECHNIQUES OF TOOTH WHITENING

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Background. The smile represents one of the most important facial expressions in human communication, playing a fundamental role in the expression of positive emotions and in the establishment of interpersonal relationships. Dental aesthetics, particularly tooth color, has a significant impact on self-perception and social interactions.

Objective of the study. The aim of this study was to evaluate the effectiveness and tolerability of two tooth whitening approaches, in-office bleaching and at-home bleaching and to analyze their impact on patient satisfaction.

Material and methods. The study was conducted on a group of 29 participants, who were divided into two groups: 18 patients underwent in-office bleaching, while 11 patients were treated using an at-home bleaching protocol. In-office whitening was performed using Opalescence Boost gel with a concentration of 40% hydrogen peroxide. For at-home whitening, Opalescence PF gel (Ultradent, USA) containing 15% carbamide

peroxide was used. The gel was applied by patients in individualized trays for 4-6 hours per day over a period of 10 days.

Results. Both tooth whitening methods resulted in a significant improvement in dental aesthetics. In-office bleaching provided rapid and immediately perceptible outcomes following treatment completion, whereas at-home bleaching induced progressive chromatic changes that became evident throughout the treatment period.

Conclusions. Tooth whitening is an effective and widely requested aesthetic dental procedure that contributes to improving smile appearance and enhancing patients' self-confidence. Both in-office and at-home bleaching techniques provide favorable clinical outcomes, with differences mainly related to the speed of the whitening effect and the degree of professional supervision during treatment.

Keywords: Modern techniques, tooth whitening, tooth sensitivity, dental aesthetics.

Introduction

In recent decades, dental aesthetics has become an essential component of modern dental practice, driven by the growing public interest in smile appearance. Tooth color represents a determinant factor in social perception and is frequently associated with oral health, personal care, and self-confidence. In this context, the optimization of dental chromaticity through conservative approaches has gained increasing clinical importance [3,6].

Continuous exposure to aesthetic standards promoted through digital media and social networks has amplified the demand for minimally invasive procedures capable of rapidly and effectively enhancing dental appearance. Tooth whitening is among the most frequently requested procedures in dental offices, being appreciated for its conservative nature and its ability to produce visible color changes without significant alteration of dental hard tissue structure [1,2].

Data from the scientific literature indicate a steady global increase in demand for whitening treatments, with the international market projected to reach approximately USD 10.6 million by 2030, with an annual growth rate of 5.2% [8]. These trends reflect the current orientation toward rapid, effective, and accessible therapeutic solutions with a positive impact on patient satisfaction and self-perception [5].

Interest in dental whitening is also evident in the Republic of Moldova, where concern for smile aesthetics is continuously developing. In clinical practice, the procedure is used both as a standalone treatment and as a preliminary stage prior to aesthetic restorations or prosthetic rehabilitations, contributing to the achievement of optimal chromatic harmony [4]. The selection of the appropriate method must consider clinical efficacy, procedural safety, and patient comfort.

In this context, the present research aims to perform a comparative analysis of professional dental whitening methods, evaluating their clinical effectiveness and their impact on patients' aesthetic perception and satisfaction. The study included 29 patients aged between 18 and 57 years, without systemic contraindications to the procedure. The obtained results allow assessment of the differences between the applied techniques and provide relevant data for optimizing therapeutic decision-making in dental practice.

Aim of the Study

To determine the effectiveness and clinical relevance of the main professional dental whitening methods and to evaluate their impact on patients' aesthetic perception.

Objective of the study

To compare the outcomes achieved through in-office and at-home dental whitening by measuring chromatic changes, analyzing procedural safety, and assessing post-treatment patient satisfaction.

Material and Methods

In the present research, a descriptive study method was used. The analysis was carried out during the 2025–2026 academic year and included patients who requested improvement of dental aesthetics through professional whitening procedures at the “Existdent” Dental Clinic.

The study group consisted of 29 voluntary patients aged between 18 and 57 years, without severe systemic diseases and without a history of allergic reactions to the substances used in the dental whitening procedure. The inclusion criteria targeted patients with permanent dentition, without active carious lesions, without severe dentin hypersensitivity, and without extensive restorations in the anterior region that could have influenced the chromatic result.

Depending on the chosen therapeutic method, the patients were divided into two groups:

Group I- At-home dental whitening (Home Bleaching)

Group II – Professional in-office dental whitening (Office Bleaching).

Within the present study, specific materials were used for each whitening method, selected according to the applied therapeutic protocol and the clinical characteristics of the patients. For at-home dental whitening, the following materials were used: Zetaplus impression material (Zhermack, Italy), thermoformable foil for trays, and Opalescence PF 15% gel (Ultradent, USA).

For obtaining impressions of the dental arches for the fabrication of individualized trays, Zetaplus (Zhermack, Italy), a condensation silicone with high consistency, was used. The material presents good dimensional stability and high fidelity in reproducing dental morphological details. For capturing fine details, the corresponding light-body material of the system was also used (Figure 1).



Fig. 1. Condensation silicone-based impression material (Zetaplus, Zhermack).

The individualized tray was fabricated from 0.8 mm Erkodur thermoformable foil (Erkodent, Germany). The material is a thermoplastic polymer based on PET-G (polyethylene terephthalate modified with glycol), which becomes malleable upon heating and allows precise adaptation to the working model. After cooling, it maintains dimensional stability and ensures uniform distribution of the whitening gel (Figure 2).



Fig. 2. Erkodur 0.8 mm thermoformable foil for tray fabrication [7].

For the at-home whitening procedure, **Opalescence PF 15%** gel (Ultradent, USA) (Figure 3) was used, based on carbamide peroxide. It gradually releases active hydrogen peroxide, ensuring controlled oxidation of chromogenic pigments within the dental structure.

The product formula includes amorphous calcium phosphate (ACP), a component that supports enamel remineralization processes. The presence of ACP contributes to maintaining the microhardness of dental structures and reducing sensitivity associated with the whitening treatment.



Fig. 3. At-home tooth whitening gel - Opalescence PF [10].

For the in-office whitening procedure performed in the second group, the following materials were used: a light-cured liquid dam, LC Block-Out Resin (Ultradent, USA), and Opalescence Boost 40% whitening gel.

During the professional whitening procedure, the initial stage consisted of isolation of the operative field by applying a light-cured liquid dam, LC Block-Out Resin (Ultradent, USA) (Figure 4). The material was applied at the level of the cervical areas and along the gingival margin, then light-cured, forming an elastic and adherent protective barrier. This step ensured protection of the soft tissues against the action of the oxidizing agent used in high concentration.



Fig. 4. Light-cured liquid dam (Ultradent).

After isolation of the operative field, the professional whitening system **Opalescence Boost** (Ultradent, USA), containing 40% hydrogen peroxide, was applied (Figure 5). The effectiveness of the product is based on the chemical reactions generated by the high concentration of the oxidizing agent, without the need for additional activation by external light sources.

The gel is supplied in a dual-syringe system, which allows controlled mixing of the active components immediately prior to application. This mechanism ensures compositional stability, safe handling, and clinical effectiveness of the professional whitening procedure.



Fig. 5. In-office tooth whitening system kit [9].

Results and Discussion

The study sample included 29 patients aged between 18 and 57 years, of whom 20 were female (69%) and 9 were male (31%). According to the selected whitening method, the patients were divided into two groups: the first group consisted of patients who opted for in-office whitening, and the second group included those who chose at-home whitening. The first group comprised 18 patients (62.1%), including 12 women (44.8%) and 6 men (17.3%), while the second group included 11 patients (37.9%), of whom 7 were women (24.1%) and 4 were men (13.8%) (Figure 6).

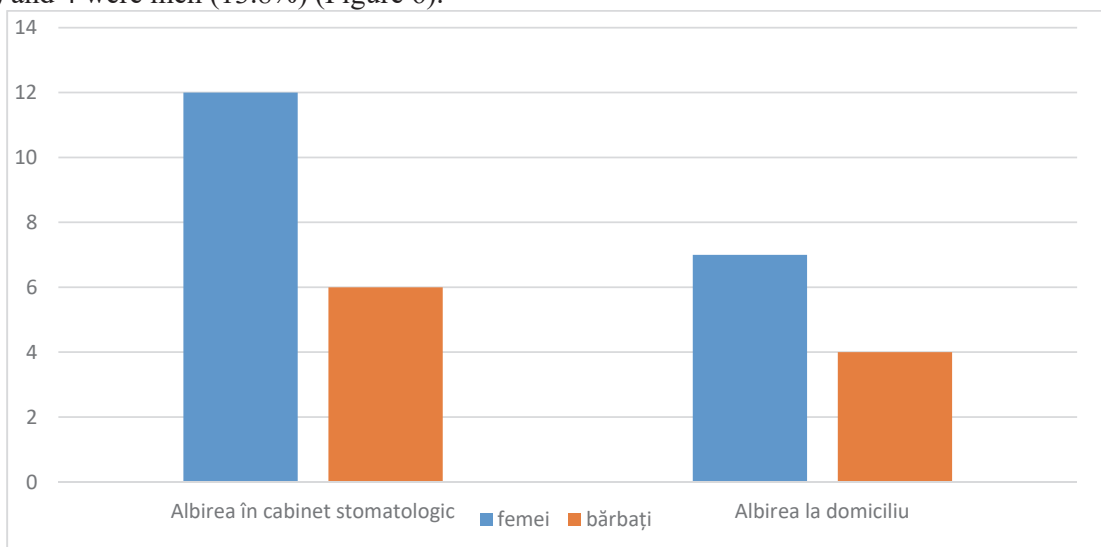


Fig. 6. Distribution of patients according to the type of dental whitening method.

Patient satisfaction was evaluated at the end of the treatment using a standardized questionnaire, employing a rating scale from 1 to 5, where a score of 1 indicated a low level of satisfaction and a score of 5 indicated a very high level.

The distribution of responses demonstrated a high level of overall satisfaction: 62% of patients assigned a score of 5, 24% a score of 4, 10% a score of 3, and 4% a score of 2. No patient assigned a score of 1. Group analysis showed slightly higher values among patients treated with the professional in-office method, where 67% reported the maximum level of satisfaction, compared to 55% in the group treated at home.

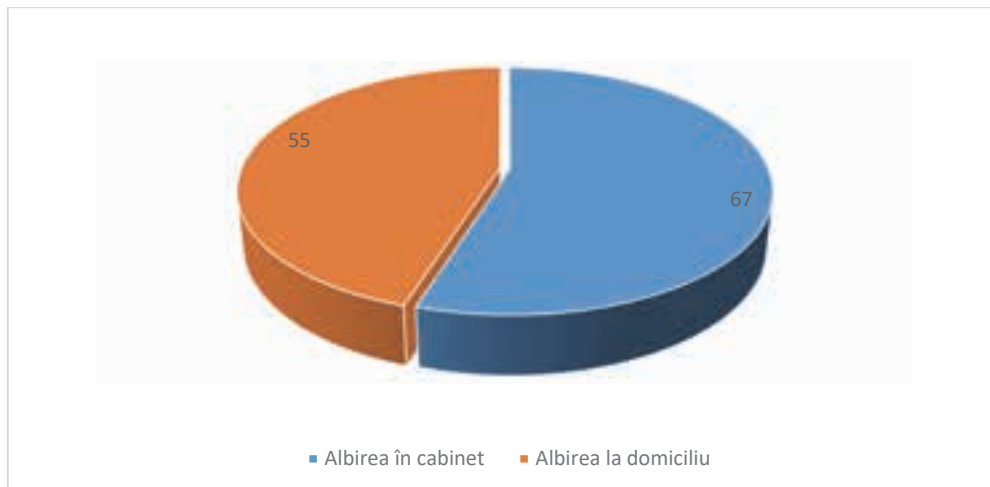


Fig. 7. Percentage comparison of patient satisfaction according to the whitening method.

Clinical Case No. 1

Patient: X

Sex: Female

Age: 30years

Marital status: Married

Profession: Teacher

Chief complaint at presentation: Aesthetic discomfort caused by discoloration of the teeth.

History of present illness: The patient reports that the change in tooth shade was observed progressively over the past approximately 2 years, without the occurrence of pain or other associated symptoms.

Medical history:

The patient denies the presence of systemic diseases, chronic conditions, or recent dental interventions. She also denies a history of tuberculosis, viral hepatitis, or HIV/AIDS infection.

Allergic history: The patient denies allergies to medications, vaccines, or other allergens.

Harmful habits: Regular coffee consumption, approximately three times per day. The patient does not smoke and does not consume alcoholic beverages.

Diagnosis: Extrinsic dental discoloration.

Extraoral examination: The face is symmetrical, the skin is pale pink in color without changes, and the lip mucosa has normal shape and color. Facial thirds are equal, the nasolabial folds are slightly expressed, and the labial commissures and nose show no abnormalities. Palpation of the temporomandibular joint is painless, and auscultation revealed no clicks or crepitation. Lymph nodes are not palpable. The parotid, submandibular, and sublingual salivary glands show no pathological changes.

Intraoral examination: The degree of mouth opening is 5 cm, without mandibular deviations, and the lips are in full contact. The oral mucosa is pale pink in color, without eruptions or other formations. The tongue is of normal size, with unchanged papillae, and no whitish deposits are present. Inspection of the dental arches shows their integrity. Percussion and probing tests do not elicit pain or discomfort.

Dental formula.

													Ob		L
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
	Ob														L

Note: Ob – filling; L – missing tooth.

Paraclinical investigations

Photographic examination: The initial tooth shade was A3 (Figure 8).

Thermal test: Negative response, without pain.

Transillumination: No structural dental changes detected.

Treatment

As the first stage, control of bacterial plaque and hard deposits was performed, followed by professional oral hygiene prior to the in-office whitening procedure using Opalescence Boost 40%.

After completion of oral hygiene, the initial tooth color was determined, establishing shade A3. A cheek retractor was applied to ensure proper access and visibility of the operative field. Isolation of the working field was performed using cotton rolls placed in the vestibular area and by applying a light-cured liquid dam at the level of the free gingival margin. While the assistant light-cured the liquid dam, the gel contained in the dual-syringe system was activated by mixing and homogenizing the activator with the base component. The gel was then applied to the vestibular surfaces of teeth 15–25 and 35–45. Activation of the whitening gel was performed after 20 minutes by aspirating the first application and applying a new layer of gel, which was maintained for an additional 20 minutes. At the end of the procedure, the gel was completely removed and the dental surfaces were thoroughly rinsed with water. The cheek retractor and all isolation materials were then removed. After the first treatment session, the patient reported a mild degree of dental sensitivity, which resolved rapidly following the use of Ultra-EZ prefabricated trays. The desired aesthetic result, corresponding to shade A1, was obtained after two whitening sessions.



Fig. 8. Initial tooth shade

– A3. Fig. 9. Gingival isolation using cotton rolls and liquid dam.



Fig. 10. Professional whitening system *Opalescence Boost 40%*



Fig. 11. Application of Opalescence Boost gel (40% concentration).



Fig. 12. Final tooth shade obtained – A1.

Clinical Case No. 2

Patient: Y

Sex: Female

Age: 22 years

Marital status: Unmarried

Occupation: Student

Chief complaint: Aesthetic discomfort caused by discoloration of the teeth.

History of present illness: The patient reports that the color of her teeth has always appeared more yellowish.

Medical history: The patient denies a history of tuberculosis, viral hepatitis, or HIV/AIDS infection.

Allergic history: The patient denies allergies to medications, vaccines, or other allergens.

Harmful habits: Regular coffee consumption approximately twice per day; occasional smoking; the patient does not consume alcoholic beverages.

Diagnosis: Extrinsic dental discoloration.

Objective Findings

Extraoral examination: The face is symmetrical, the skin is pale pink in color without pathological changes, and the lip mucosa has normal shape and color. The facial thirds are proportionate, the nasolabial folds are slightly expressed, and the labial commissures and nose present no abnormalities. Palpation of the temporomandibular joint (TMJ) is painless, and auscultation revealed no clicking or crepitation. Lymph nodes are not palpable. The parotid, submandibular, and sublingual salivary glands show no pathological changes.

Intraoral examination: The degree of mouth opening is approximately 4–5 cm, without mandibular deviation, and the lips are in full contact. The oral mucosa is pale pink in color and shows no eruptions or other lesions. The tongue is of normal size, with intact papillae, and no whitish deposits are present. Inspection of the dental arches reveals their integrity. Percussion and probing tests do not elicit pain or discomfort.

Dental formula.

L		Ob													Ob	L
8		7	6	5	4	3	2	1	1	2	3	4	5	6	7	8



Fig. 17. Tray try-in in the oral cavity.



Fig. 18. Opalescence PF gel (15% concentration).



Fig. 19. Application of Opalescence PF 15% gel in the anterior region.



Fig. 20. Final tooth shade – A2.



Fig. 21. UltraEZ desensitizing gel.

Conclusions

1. Dental whitening procedures are requested by patients of both genders, with a predominance among young individuals. The main motivation is the desire to improve smile aesthetics and increase self-confidence, both in social and professional contexts.

2. The comparative analysis of the methods highlights a superior chromatic effectiveness of in-office whitening, characterized by rapid and visible results achieved in a shorter period of time. At-home whitening represents an effective alternative, associated with a lower incidence of dental sensitivity and a higher level of patient comfort.
3. Both analyzed methods proved to be clinically safe and effective, with differences mainly determined by the concentration of the oxidizing agent, treatment duration, and the mode of therapeutic monitoring.

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