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**A study on various techniques used for bleaching of vital tooth- a retrospective study**

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Running title: various techniques used for bleaching of vital tooth

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**Abstract:**

**INTRODUCTION:** Satisfying patients' high expectations for dental esthetics is one of the challenges in contemporary dental therapy for both clinicians and dental technicians. The prevalence of dental fluorosis appears high in some areas. Its severe form results in great psychological distress to the affected individual. The aim was to analyze the different methods used for vital bleaching procedures for the patients visiting Saveetha dental college.

**MATERIALS AND METHODS:** The study was conducted in Saveetha dental college with 62 patients the graph was done in SPSS software version 23 the Dias study was conducted clinics. Ethical approval for contacting the Dias was given by an esteemed institutional research department via SRB form.

**RESULTS:** Totally there were 62 patients involved in this study of vital bleaching, the techniques that were involved are, conventional bleaching, power bleaching, thermo catalytic bleaching, laser activated bleaching, and there are also other techniques, the number of patients who did conventional bleaching are 40, number of patients who did power bleaching are 11, number of patients who did thermo catalytic bleaching are 1, number of patients who did laser activated bleaching is 1, number of patients who did other techniques are 9, patients who did vital bleaching in upper arch 36, patients who did vital bleaching in lower arch are 6, patients who did vital bleaching in individual tooth are 30, 44 patients did fluorosis, 10 patients did stains, 8 patients did esthetic reason. The chi square test was analyzed and the p value = 0.01, ( $p > 0.05$ ) and is statistically not significant.

**CONCLUSION:** In this study it was concluded that the commonly used methods for vital bleaching is the conventional method that is followed by thermo catalytic, power bleaching, other techniques and laser techniques for aesthetic reasons, such as fluorosis and stains.

Keywords: Vital bleaching-reasons-aesthetics-innovative technology.

**Introduction:**

Currently, tooth whitening is one of the most popular aesthetic procedures in dentistry. Dental market offers a variety of products, and literature shows different successful techniques. (1) So much so that clinicians may have difficulty to decide, together with their patients, the most suitable treatment for each case. Classical whitening techniques are at-home and in-office treatments. Some patients prefer at-home bleaching, and this technique is relatively low-cost, with a reduced chair-time and less tooth sensitivity compared to in-office bleaching. However, professional in-office whitening is becoming attractive due to its immediate whitening without the need for tray use at home. Both treatments have similar short and long-term results once concluded. (2) The type and concentration of the whitening gel, as well as application time vary according to the treatment: 25%-38% hydrogen peroxide in three sessions for in-office whitening; while at-home dental bleaching uses 10%-16% carbamide peroxide gel in custom-trays for two weeks. (3)

Despite the gel, the bleaching active component is the same: hydrogen peroxide. This chemical element can be either directly applied on the tooth surface, or it is released from the chemical reaction of carbamide peroxide. (4) As hydrogen peroxide diffuses through enamel and dentin, unstable free radicals are released. These radicals attack organic pigment

molecules, shifting the absorption spectrum of chromophore molecules, thereby promoting teeth whitening. Hydrogen peroxide has been known as a bleaching agent for vital teeth since the beginning of the 20th century. (5) But it was in the late 1960s that Dr Bill Klusmier accidentally established a home-bleaching technique. In order to promote gingival health among his patients, this orthodontist prescribed a carbamide peroxide-based mouthwash in a mouth tray for overnight use. After follow-up appointments with the patients, Dr Klusmier noticed that their teeth were becoming whiter. (6) Nowadays, in-office and at-home bleaching are the most widespread. Evidence-based treatments presenting satisfactory clinical outcomes for vital teeth [10]. The gels used have a high concentration of hydrogen peroxide. Otherwise, low concentrations of the bleaching agent are available in other products not necessarily used for teeth whitening. For instance, an oxidizing mouthwash containing 3% hydrogen peroxide is primarily prescribed for some types of gingival diseases; however, teeth whitening has been reported after its use. (7) A variety of over-the-counter products containing low levels of hydrogen peroxide has been marketed for teeth bleaching. Whitening strips, mouthwashes, paint-on brushes, and toothpastes are some of the goods easily available for consumers. Even though these products contain less than 3% hydrogen peroxide, their use results in teeth whitening. (8) Given the large variety of whitening products available, it can be challenging for clinicians and patients to choose the most adequate technique. Among various aspects to be considered, the long-term effect of bleaching is an important factor that might be decisive for treatment's choice. (9) Therefore, the aim of this paper is to evaluate the dental color stabilization after four different bleaching techniques. (10) A priori, we hypothesize that the association of 3% hydrogen peroxide with classical in-office bleaching using 35% hydrogen peroxide (G2) would result in whiter teeth in comparison to other techniques used in this study. (11)

#### **Materials and method:**

The date of this original research (DIAS) Considered off 62 patients in techniques used for bleaching vital bleaching. Ethical approval for contacting the Dias was given by an esteemed institutional research department via SRB form. Among the patient records we analyze data collection in Saveetha dental college and hospitals, whoever visits the hospital for their treatment of full vital bleaching. Descriptive analysis was carried out using the start testicle software SPSS version 23. Then results were analyzed and represented in a bar chart by chi-squared test.

#### **Data collection:**

Dental information archiving software (DIAS) it's a software used in Saveetha dental college storing patients information, diagnosis and treatment records. A total of 62 patient's records were reviewed and analyzed.

#### **Inclusion criteria:**

- Both gender
- All age group
- Patients who do vital bleaching

#### **Exclusion criteria:**

- Missing or incomplete data

#### **Study parameters:**

The following data were collected for the purpose of the study

- Patient visiting schedule.
- Type of instrumentation used.

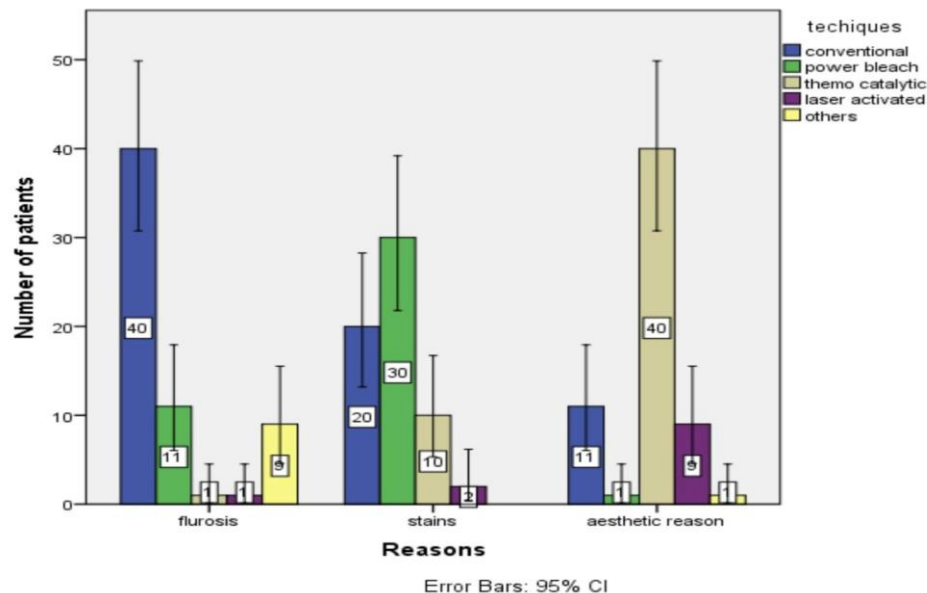
#### **Statistical analysis:**

The data was exported in Excel and analyzed using SPSS Version 23 Software. Bar chart are prepared through SPSS software. Chi square test was done to check that association between number of cases and techniques in vital bleaching.

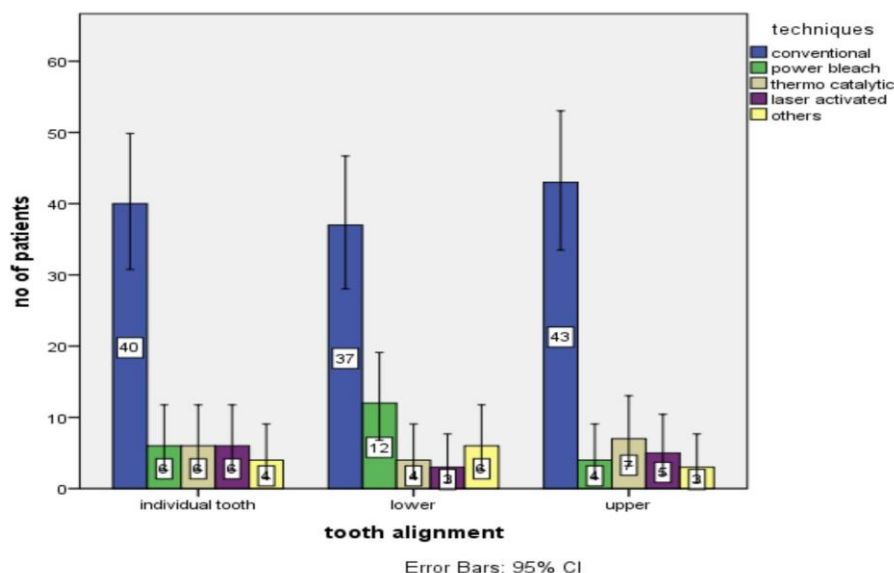
#### **Result:**

Totally there were 62 patients involved in this study of vital bleaching, the techniques that were involved are, conventional bleaching, power bleaching, thermo catalytic bleaching, laser activated bleaching, and there are also other techniques, the number of patients who did conventional bleaching are 40, number of patients who did power bleaching are 11, number of patients who did thermo catalytic bleaching are 1, number of patients who did laser activated bleaching is 1, number of patients who did other techniques are 9, patients who did vital bleaching in upper arch 36, patients who did vital bleaching in lower arch are 6, patients who did vital bleaching in individual tooth are 30, 44 patients did fluorosis, 10 patients did stains, 8 patients did esthetic reason. Ceramic veneers can completely mask the discolored tooth with minimal reduction of sound tooth substance because they require a minimally invasive design preparation. In addition, advances in ceramic materials have facilitated this process. Ceramic veneers provide both predictable and long-lasting aesthetic rehabilitation. Minimal gingival flash of the resin luting cement was removed with a number 12 scalpel blade. A flame-shaped fine diamond bur was used to finish the ceramic margins and to contour the embrasure (12–21) surfaces. Occlusion was assessed and adjusted. Flossing was performed to ensure interproximal contact patency. The durability and clinical success of porcelain veneers have been widely investigated in the literature. It has been reported that ceramic veneers provide durable and successful restoration with an estimated for 93.5% of patients over 10 years. This goal was achieved using ceramic veneers, which are the treatment of choice to mask tooth discoloration in cases of moderate to severe fluorosis. The two veneers of the central incisors were first simultaneously cemented. This was followed by cementation of the veneers of the two lateral incisors. Then, the veneers of the two

canines were cemented. Finally, veneers for the first and second premolars were cemented simultaneously on each side. Laser activation of the bleaching agent promotes the efficiency of the treatment but does not reduce postoperative sensitivity, conventional is the commonly used vital bleaching methods. The patient was presented with treatment options, which included ceramic or composite veneers, along with the advantages and disadvantages of each option. Bleaching has even been used successfully to increase the life of previous composite resin bonding by tightening the underlying tooth structure to compensate for the wear of the composite resin or to lighten the apparent color of veneers already cemented by lightening the underlying tooth structure .



**Figure 1:** The cluster graph represents the frequency distribution of various bleaching techniques like blue represents conventional, green represents Thermo catalytic, cream color represents Power bleaching, yellow represents laser technique and violet represents others, Reasons like for fluorosis, stains and aesthetic reasons. The conventional is mostly and commonly used method and least used method is thermo catalytic method. The chi square test is analyzed and p value =0.01, ( $p>0.05$ ) and is statistically not significant.



**Figure 2:** The cluster graph represents the frequency distribution of various bleaching techniques like blue represents conventional, green represents Thermo catalytic, cream color represents Power bleaching, yellow represents laser technique and violet represents others, site of bleaching in lower arch, upper arch and individual tooth. The conventional method is mostly and commonly used . The chi square test was analyzed and the p value= 0.01, ( $p>0.05$ )

and is statistically not significant.

### Discussion:

Since this study evaluated bleaching using different agents, it is important to consider dental sensitivity and gingival inflammation associated with whitening gels with increased concentrations. In order to prevent teeth sensitivity, this study used a protocol in all participants based on the literature with laser therapy and fluoride therapy after bleaching.(22) Both techniques were used since in-office whitening using a light source predisposes to tooth sensitivity. All groups received the same anti-sensitivity procedures for homogeneity among groups and to avoid any interference in the results.(23) The fact that no sensitivity was reported by participants may be explained by the use of combined anti-sensitivity therapies. Gingival assessment, dental prophylaxis and supragingival calculus removal aimed at ensuring a non-inflammatory gingiva, which could have prevented some participants from being enrolled in this study. During whitening, strategies associated with each treatment were used to prevent gingival inflammation.(24) In-office bleaching sessions were performed only after application of light-cure rubber dam, as instructed by manufacturers. At-home bleaching was performed with the gold-standard treatment, that is, 10% carbamide peroxide gel. The association of hands-on practical demonstration and written instructions given to participants, coupled with the use of scalloped trays to minimize the contact between the gel and soft tissues also might have contributed to prevent gingival inflammation.(25)

The variety of bleaching products available on the market for professional and non-professional use, as well as effective whitening even when agents with low hydrogen peroxide concentration are used called the attention of the authors to test a low-price non conventional bleaching over-the-counter product.(26) The 3% hydrogen peroxide product tested was able to whiten participants' teeth. Bleaching was detected by spectrophotometer, chosen in this study for shade matching due to its accuracy regardless of ambient illumination.(27) However, whitening was also noticed visually, as reported by participants from all groups. Even though no visual analogue scales were used in this study, a significant increase in lightness might have been responsible for this visual perception since it is the parameter better noticed by human eyes. (28)Analysis of lightness, chroma, and hue was conducted to evaluate whitening treatment in this study, as these are the three major color attributes.(29) Long-term lightness scores (60 days after treatment) were significantly higher after bleaching for all groups. That is, whitening treatments were effective regardless of the technique or concentration of the agent, which is in accordance with other studies. Literature shows that effectiveness and longevity of bleaching treatments are not related to the increase of whitening agent concentration. (30)

Therefore, statistical differences between G1 and G4 for canines, and between G2-G3, G1-G4, and G2-G4 for central incisors analysis do not impact the long-term stabilization of bleaching treatment since these differences were obtained only in short-term analysis in this study. Such differences should not be considered relevant for choosing the whitening technique.(31) Based on these analyses, the hypothesis initially posed was refuted. Chroma, another color property investigated in this study, did not change statistically after central incisors' whitening neither in short-term, nor in long-term evaluations. However, canines from G4 had a significant increase in chroma, impacting group comparisons in which lower scores for G1 and G2 were found. (30)This may seem contradictory to whitening outcomes, since a reduce in yellowness ( $b^*$ ) is expected, and chroma is directly proportional to  $b^*$  values mathematically. (32)However, the dentine chroma is more saturated, and canines have more dentin in comparison to incisors, leading to the difference found in this study. Even so, the present study is in agreement with other research that found different behaviors between canines and incisors regarding chroma changes after whitening. Hue changes were also different for incisors and canines in this study, which has been previously found. (33)Hue increased significantly in canines from G2 after whitening, but not for incisors. Although not statistically significant, hue also increased in G3. Studies show that hue is supposed to increase after teeth whitening. However, hue is not a primary variable and should be seen in context with color saturation.(34)The results of this study might have been influenced by some limitations of the 3% hydrogen peroxide chosen. First, the product used had no gel consistency. Liquid-based hydrogen peroxide has been only used as mouthwashes in the literature. Second, due to its flowability, the liquid might not have had a satisfactory contact with the frontal surface of the teeth, which may have compromised the uniformity of the whitening.(35) Finally, to the best of our knowledge, 3% hydrogen peroxide LED activation is not described in the literature and may have no influence on whitening. (36)

### Conclusion:

Within the limitations of this study, it can be concluded that Considering lightness, dentists and patients can decide either the 3% or 35% hydrogen peroxide in-office products, or 10% carbamide peroxide at-home bleaching technique to target whitening. The addition of 3% hydrogen peroxide to conventional in-office whitening only increased appointment time without improving whitening results.

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