Pre- and postoperative dexamethasone does not reduce bleaching-induced tooth sensitivity
A randomized, triple-masked clinical trial

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ABSTRACT

Background. Tooth sensitivity (TS) is the most common side effect of dental bleaching therapies. Dexamethasone has been used with tooth bleaching to reduce TS. The efficacy of dexamethasone for this purpose has not been well studied.

Methods. The authors conducted a triple-masked, randomized, clinical trial with a parallel design involving 63 healthy participants who received either a placebo or dexamethasone. The placebo or dexamethasone (8 milligrams) was administered 1 hour before the in-office bleaching (35% hydrogen peroxide) and extra doses of 4 mg were administered every 6 hours for a total of 48 hours. TS was recorded on 2 scales: visual analog scale (0-10) and numeric rating scale (0-4) in different periods. The color evaluations were performed before and 1 month after dental bleaching with visual shade guides VITA Classical (VITA Zahnfabrik) and VITA Bleachedguide 3D-MASTER (VITA Zahnfabrik), and for a shade guide evaluation, the authors used a digital spectrophotometer, VITA Easyshade (VITA Zahnfabrik). The absolute risk of TS was evaluated by a Fisher exact test. Data of TS intensity using the NRS scale for the 2 groups were compared with Mann-Whitney and Friedman tests, whereas data from the visual analog scale were evaluated by 2-way repeated measures analysis of variance. The color changes between groups were compared using a t test ($\alpha = .05$).

Results. In both groups, the authors detected a high risk of TS, which was approximately 90%. No significant difference was observed in terms of TS intensity. A whitening of approximately 3 shade guide units of the VITA Classical was detected in both groups, which were statistically similar.

Conclusions. The use of dexamethasone before bleaching did not reduce the risk and intensity of bleaching-induced TS.

Practical Implications. The use of the steroidal anti-inflammatory agent dexamethasone was not capable of preventing TS arising from in-office dental bleaching.

Key Words. Dentin sensitivity; hydrogen peroxide; anti-inflammatory agents.

Brazilian Clinical Trials Registry RBR-6pt2n3.

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after in-office bleaching. Although the mechanism of bleaching-induced TS is not well understood, it seems to result from a reversible inflammatory process due to damage produced by hydrogen peroxide in the pulp. This pain is usually mild and resolves within 48 hours after the protocol. Nevertheless, in some cases the bleaching-induced TS can be severe and responsible for patients’ withdrawal from treatment.

In light of these results, many investigators have proposed clinical trials that attempt to reduce this bleaching-induced TS, such as the use of less concentrated bleaching products and their use for shorter periods. The use of topical desensitizing agents (fluorides, potassium nitrate, glutaraldehyde) before or after dental bleaching has shown promising results.

Since 2009, some authors have investigated the role of anti-inflammatory drugs on the reduction of this adverse effect. In their studies, the preoperative use of ibuprofen, a nonsteroidal anti-inflammatory drug, reduced the immediate bleaching-induced TS; however, ibuprofen was not effective, however, to reduce the pain within the next 48 hours. Even the use of a selective anti-inflammatory drug (etoricoxib 60 milligrams) was not capable of reducing the experience and intensity of bleaching-induced TS.

Ibuprofen is believed to work through the inhibition of both constitutive cyclooxygenase-1 and inducible cyclooxygenase-2, whereas etoricoxib is a selective cyclooxygenase-2 anti-inflammatory drug. Perhaps the use of a more potent anti-inflammatory drug, such as corticosteroids, could be more effective. Dexamethasone, a synthetic member of the glucocorticoid class of steroid drugs, has been primarily used in dentistry for oral surgeries and endodontic treatments due to its powerful anti-inflammatory effects in reducing pain, edema, and inflammation.

In both general medicine and dentistry, steroids can reduce or prevent pain by blocking the entire arachidonic acid pathway and by a variety of mechanisms including disruption of the arachidonic acid pathway, blocking the production of inflammatory mediators, and sensitization of nociceptors. Its use would be of great value for procedures in which postoperative pain and edema is anticipated. To our knowledge, research has yet to be published investigating whether bleaching-induced TS can be prevented or not by the preoperative use of dexamethasone. Therefore, we conducted this parallel, triple-masked, randomized clinical trial to evaluate the effect of dexamethasone, administered preoperatively, on TS caused by in-office bleaching with 35% hydrogen peroxide. Furthermore, we tested the hypothesis that the preventive use of a dexamethasone drug would not affect the absolute risk of TS.

METHODS

The clinical investigation was approved (protocol number 172.988) by the scientific review committee and by the committee for the protection of human participants of the local university. It was registered in the Brazilian clinical trials registry under the identification number RBR-6pt2n3. We prepared this article using the protocol established by the Consolidated Standards of Reporting Trials statement. Based on pre-established criteria, we selected 63 volunteers for this study. The study was performed from November 11, 2013, to March 3, 2014, in the city of Ponta Grossa (Paraná, Brazil).

Two weeks before the bleaching procedures, all volunteer participants received a dental prophylaxis with pumice and water in a rubber cup and signed an informed consent form.

**Study design.** This was a randomized, parallel, placebo-controlled, triple-masked clinical trial, in which the patient, operator, and evaluator were masked to the group assignment. A third researcher, not involved in the evaluation process, was responsible for the randomization process, and delivery and guidance on the administration of the drugs.

**Inclusion and exclusion criteria.** Participants included in the clinical trial were at least 18 years old, had good general and oral health, and did not report any type of TS. The participants were required to have 6 caries-free maxillary anterior teeth without restorations, be free of periodontal disease, and review and sign the informed consent form. The central incisors had to be shade A1 or darker as judged by comparison with a value-oriented shade guide (VITA Classical, VITA Zahnfabrik). Despite the color shade A1 being one of the lightest colors measurable using VITA Classical, many patients with A1 shade teeth seek dental bleaching as they are dissatisfied with the color of their teeth.

Two calibrated investigators (M.R. and E.B.) independently performed the color evaluations with the shade guide. The 2 examiners, masked to the allocation assignment, scheduled the participants for bleaching, and evaluated their teeth against the shade guide at baseline and 1 month after the procedure. The 2 examiners were required to have an agreement of at least 85% (k statistic) before beginning the study evaluation.

Participants with anterior restorations or dental prosthesis, with orthodontics apparatus, with severe internal tooth discoloration (tetracycline stains, fluorosis, pulpless teeth) were not included in the study. In addition, pregnant and lactating women, participants with any other pathology that could cause sensitivity (such as recession, dentinal exposure, visible cracks in teeth), taking anti-inflammatory or analgesic drugs, smoking, bruxing, or participants who had undergone

**Abbreviation key.** \( \Delta_E \): Color change measured with the spectrophotometer. \( \Delta_DSGU \): Change in the number of shade guide units. TS: Tooth sensitivity.
tooth-whitening procedures were excluded. Those who reported past or present health problems in the stomach, heart, kidney, or liver; continuous use of anti-inflammatory or analgesic drugs; diabetes; hypertension or antihypertensive drugs; or allergies to dexamethasone and lactose were also excluded from the study.

**Sample size calculation.** The primary outcome of this study was the absolute risk of TS. The absolute risk of TS (that is, the number of patients [percent] who reported pain at some point during dental bleaching) was reported to be approximately 87% for the bleaching product Whiteness HP Maxx (FGM Dental Products). Thus, a minimum sample size of 56 participants was required to have a 90% chance of detecting, as significant at the 2-sided 5% level, a decrease in the primary outcome measure from 86% in the control group to 50% in the experimental group.

**Random sequence generation and allocation concealment.** We used blocked randomization (block sizes of 2 and 4) with an equal allocation ratio. Opaque and sealed envelopes containing the identification of the groups were prepared using a third-party service (Sealed Envelope), which did not intervene in the study.

**Study intervention.** We divided patients into dexamethasone and placebo groups. All patients received the same bleaching treatment, which was performed by a single operator (M.R.). One hour before the in-office bleaching, patients received either the dexamethasone (Decadron, Aché Pharmaceutical Laboratories) or placebo in identical capsules. The operator administered the first dose of dexamethasone (8 mg) 1 hour before the protocol, and extra doses of 4 mg were administered every 6 hours for 48 hours to keep a safe maximum dosage daily of 21 mg.

We removed the tablets of dexamethasone from their original packaging and inserted them whole into empty capsules. We stored the capsules in individual pots containing 8 capsules in total, being one 18-mg capsule (identified by red and white color) and seven 4-mg capsules (identified by green and white color). We prepared the placebo capsules in the same way described above. The capsules contained the same components of the dexamethasone drug except the active ingredient (starch [50%], lactose monohydrate [35%], dibasic calcium phosphate dehydrate [14%], and magnesium stearate [1%]).

After the end of the bleaching session, the operator instructed the participants to take the extra doses of the medicine every 6 hours for 48 hours. To increase adherence to the protocol, researchers made telephone calls and sent cell phone text messages to remind participants of every capsule to be taken.

One hour before starting the bleaching application, the researcher responsible for drug administration gave the 8 mg capsule to the patient. Then, they isolated the gingival tissue of the teeth to be bleached using a light-cured resin dam (Top Dam, FGM Dental Products), and each tooth was light-cured for 10 seconds (Radii-cal, SDI). After placement of a lip retractor (Arcflex, FGM Dental Products), the researcher used the 35% hydrogen peroxide gel (Whiteness HP Maxx) in three 15-minute applications for both groups in accordance with the manufacturer’s directions. The researcher refreshed the in-office bleaching agent every 15 minutes during the 45-minute application period. Two bleaching sessions were performed 1 week apart. All participants were instructed to brush their teeth regularly using fluoridated toothpaste.

**TS evaluation.** The researcher evaluated the TS during bleaching, and up to 1 hour, 24 hours, and 48 hours postbleaching. The patient was asked to indicate the numeric value of the degree of sensitivity for each of the periods above, using a 5-point numeric rating scale (NRS) in which 0 = none, 1 = mild, 2 = moderate, 3 = considerable, and 4 = severe.

In addition, the participants were also instructed to record the pain intensity using the visual analog scale (VAS). This scale is a 10-centimeter horizontal line with scores of 0 and 10 at their ends, in which 0 = no sensitivity, and 10 = severe sensitivity. The patient should mark with a vertical line across the horizontal line of the scale the intensity of the TS. Then, the distance in millimeters from the zero ends was measured with the aid of a millimeter ruler.

The data from each bleaching session were evaluated separately and were merged. For this purpose, the worst score or numeric value obtained in both bleaching sessions was considered for statistical purposes and determination of the overall risk and intensity of TS.

If the participant scored 0 (no sensitivity) in all time assessments from both bleaching sessions, this participant was considered to be insensitive to the bleaching protocol. In all other circumstances, the participants were considered to have sensitivity to the bleaching procedure. This dichotomization allowed us to calculate the absolute risk of TS, which represented the percentage of patients who reported TS at least once during treatment. We also calculated the overall TS intensity.

**Color evaluation.** We recorded shade evaluation before, 1 week after the first bleaching session, 1 week after the second bleaching, and 1 month after the bleaching treatment. We never performed color evaluation immediately after each bleaching session so that the effect of dehydration and demineralization on color measures could be avoided. We performed the color evaluation using the shade guides VITA Classical and the VITA Bleachedguide 3D-MASTER. In addition, we performed an objective color evaluation with the spectrophotometer VITA Easyshade (VITA Zahnfabrik).

For the subjective examination, we arranged the VITA Classical shade guide’s 16 tabs from highest (B1) to lowest (C4) value. Although this scale is not linear in the truest sense, we treated the changes as representing
a continuous and approximately linear ranking for the purpose of analysis, as already performed in several published studies.\textsuperscript{3,4,5,8,9,15,16,25-27} The VITA Bleachedguide 3D-MASTER contains lighter shade tabs and is already organized from highest (0 M1) to lowest (5 M3) value.\textsuperscript{24} The measurement area of interest for shade matching was the middle one-third of the facial surface of the anterior central incisor, according to the American Dental Association guidelines.\textsuperscript{4,12,25}

The 2 examiners, masked to the allocation assignment, scheduled the participants for bleaching and evaluated their teeth against the shade guide at the different time assessments. Color changes were calculated from the beginning of the active phase up to and including the individual recall times by calculating the change in the number of shade guide units (ΔSGU), which occurred toward the lighter end of the value-oriented list of shade tabs. In the event of disagreements between the examiners during shade evaluation, a consensus was reached through discussion.

For the objective examination, before the spectrophotometer measurement, the examiner took an impression of the maxillary arch with dense silicone paste (Coltoflex and Perfil Cub Kit, Vigodont). The impression was extended to the maxillary canine and served as a standard color measurement guide for the spectrophotometer. For each dental component to be evaluated, we created a window on the labial surface of the molded silicone guide using a metal device with a radius of 6 millimeters and well-formed borders.\textsuperscript{3} We determined the shade using the parameters of the spectrophotometer on which the these values were indicated: L*, a*, and b*, in which L* represents the luminosity (value from 0 [black] to 100 [white]), and a* and b* represent the color shade, in which a* is the measurement along the red-green axis and b* is the measurement along the yellow-blue axis, respectively. The color comparison before and after treatment is given by differences between the 2 colors—color change measured with the spectrophotometer (ΔE)—which is calculated using the formula: $ΔE = [((ΔL*)^2 + (Δa*)^2 + (Δb*)^2)]^{1/2}$.\textsuperscript{26}

**Statistical analysis.** We performed the analysis after the intention-to-treat protocol, and we involved all participants who were randomly assigned.\textsuperscript{21} In cases of missing data, the last observation was carried forward. The statistician was masked to study groups. We compared the absolute risk of TS for both groups using the Fisher exact test ($α = .05$). We calculated the relative risk as well as the confidence interval for the effect size.

We performed the comparison of the TS intensity (NRS data) of the 2 groups at the 2 different assessment points using the Mann-Whitney $U$ test. We performed comparisons between times within each group using the Friedman test. We performed the comparison of the TS intensity obtained with the VAS scale with a 2-way repeated measures ANOVA. We compared the color changes between groups (ΔSGU and ΔE between baseline versus 1 month postbleaching) using a $t$ test. In all statistical tests, the significance level was .05. We performed all analyses by using the software SigmaPlot version 11.0 (Systat Software).

**RESULTS**

We screened 104 participants, examined in a dental chair to check if they met the inclusion and exclusion criteria (Figure).

**Characteristics of included participants.** The baseline color of the participants was similar (placebo: mean [standard deviation {SD}], 4.8 [2.8] and dexamethasone: mean [SD], 5.3 [2.7]); the mean age (SD) between participants was similar between the groups (placebo: 22.4 [3.6] and dexamethasone: 22.7 [4.5]), ranging from 18 to 33 years. Forty-six percent of the participants from the placebo group, and 39% of the participants from the dexamethasone group were men.

**Protocol adherence and dropouts.** Four participants discontinued intervention in the clinical investigation, 2 in each group. They were a part of only the first bleaching session. One participant from the placebo group discontinued intervention due to severe sensitivity and the other 3 patients claimed lack of time. All participants attended the recall visit 1 month postbleaching, except 1 participant from the dexamethasone group. For these participants, the last observation was carried forward for statistical purposes to keep the intention-to-treat analysis.\textsuperscript{21}

One patient from the dexamethasone group reported not taking the 4 mg capsules after the first bleaching session because he did not understand how to take it. Another patient from the dexamethasone group did not take 6 capsules after the second bleaching session due to the development of an allergic reaction. The figure depicts the participant flow diagram in the different phases of the study design.

**TS.** Three patients from the placebo group and 4 from the dexamethasone group took an analgesic to alleviate the bleaching-induced TS (Tylenol, Janssen-Cilag Farmacêutica). Another 2 from the placebo group self-administered an anti-inflammatory drug (Nimesulida, Medley, Campinas) due to severe TS.

Data from the 2 bleaching sessions were statistically similar ($P > .05$; data not shown), meaning that the pattern of bleaching-induced TS did not change between sessions. In the face of this similarity, what follows are the data from the overall risk and intensity of TS, irrespective of the bleaching session.

In regard to the absolute risk of TS, no significant difference was observed between groups as seen in Table 1 ($P = .99$). The relative risk, along with the 95% confidence interval, is also evidence that the use of the experimental drug had no effect on the reduction of TS. In regard to TS intensity (Tables 2 and 3), the groups did not differ statistically under the 2 pain scales used in this study.
Clearly, the bleaching-induced TS did not last longer than 24 hours after the bleaching protocol (Tables 2 and 3).

**Color evaluation.** Significant whitening was observed in both study groups under the subjective and objective evaluation methods ($P < .001$). The descriptive data from bleaching obtained after the first and second bleaching sessions can be seen in Table 4. At the end of the bleaching protocol, a whitening of approximately 3 shade guide units was detected for both groups and the $\Delta E$ varied by approximately 6.0 units (Tables 4 and 5). The results of the subjective (VITA Classical: $P = .642$; VITA Bleachedguide 3D-MASTER: $P = .775$) and the objective evaluation with the spectrophotometer ($P = .582$) matched the hypothesis of equality between the groups after bleaching. The effect size and the confidence interval for the overall mean difference is also shown in Table 4 and is evidence of no statistical difference between groups.

**Adverse effects.** Seven patients from the dexamethasone group had allergic reactions to the medicine with reddened skin resembling acne on the face and neck. One of these 7 patients had that reddened skin reaction extending down the thorax, abdomen, arms, and legs.
TABLE 1

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>TOOTH SENSITIVITY (NO. OF PARTICIPANTS)</th>
<th>ABSOLUTE RISK (95% CONFIDENCE INTERVAL)</th>
<th>RISK RATIO (95% CONFIDENCE INTERVAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>Yes: 27 No: 3</td>
<td>90 (76-97)</td>
<td>1.01 (0.86-1.18)</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>Yes: 30 No: 3</td>
<td>91 (74-97)</td>
<td></td>
</tr>
</tbody>
</table>

* Fisher exact test (P = .99).

TABLE 2

<table>
<thead>
<tr>
<th>ASSESSMENT TIMES</th>
<th>PLACEBO</th>
<th>DEXAMETHASONE</th>
<th>GROUP COMPARISON</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Bleaching</td>
<td>1 (1-2)a</td>
<td>2 (1-3)a</td>
<td>NS</td>
</tr>
<tr>
<td>Up to 1 H</td>
<td>2 (1-3)a</td>
<td>2 (1-3)a</td>
<td>NS</td>
</tr>
<tr>
<td>Up to 24 H</td>
<td>1 (0-1.2)b</td>
<td>1 (0-1)b</td>
<td>NS</td>
</tr>
<tr>
<td>Up to 48 H</td>
<td>0 (0-0)c</td>
<td>0 (0-0)c</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Within each column, significant differences are represented by uppercase letters.
† NS: No significant difference between groups.

TABLE 3

<table>
<thead>
<tr>
<th>ASSESSMENT TIMES</th>
<th>PLACEBO</th>
<th>DEXAMETHASONE</th>
<th>GROUP COMPARISON</th>
</tr>
</thead>
<tbody>
<tr>
<td>During Bleaching</td>
<td>2.7 (2.3)a</td>
<td>3.2 (2.7)a</td>
<td>NS</td>
</tr>
<tr>
<td>Up to 1 H</td>
<td>3.5 (2.9)a</td>
<td>3.5 (2.7)a</td>
<td>NS</td>
</tr>
<tr>
<td>Up to 24 H</td>
<td>2.2 (2.8)b</td>
<td>1.9 (2.6)b</td>
<td>NS</td>
</tr>
<tr>
<td>Up to 48 H</td>
<td>0.4 (1.7)c</td>
<td>0.2 (0.8)c</td>
<td>NS</td>
</tr>
</tbody>
</table>

* Within each column, significant differences are represented by uppercase letters.
† NS: No significant difference between groups.

all patients, except 1, this allergic reaction occurred only after the second bleaching session. Two patients reported heartburn during treatment.

In 6 of the 7 volunteers, the side effects appeared only after they had taken the last capsule of the drug. No treatment was administered to these 6 patients. The redness disappeared soon after the medication ended (within the next 24 hours) and acne-type lesions were gone in less than 1 week. A dermatologist prescribed an antiallergy agent (the patient did not report the type or name of the medicine) for the participant whose face, thorax, abdomen, arms, and legs were afflicted. The participants reported heartburn only on days they took the drug; the reddened skin disappeared shortly after administration of the last dexamethasone capsule.

DISCUSSION

The high prevalence of bleaching-induced TS, shown by previous studies,47-50 was confirmed in our investigation. Approximately 90% of participants in both groups reported TS at some stage of bleaching. Pain is the result of activation of sensory structures called nociceptors.27,28 It is believed that pulpal pain is a consequence of the inflammatory response due to tissue damage.31 In the inflamed tissue, vasodilation and increased vascular permeability occur, resulting in edema formation and increased internal pressure. This stimulates nociceptors, which triggers pain.32 It has been reported that the application of hydrogen peroxide produces a transient inflammatory reaction in the pulp chamber,33,34 with the release of bradykinin35 and substance P.36 These 2 substances are known to be involved in the processes of pulpal pain and inflammation.36,37

The rationale behind the conduction of this study is that glucocorticoids, such as dexamethasone, are known to inhibit the expression of multiple inflammatory mediators (cytokines, enzymes, receptors, and adhesion molecules), and to inhibit the transcription of several cytokines that are relevant in inflammatory diseases.39 Our expectation was that TS could be prevented by dexamethasone administration, as this drug blocks the entire arachidonic acid pathway, reducing the production of inflammatory mediators,47,59,20,39 which sensitize nociceptors. The failure of the dexamethasone to prevent pain during and after bleaching suggests that the production and release of inflammatory mediators does not play an important role in the development of bleaching-induced TS; therefore, other mechanisms must play this role.

According to Markowitz,41 the bleaching-induced TS can be a result of direct activation of neuronal receptors by the hydrogen peroxide. Markowitz47 suggested that the transient receptor potential cation channel, subfamily A, member 1 (TRPA1 ion channel) gene, TRPA1, as being responsible for oxidizer-induced pain.39 Peroxides and other oxidizing agents can oxidize cysteine residues in...
the TRPA1 ion channel, resulting in their activation, triggering pain. In addition, the intracellular reaction of peroxide with iron ions to produce oxygen radicals, via the Fenton reaction, also contributes to the activation of TRPA1’s cysteine residues by peroxides. If this is the cause of bleaching-induced TS, the use of an anti-inflammatory drug, such as the one investigated in our study and other studies, will not reduce the pain experienced during and soon after bleaching.

An argument can be made that the pulp tissue inserted into mineralized and restrained tissues might restrict blood flow, mainly when there is edema, preventing dexamethasone from reaching the extracellular fluid of the pulp tissue and exerting an effective anti-inflammatory reaction. A similar condition occurs when administering antibiotics to teeth with irreversible pulpitis. The lack of effectiveness of the antibiotics in reducing the number of analgesics taken by patients might be related to the fact that this substance does not reach the target site in therapeutic concentrations. Yet, this explains why dexamethasone is effective to reduce pain resulting from surgeries. In soft tissue, edema can occur freely without restriction imposed by a closed, mineralized tooth. In addition, in bleaching procedures, dexamethasone is administered concomitant to the causative agent, which can cause continued activation of nociceptors until their complete elimination of the pulp tissue by endogenous catalases.

So far, all the studies that attempted to investigate the oral administration of nonsteroidal and selective and nonselective anti-inflammatory drugs, for control of bleaching-induced TS failed to mitigate sensitivity. The most successful approaches for reduction of TS were achieved by topical application of a potassium nitrate–based gel and a glutaraldehyde-containing product. The former prevents the repolarization of the nerve fibers whereas the mechanism of action of the latter is yet to be understood. Further studies should focus on the topical application of products that prevent nerve fiber repolarization, making the dentin-pulp complex insensitive to this reversible but existent damage produced by hydrogen peroxide.

Our study used 3 methods for color evaluation. Although the spectrophotometer provides an objective color assessment, previous studies reported that shade guides showed more accurate visual correlation and allowed more accurate monitoring, and consistent and reliable color of teeth. VITA Classical is frequently used in dental bleaching studies; however, it has a nonlinear color arrangement, as it was not primarily designed for evaluation of dental bleaching. This was the reason we also used the shade guide VITA Bleachedguide 3D-MASTER. It is a newer shade guide organized from lowest to highest value; it also contains lighter shade tabs.

The means and standard deviations in Table 5 show the change in shade guide units obtained with 2 shade guides and the color change measured and obtained by spectrophotometer at baseline versus 1-month postbleaching.
with subtle color gradation and more uniform color distribution compared with VITA Classical. In addition, the Bleachedguide was scored as the easiest to rearrange, and the most preferred for dental bleaching monitoring and other dental procedures that require shade matching. Unfortunately, few studies have reported using this shade guide, which prevents us from making comparisons with published studies using this scale.

Based on the VITA Classical guide, our study showed an effective bleaching of approximately 3 SGU for both groups. This is lower than the change of 5 to 8 SGU detected by other authors who also used 35% hydrogen peroxide. This difference can be attributed to the inclusion of participants with lighter teeth (A1 or darker) whereas investigators in previous studies selected patients with darker teeth (C2 or darker). Although to the authors’ knowledge no study has so far correlated the degree of whitening with baseline color, our experience in conducting bleaching studies suggests that patients with lighter teeth do not respond as well to the bleaching regimen, perhaps due to the lower amount of pigment available for hydrogen peroxide oxidation. Future studies need to be conducted to prove this hypothesis.

The use of dexamethasone for the prevention of bleaching-induced TS produced adverse effects in 7 of 33 participants from the experimental group. Most of the patients reported skin redness and acne. These adverse effects were attributable to corticosteroids and adrenal androgens sharing the same precursor (pregnenolone); dexamethasone intake increased the level of testosterone—an androgen hormone—and consequently, skin oiliness increased, contributing to the onset of acne.

Finally, the limitations of this study should be reported. Although our sample size was larger than in most studies that evaluate anti-inflammatory drugs for reduction of TS, the sample size we used only allowed for the detection of high effect sizes. Therefore, we cannot rule out the fact that smaller effect sizes do exist. The use of the same experimental design to conduct studies with larger sample sizes should be encouraged to rule out this hypothesis.

In addition, there are some other limitations. Most of the participants in this study were young adults with teeth of a lighter color at baseline, which affects the generalizability of the findings of the investigation to the overall population. To control adherence to the protocol, we made phone calls and sent phone text messages to remind patients to take their medicines. However, the adherence to the protocol could not be controlled, which is a problem of every clinical trial that tests the effects of drugs.

CONCLUSIONS

The administration pre- and postoperatively of dexamethasone for a period of 48 hours, starting 1 hour before an in-office bleaching treatment, does not reduce the incidence or intensity of bleaching-induced TS. Furthermore, studies with larger sample sizes should be performed to evaluate whether dexamethasone or other anti-inflammatory drugs have a place in dentistry for preventing and managing bleaching-related TS.

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