



Clinical Evaluation of the Efficacy and Sensitivity of Teeth Whitening Using GloboDent's BlanQuest® Pro Whitening System: Clinical Case Series

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ABSTRACT

Teeth whitening is the procedure of choice to improve the whiteness of the teeth in the least invasive way, reason why it is highly recommended in scientific literature. Peroxides are the preferred material used to obtain predictable results in different concentrations, types and techniques. Hydrogen peroxide at 35% is described in the scientific literature as the concentration of choice for whitening with the In-Office technique, which is a technique that allows us to obtain immediate and fast results.

In this study, a total of 15 patients were evaluated, of which we selected 5 to perform the clinical tests presented as a clinical case, of them only 4 completed the established protocol. 35% hydrogen peroxide of GloboDent's BlanQuest® Pro brand was used, performing 2 sessions with 15 days of separation between one and the other, placing 3 applications of gel, each for 15 minutes with activation of blue LED light. Application of GloboDent's remineralizing gel and color taking with polarized light filter were made to avoid glare and to collect a more reliable tone with the vita classic guide.

Results: In all cases we obtained improvement from the initial tone of up to 2 or more tones, in some of them there was a slight regression at 15 days after stabilizing the color, improving again when applying the second session as described in the literature. Most patients had mild or no sensitivity, which disappeared within 48 hours of whitening. All patients expressed the improvement in their smile with this procedure and would perform it again in the future if necessary.

Conclusion: Teeth whitening is an aesthetically safe procedure that improves the whiteness of the tooth. The 35% hydrogen peroxide is an adequate formulation to obtain good and fast results with

the in-office technique, being the case of BlanQuest® Pro a product with the standards of the current scientific literature.

INTRODUCTION

Teeth whitening has now become one of the most demanded procedures by patients looking for aesthetics and recommended by doctors who want to offer a more conservative and less invasive solution to their patients as a method of obtaining "Whiter" teeth.

Whitening is defined as: the process of trying to increase the visualization of the "white of the tooth". (1) Being a concept that we can understand only when we understand the way in which teeth whitening works on the tissues in which it acts.

Current whitening materials work in a different range of compositions, with hydrogen peroxide being the most often used at different concentrations, while in recent years the use of carbamide peroxide, especially for the technique performed on an outpatient basis (home tray whitening) where the patient is the one who applies the product at home under professional supervision.

To perform a teeth whitening / bleaching, one of the most important steps after the diagnosis is the choice of the technique to be used, where 3 main techniques are currently handled: Office Technique or (In- Office Technique), Ambulatory Technique or (Home Technique) and Mixed Technique, where we combine the quick results of the Office Technique (In- Office) with the Ambulatory Technique (At Home). (2)

Once the technique to be used has been selected, both the Patient and the Clinician must understand that not all the teeth will reach the same white, or the imagined "White", since each tooth has its maximum shade of whitening that can be obtained naturally, regardless of the type of technique, material or number of applications used. (3,4)

Likewise, to be able to understand that not all teeth lighten in the same time or with the same speed as others, since each one in its structure has individual characteristics, a thing that we must be able to explain to the patient, also we have to understand it as clinical, because regardless of the concentrations in which we use hydrogen peroxide and / or carbamide in the treated cases, the more concentration or more exposure will not mean more whitening. (3,5,6)

The question then arises of the selection of which material should I use and which technique is the most convenient? To answer this question, we must understand that at present the 2 material compositions are hydrogen peroxide and carbamide peroxide (Hydrogen Peroxide plus Urea), where the concentration of a 10% carbamide peroxide is equivalent to 3.5% hydrogen peroxide. Hydrogen peroxide has an effectiveness time of 30 to 60 minutes, while carbamide by the addition of urea can last from 2 to 10 hours. A very important point is to know or verify the pH at which the product to be used will work at, since higher concentrations tend to work with more acidic

Ph's, causing the uncomfortable side effect of sensitivity and affecting or inflaming the dental pulp (3,4,7).

Most current research recommends the use of 35% hydrogen peroxide for the in-office technique and 10% carbamide peroxide for the outpatient technique, with which the results are achieved when the tooth surface is exposed for the appropriate time, clearing that the target will be given by the tooth, not just because of the product. (3,6,8-13)

After multiple reviews of the available scientific literature on teeth whitening, it was observed that most agree on 3 ways to apply teeth whitening products. The first is the one recommended by Dr. Van B. Haywood, where the application of 35% hydrogen peroxide is carried out in the office in 1 session consisting of 3 applications of 15 minutes; activated or not by Led light, combined with a second session a week or 15 days of 3 new applications to promote the duration of the whitening effect initially obtained or improving more the tonality of teeth. The second technique is the use of preformed trays (EVA formed trays), for the application of 10% carbamide peroxide for 30 minutes daily for 2 to 3 weeks, depending on the level of pigmentation to be treated. (2,14) Finally the last technique is one that has taken a lot of noise in recent years due to its results and prolonged effect of whitening, The "Mixed" Technique, where we previously made a print and model (of the teeth) in order to manufacture the preformed trays / EVA formed trays for homemade application, then we perform a session of 3 applications of 15 minutes in the office of hydrogen peroxide at 35%, followed by rest for 1 week and then start the process with the ambulatory product (carbamide peroxide 10% or hydrogen peroxide 6%) applied for 30 minutes daily for 1 to 3 weeks depending on the desired whitening effect.

Understanding all this, we proceeded in to carrying out this study, based on the presentation of a series of clinical cases, where we performed authorized clinical tests on multiple patients, performing the In- office technique exclusively, as described by Dr. Van B. Haywood in the scientific literature, using as the material of choice the 35% hydrogen peroxide of GloboDent's BlanQuest® Pro brand. This whitening gel promotes qualities described by the manufacturer of a slightly acidic and stable Ph through the time of application/procedure, less or no postoperative sensitivity and recommend the application of LED light, since in its composition there are photo initiators. Likewise, the kit includes a gingival protection barrier to prevent soft tissue burns due to hydrogen peroxide and remineralizing gel formulated with 2% potassium nitrate.

MATERIALS AND METHODS

For this study, 15 patients were enrolled, who were clinically evaluated to verify if they met the inclusion and exclusion criteria set forth for the study, established in Table 1.

Of these, 5 patients were selected, who met the inclusion criteria, and therefore a medical and dental history was made with the relevant data, as well as a clinical diagnosis of the teeth in general. Of these only 4 remained during the pre-established complete protocol, so only 4 clinical cases were presented.

Table 1:

Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Presence of the upper and lower incisors	Teeth treated endodontically
Have no history of previous dental trauma	Teeth with restorations covering more than 2/3 of the clinical crown.
All teeth to be treated should be vital.	Absence of more than 2 the more incisors.
Be between the ages of 18 to 50 years of age	History of allergy to hydrogen peroxide
No history of chronic tooth sensitivity	Patients with some type of autoimmune condition, pregnant women or children and / or adolescents under 18 years of age.
Have an A2 color pigmentation in front of the vita guide.	Patient with chronic tooth sensitivity.
Be willing to avoid the consumption of coffee, dyes or tobacco within 72 hours after the whitening process carried out.	Presence of very extensive restorations (crowns, extensive composite, etc.) in the teeth to be treated.
Be willing to return 15 days after the first session to perform a second session and repetition of the photos.	Presence of extensive gingival retractions, abrasion or abfractions.
Teeth that do not have pathologies of tissue formation (enamel, dentin)	Teeth with stains of intrinsic origin.

As a next step, we perform the explanation of the procedure and the guidelines of that were carried out, they were provided with a consent form, where pros and cons were detailed, as well as the important points of the procedure. It was signed by each of the participants as an authorization to participate in the clinical trial group.

As materials, for the taking of clinical photographs we used the Mobile Photography System "The Smile Lite MDP", which consists of LED lights that work as Twin-flash and / or Ring flash modulable, also including light diffusers for the Twin-flash and a polarized lens, which allows the taking of photos without brightness, therefore being an excellent tool for color verification that is often influenced by the quality and brightness of the light being used.

This device is recommended as a professional camera replacement, since this is used with the camera of your preferred Smartphone adjusted to its base, since as we know that current Smartphones have a high picture quality system in their cameras, a tool that saves us money when acquiring a system for dental photography. (See image 1)



Image 1: Smile Lite MDP photography device, for taking digital photography with Smartphone.

The Smartphone for mobile dental photography used in this study, we used the iPhone SE with 12MP camera with autofocus and aperture of F / 1.8, with digital zoom of up to 5X, 6-element lens and image stabilizer, which captures the images in JPEG format. (Image 2)



Image 2: Smartphone iPhone SE 1st Generation Apple.

The whitening material used was the BlanQuest® Pro of the Globodont brand, for use in the In-office technique, it is formulated as explained by the manufacturer with 35% hydrogen peroxide and comes as a gel already prepared of transparent color in a syringe ready for use, as well as includes in the kit a remineralizing gel to control post-bleaching sensitivity and gingival barrier. It is made to be used with activation light or without light, all depending on the technique that the operator wants to perform and is recommended that when not in use has to be storage in a refrigerated form. (See image 3)



Image 3: In- Office Teeth Whitening Kit (BlanQuest® Pro) from Globodent LLC.

The whitening technique used for this clinical trial was based on the one described by Dr. Van B. Haywood for In-Office whitening, where he recommends the application of 2 whitening sessions with an interval of 1 to 2 weeks between sessions to achieve better tones and prolong the teeth whitening effect for more time.

The protocol was initiated by performing a prophylaxis of the dental surface with ultrasound and Polish with prophylactic paste. A week later the tooth surface was polished again with prophylactic paste and the initial color/shade taking was made with classic vita guide, taking a polarized photo to record the shade, step that was repeated in each of the times that the color was taken during the study. We proceeded to ask about the presence of tooth sensitivity, with subsequent initial application of Remineralizing Gel for 5 minutes as established by the literature for prevention of sensitivity during and after whitening, regardless of whether the response on sensitivity initially was negative. The desensitizer was removed with water jet and subsequent drying of the dental surface with air to begin the application of gingival barrier, with photo-polymerization of the same using Colto Lux LED lamp from Coltene brand.

We immediately proceeded to the application of BlanQuest® Pro whitening gel, which has an exceptional thixotropy and does not produce bubbles during its application. This transparent gel is applied in a layer of approximately 1mm on each tooth to be treated. Once the gel was applied, it was activated with LED light for 15 minutes, a process that was repeated 3 times, removing the gel between sessions, since according to the literature it explains the hydrogen peroxide degrades after 15 minutes and its effect stops working. Between each application, the patient was questioned about the presence or not of tooth sensitivity, compiling their response on the procedure sheet.

At the end of the 3 applications, patient's teeth were rinsed with enough airless water in order to dilute the hydrogen peroxide, then we removed the gingival barrier and proceeded to the immediate color/shade taking, collected in polarized photograph, for verification of the changes in tonalities and subsequent application of the remineralizing gel included in the BlanQuest® Pro kit for 5 minutes in order to complete the procedure.

At 15 days after the initial whitening, the patients of the study group were recalled again, and the color data was re-collected to verify their stabilization or regression of the shade with the classic vita guide and new polarized photos were taken.

Once this phase was done, we proceeded to repeat the complete protocol of whitening in 3 sessions of 15 minutes with application of blue Led light, but this time we did not perform the pre-application of the remineralizing gel, it was only applied after the whitening process was finished.

We collected the color with the classic Vita guide and took polarized photos. We verified the post-operative sensitivity in each patient and an aftercare sheet was given with the post-operative care of teeth whitening and maintenance, including care in the diet to be ingested during the following 48 to 72 hours which includes to avoid the intake of pigmented foods that can give regression to the whitening performed.

PRESENTATION AND RESULTS OF TESTS AND/OR CLINICAL CASES.

Patient 1:

Female patient of 28 years of age, without any relevant medical condition. In her Dental history, she does not suffer from tooth sensitivity, and carries an adequate daily hygiene, without restorations in the anterior arch. Within her diet, she ingests coffee daily and a little less frequently soft drinks, juices, chocolates, and other foods with dyes. She reports that she has had in-office teeth whitening performed before and only presents dental restorations in the posterior sector.

At the initial evaluation and diagnosis appointment, dental prophylaxis and polishing of dental surfaces with prophylactic paste was performed, and the following week the patient was recalled for the first whitening session. At that time the color was taken with classic Vita guide, yielding as initial color a B2 (image 1). Subsequent cleaning of dental surfaces with prophylactic paste and application of the remineralizing gel for 5 minutes was completed (image 2).

Once the remineralizing gel was removed and washed, the gingival barrier was placed and the whitening gel was applied as explained in the protocol.

Once the whitening session was over, the immediate final color registration was carried out, managing to bring the tone to B1 according to the classic vita guide. (Image 3)

After 15 days we took the shade/color to check if there was any change or regression. Only the center-backs had a regression to B2, but the others remained in the same final tone that was B1.

We decided in this case only to make 2 new applications of 15 minutes with LED light, and immediately took color/shade with polarized photography (image 4) and subsequent application of remineralizing gel.

The immediate color obtained was WB (White Bleach) Coltene Color Guide, since the B1 tone of the vita guide was even darker compared to the tone obtained at the end of the second session. In the first session the patient reported a slight sensitivity and in the second session after fifteen days she didn't report any type of sensitivity.

After each whitening session, the patient received the post-whitening care guide for its maintenance and was satisfied with its results.



Image 1: Initial photo



Image 2: Initial color shot vita classic guide, shade obtained is the B2.



Image 3: application of GloboDent remineralizing gel for 5 minutes, before and after the procedure, this was done in all cases.



Image 4: results after the first whitening session, tone achieved B1.



Image 5: taken after 15 days, the results obtained after the first session was maintained.



Imagen 6: tone obtained after the second session; it is clearer than B1 in the vita guide (lighter tone of the whole guide)

CASE 2:

Female patient of 18 years of age, in her medical history, occasionally suffers from iron deficiency anemia and sinusitis, data that are not relevant as a contraindication of the procedure. Likewise, she is not currently taking any medication.

In her dental history she does not present any pathological clinical data, except for having previously orthodontics and therefore at the time of its removal, the enamel was slightly worn. Teeth whitening has never been done before on her teeth.

As described in the clinical protocol, the procedure was explained to the patient, advantages and disadvantages were informed, as well as steps to follow. A week later the patient was recalled, and initial color was taken with polarized photos with the classic vita color guide, obtaining the initial color of A3. (See image 1)

We began the procedure with cleaning the tooth surface as described in the protocol. Also, We verified the sensitivity between each of the applications, being nonexistent as indicated by the patient. At the end of the first session, we managed to obtain a color according to the classic vita guide of A1, verified in the polarized photos (see picture 2)

After 15 days the patient returned, we retook the color having a slight regression by stabilizing the color to A2 tone with the classic vita guide (See picture 3), we performed the entire protocol of the first session, only without applying the remineralizing gel initially, which was applied until the end.

At the end we got again the initial color obtained in the first session of A1 according to the classic vita guide (image 4). During this new application the patient did not report any dental sensitivity of any kind, even though as a clinic it was expected due to the slight wear on the enamel that this would occur, demonstrating the quality and protection of the dental structure that this product has.



Image 1: Initial color shot with polarized filter to eliminate brightness and obtain a more reliable tone. The starting tone is an A3 Vita Classic guide.



Image 2: A1 tone obtained at the end of the first whitening session.



Image 3: Shows the tone (A2), stabilized 15 days after the first session, where a slight regression of the tone initially obtained is observed, which was A1.



Image 4: sample of the final tone obtained (B1) after the second whitening session carried out at 15 days, where we improved the tone despite the regression as a result of color stabilization.

Patient 3:

A 27-year-old male patient in the last 12 months was under medical treatment to treat some post-COVID-19 sequelae. In his medical history he only reports suffering from sinusitis, allergic rhinitis, and asthma sporadically. None is a contraindication to perform teeth whitening so far.

In his dental medical history, he does not report previous presence of dental sensitivity, has previously done whitening (the last one 3 years ago), and maintained good dental hygiene and agreed not to drink coffee or dyes during the 48 hours following the teeth whitening procedure.

The initial color obtained in the polarized photos was B2 of the Vita Classic guide. The work protocol was carried out as in the other cases as it was standardized. The patient did not present any sensitivity during any of the applications. Once the first session was over, we took the color with the classic vita guide, achieving the A1 tone.

After 15 days we took a new color shade as stipulated in the protocol and we had no color variation, which was very satisfactory.

Once applied the second session we verified for the last time the color and obtained as a tone the B1 color which is the clearest of all in the vita guide, making more noticeable the difference between the restoration previously existing in the patient and the natural tooth, being these changed as recommended by the scientific literature 2 to 3 weeks after having done the whitening.



Image 1: Photo taken with polarized filter to eliminate brightness and collect the most reliable tone. The initial tone is B2 taken with Vita Classic guide. The centrals have restorations in the incisal edge.



Image 2: Tone A1 obtained after the first whitening session, note that we eliminated all the margin of restoration that was on the vestibular surface of the teeth.



Image 3: Taking the color at 15 days, we took the shade when we were going to start placing the gingival barrier. In this case the stabilized tone was the same obtained after the first session (A1).



Image 4: final tone obtained after the second session, which is B1, significantly improving the initial tone of the patient. Restoration changes were made 1 month after the second session.

Patient 4:

Female patient of 24 years of age, without any pathological clinical health data, reported good oral hygiene and no habits, except drinking coffee 1 time a day. During the dental clinical history, we are told she experiences light tooth sensitivity, and in-office teeth whitening has been previously performed more than 1 year ago.

We started the protocol stipulated for the study and in the color taking with classic vita guide taken with polarized photos we captured the A2 tone as an initial shade before the dental clearing process.

We explained the protocol to be carried out, which was accepted by the patient as well as the previous cases. At the end, we took the color shade and obtained as final tone A1. Throughout the process the patient did not report any tooth sensitivity.

Fifteen days later, as established in the protocol, the patient returned for check-up and a new whitening session. we performed the color verification and had a slight regression of the tone towards the A2. We verified with the patient if there was any use of pigmenting substances during the first 48 hours, to which the patient responded negatively, so apparently, she had not consumed any pigmenting substance. We also carried out a verification on the state of her sensitivity to which she explained that she presented slight sensitivity during the first 48 hours after the initial whitening and that later it disappeared. She stated that the sensitivity was not uncomfortable or persistent, only momentary.

In this second session we made 2 applications of 15 minutes each with LED light activation, since during the second application the patient began to present slight sensitivity. When removing all the material, we took the color shade with the classic vita guide and were able to again obtain an A1 tone with inclination to B1, since it was a little clearer than the A1 color. We placed remineralizing gel included in the whitening kit used and finished the process of clearing the patient, who was very satisfied with the results obtained.



Image 1: Initial color taking of the patient, this being an A2 tone with vita classic guide.



Image 2: Tone A1, obtained after the first whitening session with 3 applications.



Image 3: Color shot 15 days after color stabilization, where we had a regression to the original tone that was A2.



Image 4: Final color obtained after the second whitening session, where we improve to a B1 tone, the clearest of the vita guide, demonstrating the importance of performing at least 2 whitening sessions in the cases we treat.

DISCUSSION

In this in-vivo study, we used the clinical trial method as a form of clinical cases, in order to be able to obtain and verify the results of the procedure in real time, as well as the confirmation of the capacity given by the technique used and the materials used in order to obtain reliable results according to the scientific data obtained in previous studies. It was also carried out within all ethical parameters and under prior approval of the patients who decided to participate in it.

The in-office whitening technique is one of the most used methods due to the fast and reliable results obtaining by its application. It has been proposed with various modifications, in terms of application time, number of sessions, percentage of concentration of the peroxides used, among others.

The application method we decided to use in our study was based on the recommendations or protocol proposed by Dr. Van B. Haywood and Marson et al. This method consists of an initial session with or without light application, where you apply the gel 3 times in a time frame of 15 minutes each, then wait a period of 15 days, because during this time the color stabilizes, since as we know the tooth goes through a process of dehydration, making it necessary to perform a second session to regain and improve the color if needed, also to help it to lasts through time. (15,16,17)

The importance of performing more than 1 whitening session is that, in some cases, during the first 15 days we will present a color stabilization, where there is a chance of presenting a slight regression of the original tone obtained at the end of the first session, due to the dehydration process of the tooth. Therefore, a second session allows us to improve the tone more and have a lower percentage of regression after the stabilization period, as demonstrated in our study.

Hydrogen and carbamide peroxides have proven to be the ideal substances to improve the tone of the teeth, in a non-invasive and / or aggressive way compared to other more abrasive methods with tooth enamel. They work by oxidizing the chromophores present on the tooth surface, managing to increase and improve the white of the tooth. (1)

The 35% hydrogen peroxide is the most used to perform the in-office technique, because its concentration is powerful enough to provide a quick effect, but at the same time not as aggressive on the enamel as the higher concentrations have shown to be. (11,16,17) In our study, we used GloboDent's BlanQuest® pro whitening gel, which is 35% hydrogen peroxide with a pH of 5.5, which allows it to work efficiently and minimizes postoperative sensitivity.

In our clinical trials we were able to obtain improvement results of 2 or more tones, measured with the vita classic guide, with the presence of mild or no sensitivity in most cases, as explained by the brand of products used.

It should be noted that the change in tonality is better perceived if in our protocol we use the taking of before and after photographs; this should preferably be done with a professional camera, or in the case of not having one, we can use our smart devices or Smartphone with an adequate light source, as we did in this study. In this way the patient will perceive the results better and appreciate more the improvement obtained.

CONCLUSION

Teeth whitening is one of the safest and most effective procedures to improve the whiten of the teeth. All the techniques described in the literature allow us to obtain good results. Within them, the in-office technique is highly recommended to obtain quick results, but patients must qualify for it.

35% hydrogen peroxide is the ideal material for the in-office technique, since it is a concentration powerful enough to produce immediate results, apart from being the most used by dentists.

The pH of the product, application time, number of sessions and the quality of the dental structure are fundamental points to obtain good results with teeth whitening, since not all teeth will clarify in the same way, regardless of the material and technique we use, so it is recommended not to create a high expectation in the patient with the procedure, since the tooth will lighten what its structure allows it to clarify.

We recommend continuing to carry out studies and clinical tests in order to collect more data that may be useful to support the progress of this minimally invasive procedure, which gives predictable results, since otherwise the other method to recover aesthetics involves the wear of tooth enamel, which is a very valuable dental tissue that we must preserve.

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