

EFFECTIVENESS OF BLEACHING TECHNIQUES IN NON-VITAL TEETH: LITERATURE REVIEW

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Abstract: Due to the appreciation of aesthetic dentistry, patients and professionals have been seeking treatments that favor the naturalness and harmony of teeth. Thus, tooth whitening has been a preferred choice in aesthetic planning, as it presents a minimally invasive treatment for vital, non-vital, discolored or stained teeth. In non-vital teeth, this color change can be the result of pulp necrosis, endodontic materials, filling materials, aging and trauma. Therefore, this literature review aimed to observe the effectiveness of bleaching techniques in non-vital teeth. During data collection, scientific articles published between the years 2000-2020 were selected, arranged in the Virtual Health Library (BVS), Scientific Electronic Library Online (SciELO), Brazilian Bibliography of Dentistry (BBO) and Medical Literature Analysis and Retrieval System Online (Medline), in Portuguese and English. Publications on the subject, prior to the year 2000 and after 2020, indexed in other databases or that do not address the objectives of the study were excluded. The data collected were organized chronologically (2000-2020), and descriptively. For correct execution and choice of internal whitening techniques (Walking Bleach, Power Bleaching or Mixed Technique), it is essential to carry out a detailed clinical examination, as well as an assertive diagnosis. Power techniques (bleaching and walking bleach) in pulpless teeth has a good acceptance by patients, where it requires follow-ups for preservation and maintenance of cases. Faced with patients' dissatisfaction with dental darkening, tooth whitening techniques have increasingly participated in aesthetic planning. Thus, after reviewing the literature, research showed the same bleaching capacity in devitalized teeth, using different techniques and materials.

Keywords: Whitening; Dental Aesthetics; Carbamide Peroxide.

INTRODUCTION

Due to the appreciation of aesthetic dentistry, patients and professionals have been seeking treatments that favor the naturalness and harmony of teeth (MARTOS *et al.*, 2011). Thus, dental darkening can be caused by extrinsic and intrinsic factors, such as the recurrent intake of dark colored foods, tobacco, mouthwash, use of medications and genetic causes. (WATTS and ADDY, 2001; JAHANGIRI *et al.*, 2002; DAHL and PALLESEN, 2003; JOINER, 2004). In addition, other factors can also interfere in this change, such as pulp necrosis, endodontic materials, filling materials, aging and trauma (PALLESEN, 2003; JOINER, 2004).

In this sense, a detailed examination is necessary to understand the etiology of the color change, outline a diagnosis and an adequate treatment plan. Thus, tooth whitening has been a preferred choice in aesthetic planning, as it presents a minimally invasive treatment for vital, non-vital, discolored or stained teeth.

In non-vital teeth, the internal bleaching technique has become the most indicated procedure, since it is effective and accessible (RIBEIRO E MENEZES, 2019). Thus, the industry provides numerous whitening materials for this purpose, and this can generate indecision on the part of the dentist when performing the technique. However, as observed in the literature, the most used bleaching agent is Hydrogen Peroxide (PH), which can be applied in the Walking technique. Bleach or Mixed Technique (RABANG and CORRÊA, 2000; ROBAZZA and LAGEMARQUES, 2002). Thus, this PH whitening agent circulates in the pores and other regions of the crystals present in enamel and dentin, in addition to carbon rings with a higher molecular density, structuring hydroxyls, changing the particles with color change into smaller particles, and

consequently clearer (MAIA and CATÃO, 2010).

The impartialities of the method that uses PH catalyzed by heat or light source are: the use of materials with great corrosion capacity and objection to inspecting the results. Contributing, or just 35% PH with temperature increase that increases the internal absorption capacity., in patients with a history of trauma or accidents. (MAIA and CATÃO, 2010).

Due to the color change in non-vital teeth, internal whitening has been an aesthetic treatment option that presents a conservative, economic and simplified approach, compared to other rehabilitation procedures, which involve dental wear. Faced with numerous techniques and materials, professionals are inconstancy and insecurity when performing this type of whitening. Therefore, from a literature review, comparative criteria were raised on the effectiveness of different bleaching methods and agents used in the bleaching procedure of non-vital teeth. Seeking to observe and investigate the effectiveness of different bleaching techniques and agents in non-vital teeth, it is hypothesized that the use of different bleaching techniques and materials do not influence the final result in non-vital teeth.

MATERIALS AND METHODS

The work, as it is a literature review, was not subject to the evaluation of the Research Ethics Committee according to resolution 466/12 of the National Health Council (CNS).

The research was an integrative, exploratory and retrospective review, based on the identification and analysis of data recorded in scientific articles from national and international journals. The purpose of the bibliographic study was to position the researchers in relation to what has already been produced on the research topic.

The present work has the function of representing an exploratory research study, based on a bibliographic review, since it will consist of probing, choosing and ordering references in order to achieve the main objectives of the study (AMARAL, 2007). Thus, this type of research aims at the development of concepts and conceptions of situations on the mentioned subject, in search of an improvement of ideas, resulting in the researcher being closer to the theme (Gil, 2002).

Data were collected between September 2020 and January 2021. The selection of studies published between the years 2000 to March 2020, organized in the Virtual Health Library (BVS) databases, was used as an inclusion criterion., Scientific Electronic Library Online (SciELO), Brazilian Bibliography of Dentistry (BBO) and Medical Literature Analysis and Retrieval System Online (Medline), in Portuguese and English. To identify all relevant studies, descriptors were used from the structured vocabulary Descriptors in Health Sciences (DeCS) with different combinations such as: Hydrogen peroxide, Techniques and Hydrogen peroxide. Publications on the subject, prior to the year 2000, indexed in other databases or that do not cover the study objectives were excluded.

The research data were organized chronologically between 2000 and 2020, in a descriptive way. The selected articles were read in full with the aim of synthesizing and ordering the data contained in them, thus seeking to acquire an answer to the research problem (MINAYO *et al*, 2009).

The research took place through a thorough search in the databases, identifying the sources that could really interest the research. In addition, exploratory, selective and interpretive readings were carried out, in order to carry out a literature review on the

effectiveness of different bleaching techniques in non-vital teeth.

LIST OF ACRONYMS

PH - Hydrogen Peroxide

PC – Carbamide Peroxide

PS – Sodium Perborate

RESULTS

At first, in 1860, the first studies were submitted on whitening compositions, such as calcium chloride, chlorine, aluminum chloride, oxalic acid, sulfur dioxide, sodium hypochlorite and sulfur dioxide (BOAVENTURA *et al*, 2012). In 1895, Westlake exposed a bleaching method that applied pyrozone (hydrogen dioxide) awake to an electric current (BOAVENTURA *et al*, 2012).

In 1989, other techniques were implemented using the homemade technique and 10% Carbamide Peroxide (PC). On the other hand, there were some disadvantages such as swallowing the product, contact of the substance with the mucous membranes, stomach irritation, bad unpleasant taste and a longer treatment time to achieve the desired whitening result (ZANIN *et al*, 2003).

Walking technique was born. Bleach, based on the application of the bleaching agent for 3 to 7 days, returning to the office to change the bleaching material until the desired color is obtained. In this procedure, a paste with PC and 30% PH is made, and then inserted into the pulp cavity. Previous studies show that this technique has a mediate clinical effect, presenting lower recurrence and risk of cervical bone resorption (CARDOSO RM *et al*, 2008; LUCENA MT 2015; MATOVANI *et al*, 2015). In addition, clinical results show that this technique is considered a conservative, low-cost, effective treatment with more predictable clinical results (LUCENA, *et al*, 2015). If

loss of chromatic reversibility is observed, restorative or prosthetic solutions must be chosen (CARDOSO RM, *et al*, 2011).

The Power Bleaching technique consists of applying bleaching agents in high concentrations (PH 38% and PC 35% and 37%) inside the pulp chamber and on the buccal surface of the dental element (BUCHALLA and ATTIN, 2007), therefore, being indicated for patients with severe discolorations. The mechanism of action is based on an oxidation-reduction reaction of the bleaching agent, capable of releasing free radicals, consequently reducing the procedure time (GARONE, 2002). Always depending on the degree of darkening, the professional must perform 3 to 4 sessions to obtain a satisfactory result. (ERHARDT; MELARA; COELHO-DE-SOUSA, 2012).

The mixed technique is chosen according to its ineffectiveness and resistance to previous bleaching, combining the two types of technique in the same treatment (ERHARDT, MELARA, COELHO-DE-SOUSA, 2012). According to Carvalho *et al*, (2017) and Santos *et al*, (2018), this technique is considered effective and conservative, however, there is a prognosis of color recurrence.

Edhardt *et al*, (2003) understood that the combination of bleaching techniques obtained sufficient results to prove that the applicability of various bleaching techniques, with the use of Walking techniques Bleach and Power B leaching, with the addition of PS and PH, resulted in a more effective whitening effect. Metinguel *et al*, (2017) obtained satisfactory results, performing the Power Bleaching and Walking techniques Bleach on pulpless teeth. Thus, considering a procedure with good acceptance by patients, which requires follow-ups for the preservation and maintenance of cases.

DISCUSSIONS

In view of the literature review, it was observed that the combination of techniques and materials for tooth whitening in pulpless teeth, the same result is obtained. Therefore, the null hypothesis was accepted.

The application of bleaching materials provides us with dates since the 17th century, the use of numerous substances were suitable, namely: calcium chloride, chlorine, aluminum chloride, oxalic acid, sulfur dioxide, sodium hypochlorite, and several others. Therefore, sulfur dioxide and Labarraque Liquor (2.5% sodium hypochlorite) were proposed as bleaching agents, as well as oxalic acid to improve the bleaching of pulped and pulped elements (BOAVENTURA *et al*, 2012).

In what was explicit, several techniques were built and used to improve its use, increase its effectiveness, help with comfort, and confidence in a shorter clinical time of the patient. Techniques that use Light, such as: Co2 and Argon 488nm laser bleaching, Diode laser, LED bleaching and light-curing luminescence lightening, Neodymium laser devices. (ZANIN AND BRUGNERA, 2002)

Erhart, Shinohara and Pimenta (2003) stated that the Walking technique Bleach is a proposal to promote an effective whitening treatment using the whitening material PS diluted in distilled water, provided that it is inserted in the cavity for three days and performing at least 3 sessions. However, Martins *et al*, 2009 reaffirms that the mixture of the bleaching agent PS mixed with distilled water, there is no limitation for the duration of the treatment. However, the authors mentioned above concluded that there was no need to change the bleaching material during the aesthetic treatment.

Cardoso RM, *et al* (2011) reported that the Walking technique Bleach is very effective and has a short clinical time, making it a conservative alternative without wear of

the tooth structure (MACIEL *et al*, 2018). For Santos-Junior *et al.*, (2018), one of the most beneficial and safe bleaching materials in this technique is PS. Therefore, the best benefit of using this whitening agent is the low concentration of PH emitted. Research indicates that PS is quite efficient when associated with some mixtures other than water such as: PH, and chlorhexidine gel, but some authors defend that the mixture of PS and PH exhibit a greater effect. (SAMPAIO MD, *et al*, 2010; MACIEL KBL, *et al*, 2019).

Schwendler A. *et al.*, (2007) states that the Power Bleaching technique presents greater efficiency when bleaching is performed in at least 3 to 4 sessions, leading to a more satisfactory result. However, for Andrade *et al.*, (2005) the Power Bleaching technique presents the applicability of acid in the interior and exterior of the element, in order to remove the smear layer and open the dentinal tubules, an increase in the penetration of dental enamel and dentin at PH. This method has become optional and can only be done in the first application of bleaching. Some product manufacturers do not recommend the use of dental acid. Yet for Kings A; Loguercio AD, (2007) in the Power Bleaching technique uses the bleaching agent hydrogen peroxide at 35%, presenting an effective result right after the clinical procedure.

The findings of Yi Kck, *et al* (2008) point out that the Walking techniques Bleach, Power Bleaching and mixed tooth whitening is used in cases of teeth with dark pigmentation and difficult to resolve, because it manages to increase the effect of whitening and bring more effective results. In addition, one of the advantages of the mixed bleaching technique is a lower concentration of the bleaching agent where it is sufficient to achieve a desired result. (REIS A; LOGUERCIO AD, 2007)

Although there are risks in whitening non-vital elements, the whitening method can be

successfully performed, as soon as there is an efficient diagnosis, a well-planned plan, and a correct method assigning a follow-up to the case.

CONCLUSION

Faced with the dissatisfaction of patients with dental darkening, tooth whitening techniques have increasingly participated in aesthetic planning. In view of the literature review, studies indicate that even using different techniques and materials, the bleaching capacity is the same for devitalized teeth.

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