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Effectiveness of Auriculotherapy in Reducing Dentin Sensitivity During and After the Bleaching Procedure

Eficácia da Auriculoterapia na Redução da sensibilidade Dentinária Durante e Após o Procedimento Clareador

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Abstract

Tooth sensitivity is a common side effect of whitening treatment. The popularity of alternative and complementary therapies such as auriculotherapy has grown steadily. The purpose of this research is to assess the efficacy of acupuncture as an integrative technique for reducing sensitivity during and after the whitening operation. The study is a clinical trial with two study groups: group 1 (n=3) volunteers who got auriculotherapy before and during the whitening operation, and group 2 (n=3) participants who did not get auriculotherapy, for a total of (N=6) volunteers (pilot study). The volunteers were males between the ages of 18 and 30, chosen based on inclusion and exclusion criteria. The auriculotherapy technique was performed by batches. Six envelopes with the process to be performed, auricle without crystal, merely micropore, and auricle with crystal on the predefined locations were separated. Two sessions were performed, one 7 days before whitening and the second shortly before whitening, to replace the crystals in the participants chosen for this operation. Only the micropore was altered in the case of the others. Sensitivity was assessed using the Wong-Baker Face Scale in conjunction with the Visual Analog Scale. It was discovered that the group that used auriculotherapy had lower sensitivity than the group that did not. As a result, auriculotherapy seems to be useful in lowering dentin sensitivity during and after the whitening operation.

Keywords*: Tooth Sensitivity. Clinical Trial. Whitening. Auriculotherapy.*

Resumo

A sensibilidade dentária é um efeito adverso comum associado ao tratamento clareador. A procura por terapias alternativas e complementares, como a auriculoterapia tem aumentado progressivamente. Nessa perspectiva, o objetivo deste estudo é analisar a eficácia da acupuntura como prática integrativa para diminuir a sensibilidade durante e após o procedimento clareador. A pesquisa é um ensaio clínico, constituído por 2 grupos de estudo: o grupo 1, representado pelos voluntários que receberam a auriculoterapia antes e durante o procedimento clareador (n=3), e o grupo 2, representado pelos voluntários que não receberam a auriculoterapia (n=3), totalizando (N=6) voluntários (estudo piloto). Os voluntários são do sexo masculino, com idade entre 18 e 30 anos, selecionados seguindo critérios de inclusão e exclusão. O procedimento de auriculoterapia foi realizado com base em um sorteio. Foram separados 6 envelopes, nos quais continha o procedimento a ser realizado, auriculo sem cristal, apenas micropore e auriculo com cristal nos pontos pré-determinados. Foram realizadas 2 sessões, sendo uma prévia 7 dias antes do clareamento e a outra imediatamente antes do clareamento, substituindo os cristais em seus respectivos acupontos para os voluntários sorteados com esse procedimento. Para os demais era feita apenas a troca do micropore. Foi utilizado a Escala Wong-Baker Face associada à Escala Visual Analógica como meio avaliativo da sensibilidade. Verifcamos uma redução na sensibilidade para o grupo que utilizou a auriculo em comparação ao grupo que não utilizou. Sendo assim, podemos sugerir que a auriculoterapia foi efetiva na redução da sensibilidade dentinária durante e após o procedimento clareador.

Palavras-chave: Sensibilidade Dental. Ensaio Clínico. Clareadores. Auriculoterapia.

1 Introduction

Aesthetic treatments have been growing considerably in dentistry and currently dental whitening has been highlighted because it is a conservative procedure and with satisfactory results. Dental whitening can be performed in a high-concentration office and in a home-based manner supervised by the dentist, using individual trays and low-concentration peroxides [1].

It is known that this treatment is only possible due to some characteristics of bleaching agents, such as the low molecular weight of some active chemical components, among them hydrogen peroxide and its diffusion capacity through enamel and dentin, and can reach the pulp. This diffusion through the dental tissues can still be increased in the presence of exposed dentin in areas of gingival recessions, defects in the cementum enamel, defects in the enamel, or in marginal areas between the tooth and the restoration[2,3].

Although it is considered a safe treatment, it may have some undesirable effects such as tooth sensitivity, gingival irritation and inflammation, pulp inflammation, toxicity, demineralization, cervical resorption, changes in dental pH and increase in enamel cracks[4,5]. However, dental sensitivity is an adverse effect that reaches on average 70 to 96% of patients [6,1] causing some patients to abandon treatment.

According to Maran *et*al.[7] the higher the peroxide concentration, the higher the oxidative stress generated in the pulp tissue, which in turn may be the factor responsible for dental sensitivity. This oxidative stress generates an inflammatory process that releases mediators, such as adenosine triphosphate and prostaglandins, that excite the nociceptors and trigger sensitivity induced by whitening.

Some studies have shown that the use of desensitizing agents previously applied to whitening may minimize the intensity of dental sensitivity when added potassium nitrate to 5% and sodium fluoride to 2% in its composition [6]. These potassium ions reduce sensory nerve activation by preventing depolarization of nerve fiber and fluoride blocks, and dentinal tubules that may be exposed reduce their fluid flow[8].

In addition to the previous application of desensitizing agents, other treatment options are reported as the decrease in the concentration of peroxide products, administration of analgesic, incorporation of desensitizing agents to the bleaching gel and laser application [9,10,11].

The search for alternative and complementary therapies has increased progressively, due to its proven efficacy in several pathologies, especially for health promotion, prevention and treatment, because it is a technique of rapid application and easy adaptation of patients[12.13]. The Federal Council of Dentistry, through Resolution CFO-82 of 2008, recognized and regulated the use of integrative and complementary practices to oral health, including Auriculotherapy (acupuncture).

Auriculotherapy was constituted as a main therapeutic method in pain treatments. The use of its practice within traditional Chinese medicine is dated from decades, where stimuli are made in certain areas of the ear, and these have reflexes in the body[14].

The analgesia provided by auriculotherapy involves the stimulation of nerves of small diameter and differentiated threshold. These nerves send messages to the spinal cord, which activates neurons of the brain trunk and hypothalamus, triggering endogenous opioid mechanisms[15].

They are indicated in situations where the patient has the need for immediate relief of acute and chronic pain. As it stimulates the reflex point in the ear, it promotes a relief action of symptoms in several distant parts of the body [16.17].

In dentistry, auriculotherapy can be used as auxiliary therapy in analgesia, muscle relaxation, paresthesia and facial paralysis treatment, orofacial pain control, post-surgical anti-inflammatory action and control anxiety[18.19].

In this perspective, it is justified to carry out this study, which aims to analyze the effectiveness of acupuncture as an integrative and complementary practice to decrease sensitivity during and after the whitening procedure.

2 Material and Methods

The research project was submitted to the Research Ethics Committee of Universidade Paranaense (UNIPAR/ Umuarama) for analysis of ethical principles, being under consideration by protocol number 5.673.673.

6 volunteers were selected in order to carry out a pilot study to test the methodology used and verify the evaluators' calibration. The volunteers are male, aged between 18 and 30 years, who were submitted to a clinical examination and selected following inclusion and exclusion criteria.

It was considered with inclusion criteria: Not having previously performed any whitening treatment; agree to sign the consent form for the study; be in good general and oral health; age between 18 and 30 years; attend all sessions; present color registration in canines or incisors superior and inferior A2, A3 or A3.5 based on the VITAPAN® Classic color scale (Vita Zahnfabrik, Bad Säckingen, Germany); do not present carious lesion or non-carious cervical lesions (LCNC's) in central, lateral, canine and premolar incisors (1stPM); do not present composite resin restoration on previous teeth.

Exclusion criteria were considered: Do not have history of reaction to peroxides; presence of endodontic treatment in the upper anterior teeth; presence of composite resin in the anterosuperior teeth referring to aesthetic restorations or gluing of brackets; presence of staining caused by tetracycline or fluorosis or discoloration due to trauma; color registration in canines or incisors superior and inferior A1 or B1 based on the VITAPAN® Classic color scale (Vita Zahnfabrik, Bad Säckingen, Germany); use of anti-inflammatory drugs and/or antibiotics in the last 15 days before the procedure, as well as the use of analgesics in the last 3 days.

After selecting the volunteers, a free and informed consent form was delivered reporting the objective of the research, risks, discomforts and benefits, as well as recommendations to be followed during the whitening treatment of the practice and auriculotherapy, in addition to ensuring the freedom of participation in the research until its completion or to give up if so is the will of the volunteers. For follow-up and registration of the procedures, a general clinical record was filled out, from each volunteer in which personal data, general health, habits and data related to auriculotherapy (emotional problems, presence of pain, location of pain, degree of intensity, time, type of pain, aggravation, treatment related to this pain: self-medication, medical follow-up, use of medication, if you have already done alternative treatment, acupuncture, how long, follow-up).

The research was based on a clinical trial, consisting of 2 study groups: group 1, represented by volunteers who received auriculotherapy before and during the bleaching procedure (=n 3 2), and group 3, represented by volunteers who did not receive auriculotherapy before and during the bleaching procedure (n=3), totaling a sample of (n=6) volunteers.

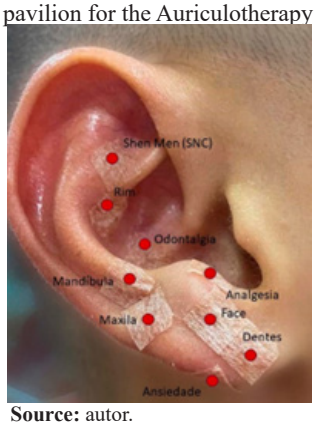
The auriculotherapy procedure was performed by a trained professional in the area, being instructed to perform the procedure based on a draw, through a closed envelope, being the same open only at the time of application of the technique. 6

envelopes were separated, in which the procedure to be carried out: Volunteer 1- (auriculus without crystal, only micropore), Volunteer 2-(auriculus with crystal at predetermined points), Volunteer 3- (auriculus without crystal, only micropore), Volunteer 4-(auriculus with crystal at predetermined points), Volunteer 5- (auriculus without crystal, only micropore), Volunteer 6- (auriculus with crystal). 2 sessions were held, one prior being performed 7 days before bleaching and the other immediately before bleaching, replacing the crystals in their respective acupoints for volunteers 2, 4 and 6. For the other volunteers only the exchange of the micropore was made.

After blinding the volunteers, the next step was to blind the researcher who performed the whitening procedure, so that he or she did not know the auriculotherapy group to which the patient was allocated. Thus, a draw was made with a closed envelope, in which it contained only the numbers of the volunteers: (Volunteer 1, 2, 3, 4, 5 and 6) once the procedure to be performed (external whitening with hydrogen peroxide 35%- 45 minutes direct) would be done in all groups. Blinding is a point, among others necessary, that is characterized by avoiding errors of data measurement and consequently undesirable trends.

The acupoints chosen in the auricular pavilion were: Opening points (SNC- Shen Men, Kidney, SNA, Analgesia and subcortex) being the same applied to the dominant ear (right ear and left ear we use the left ear) and associative points, being applied to the opposite ear (jaw, maxilla, tooth, dental pain and anxiety) (Figure 1).

Figure 1- Acupoints chosen in the auricular pavilion for the Auriculotherapy procedure.



Source: autor.

Asepsis of the auricular conduit with 70% alcohol and degreasing of the skin with Benjoin dye (objective: to remove oil from the skin and fix the micropore better) was performed. Then we made the capping of the points with the crystal and fixation with micropore.

The number of teeth whitened were those corresponding to the teeth visible in the smile line, this involves the premolars (1st PM), canines and incisors of the upper and lower arch.

For the whitening procedure, the volunteers were submitted to dental prophylaxis, and then the initial measurement of color. For this, the incisors and superior canines were evaluated, with the VITAPAN® Classic color scale (Vita Zahnfabrik, Bad Säckingen, Germany) and intraoral photographs were taken: frontal smile (showing the teeth of the upper and lower arch). The initial color served as a reference, and the degree of color change was determined immediately after whitening and after 7 days using the VITAPAN® Classic color scale (Vita Zahnfabrik, Bad Säckingen, Germany).

A labial retractor- Arcflex® (FGM, Joinvile, SC, Brazil) was positioned for lip protection, and a photopolymerizable gingival barrier- TopDam® (FGM, Joinvile, SC, Brazil) was applied, 3mm wide, in soft tissues (marginal gum and interdental papillae) as protection. With a clinical mirror positioned from incisal to cervical, the posterior part of the papillae and gingiva was observed in order to detect failures in the application of the barrier. Once the entire surface was covered and protected, the gingival barrier was polymerized for 20 seconds for each group of 3 teeth, with LED/ Raddi-Cal unit (SDI, Victoria, Australia).

The whitening gel used for both groups was hydrogen peroxide- Whiteness® HP 35 45% (FGM, Joinvile, SC, Brazil), leaving it in the tooth for 45 minutes non-stop. It was manipulated according to the manufacturer: The peroxide phase (phase 1) of the whitening agent was mixed to the previously agitated thickening phase (phase 2), in the suggested proportion of 3 drops of peroxide to 1 drop of thickener, in a ratio of 21:7 for the two complete arcades, respectively. This mixture was manipulated with intensity for approximately 40 seconds, until a viscous and firm gel was obtained.

The whitening gel was applied with the aid of a plastic spatula, completely covering the vestibular surface of the teeth to be whitened (central incisors up to 1st premolar), including the interproximal faces, in a layer of 0.5mm to 1.0mm thick. This gel was moved with the aid of a Cavibrush micro applicator (FGM, Joinvile, SC, Brazil), every 5 minutes to release any generated oxygen bubbles and renewal of gel contact with teeth.

The removal of the gel was performed by means of a moistened gauze, removing at first the excess gel, and then perform the washing with water of the triple syringe and suction by means of a high power suction.

Then, the dental elements were polished with Diamond Excel® polishing paste (FGM, Joinvile, SC, Brazil) and Diamond flex® felt discs (FGM, Joinvile, SC, Brazil). The gingival protector was removed, highlighting it with an exploratory probe and recorded the color of incisors and canines with VITAPAN® Classic color scale (Vita Zahnfabrik, Bad Säckingen, Germany). The patient returned after 7 days to record the final color.

To verify the effectiveness of auriculotherapy in reducing dentin sensitivity during and after the bleaching procedure, the Wong-Baker Face Scale associated with the Visual Analogue

Scale (VAS) was used. This measure consists of a 10 cm ruler, where one end is related to numbering (0) - "no pain" and at the other end the numbering (10) - "the worst pain possible" (10). The magnitude of pain is indicated by marking an X in the ruler according to the numbering, 0 (absence of pain), between 1e 2 (mild pain), from 3 to 7 moderate pain, and from 3 to 4 is still a bearable pain (that goes and back), and 5 to 7 the pain is already beginning to bother (more present), from 8 to 10 intense (unbearable) pain, needing to do the removal of the gel and application of desensitizing for improvement). The Wong Baker Face Scale uses a series of cartoon faces. On the far left is a happy face. The face on the right side is crying. The expressions on the four intervening faces become progressively sadder when you move to the right.

This record was performed in both groups, right after application of the gel until completion of the procedure (45 minutes). Over this time, sensitivity was measured every 5 minutes.

For this assessment, an individual questionnaire was applied for each group. In this questionnaire, the auxiliary recorded the volunteer data (name and number of the volunteer), date of the procedure and hemiarch in which he or she was measuring the sensitivity. In case of positive sensitivity, the auxiliary showed the Wong-Baker Face Scale associated with the Visual Analogue Scale (VAS), so that the volunteer then pointed the intensity of discomfort.

A questionnaire with the Wong-Baker Face Scale design associated with the Visual Analogue Scale (VAS) was delivered to each volunteer, as well as an upper and lower arcade, so that they could record any dentin or soft tissue sensitivity every day after 24h and 1 week. During this period, the patients needed to mark (3x a day) the degree of sensitivity and the related arcade.

In case of severe sensitivity, the patients were instructed to inform the researchers so that the condition could be reversed by indicating desensitizing or analgesic/anti-inflammatory drugs for pain relief.

3 Results and Discussion

As the objective of the study was to evaluate the effectiveness of acupuncture as an integrative and complementary practice to decrease sensitivity during and after the whitening procedure, an intergroup comparison (quantitative variable) was performed, as it can be seen in Table 1, where we verified the degree of sensitivity between the groups (G1- Auriculotherapy application and G2- no auriculotherapy application) due to the time of application of the whitening gel (Whiteness HP 35% - direct application 45 minutes, with measurement of the pain threshold every 5 minutes) and in Table 2 where we verified the degree of sensitivity between the groups (G1- Auriculotherapy application and G2- no auriculotherapy application) after the application of the whitening gel (Whiteness HP 35%/FGM), for seven days.

Table 1- Degree of sensitivity between groups (G1- application of auriculotherapy and G2- without application of auriculotherapy) as a result of the time of application of the whitening gel (Whiteness HP 35%- direct application 45 minutes, with measurement of the pain threshold every 5 minutes)

Volunteers	**1**	**2**	**3**	**4**	**5**	**6**
Pain Intensity (0-10) Time (45minutos) Evaluation every 5 min.	**G1**			**G2**		
5	0	0	0	0	0	0
10	0	0	0	2	2	2
15	0	0	0	2	4	4
20	1	0	0	4	4	4
25	1	0	0	4	6	4
30	1	0	1	6	7	7
35	1	0	1	6	7	7
40	1	1	1	6	8	8
45	1	1	1	6	8	8

0- Absence of pain; 1- 2 (mild pain); 3 to 7 moderate pain, being that:3 to 4 is still a bearable pain (that comes and goes); 5 to 7 pain is already beginning to bother (more present); 8 to 10 intense pain (unbearable).
Source: research data.

According to Table 1, it was observed that the use of integrative practice (Auriculotherapy- G1) before and during the whitening procedure reduced sensitivity when compared with the group that did not use such practice (G2). During the first 15 minutes of the whitening procedure, patients in group 1 did not report sensitivity (Degree 0), after that time the degree of sensitivity varied between 0 (absence of sensitivity) and 1 (mild pain).

The group that did not use the integrative practice (G2) reported absence of sensitivity only in the first five minutes (grade 0), but after the five consecutive minutes, the degree of sensitivity increased from 0 to 2 (mild pain), 4 (pain bearable, comes and goes), 7 (pain more present, where it starts to bother), arriving in intense pain (8), unbearable close to 45 minutes. After 30 minutes, as the pain began to bother, the bleaching agent was removed and applied a desensitizing agent based on sodium fluoride and potassium nitrate (Desensitize 2%- FGM) for 10 minutes, to reduce sensitivity and application of acidulated phosphate fluoride (for 1 minute) for formation of calcium fluoride in enamel, thus reducing the demineralization of enamel generated by the whitening gel. For these volunteers (G2), as well as for the volunteers of group 1, another whitening session was rescheduled for completion of the treatment.

Based on the data from Table 2, it was observed that the degree of sensitivity between the groups (G1- application of auriculotherapy and G2- without application of auriculotherapy) after the whitening procedure (evaluation performed during 7 days) was 0 (absence of sensitivity) for group 1, presenting only 1 volunteer with degree 1 sensitivity (mild pain) on the 1st day after procedure. On the other hand, for group 2, on the 1st and 2nd day after the procedure, there

was a report of sensitivity degree 4 and 3 (pain bearable, going and back), respectively, ceasing sensitivity in the subsequent days. For these volunteers (G2), analgesic was prescribed.

Table 2 - Degree of sensitivity between the groups (G1- Application of auriculotherapy and G2- without application of auriculotherapy) after the application of the whitening gel (Whiteness HP 35%/FGM). Evaluation carried out for 7 days after application of the gel

Volunteers	1	2	3	4	5	6
Pain Intensity (0-10) after application of whitening gel	**G1**			**G2**		
Day 1	1	0	0	4	4	4
Day 2	0	0	0	3	3	3
Day 3	0	0	0	0	0	0
Day 4	0	0	0	0	0	0
Day 5	0	0	0	0	0	0
Day 6	0	0	0	0	0	0
Day 7	0	0	0	0	0	0

0- Absence of pain; 1- 2 (mild pain); 3 to 7 moderate pain, namely: 3 to 4 is still a bearable pain (that comes and goes); 5 to 7 the pain is already beginning to bother (more present); 8 to 10 intense (unbearable) pain.
Source: research data.

For patients with darkened vital teeth, dental whitening is one of the dental procedures most requested by patients who want a more pleasant smile. Bleaching agents have an oxidizing action that leads to the formation of free radicals, reactive oxygen species and hydrogen peroxide ions. These reactive molecules attack the chromophores, causing their degradation and resulting in a whitening effect[20, 21]. However, the most common adverse effect resulting from whitening is the dentin sensitivity, which is characterized by the manifestation of acute, short-term or transient pain [22] by the penetration of a whitening agent in the dentin canaliculi.

Sensitivity when present occurs only when teeth are exposed to thermal changes, in the first days of treatment and in the first hours after removal of the whitening agent, being able to vary from mild sensitivity to severe sensitivity, and its intensity decreases with the passage of time, not exceeding 48 hours. Clinical studies show that 15% to 78% of patients who had their teeth cleared reported trans hypersensitivity and post-whitening treatment[23.24]. These data corroborate with the result of our study, since volunteers who did not use auriculotherapy reported sensitivity degree 4 (bearable pain), degree 7 (most present pain), reaching intense pain (degree 8), unbearable close to 45 minutes of procedure, as well as sensitivity degree 4 and 3 after treatment (48 hours).

According to Matias *et* al.[25] the etiology of sensitivity is multifactorial: inadequate brushing, occlusal interferences, the use of abrasives, or erosion by acidic diets, periodontal therapy, bacterial contamination, gingival recession. In addition, some factors that influence the degree of pain felt by an individual are previous experiences, emotional state, cultural differences, age and gender [26.27] with higher prevalence in women and young people.

The fact that there is a higher prevalence in women may be related to hormonal variations to which they are subject, with a higher incidence in the premenstrual period, in which hormone rates are falling[27]. As the objective of the study was to verify the effectiveness of alternative means in reducing the degree of sensitivity during and after the whitening procedure, we had to rule out variables that could exacerbate the degree of sensitivity, thus selecting only men for the research and application of inclusion and exclusion criteria.

Since the beginning of dental whitening, some studies have been done to minimize the adverse effects of using dental whitening techniques[1]. Among them, reduction in the frequency and time of use of bleaching gel, reduction of the concentration of hydrogen peroxide, use of topical drugs such as potassium nitrate and systemic drugs, however, none of these techniques according to the literature were able to completely eliminate tooth sensitivity[28].

According to the study by *Paula et* al.[29], the use of desensitizing agents has produced better results than the use of analgesics and anti-inflammatory drugs. In addition, previous studies state that bioactive products with tubular occlusion activity can preserve the dental tissue forming a protective layer over the enamel. However, the effect of topical application of potassium nitrate, fluoride and remineralizing agents are still conflicting[30.31]. Thus, studies have been conducted to verify evidence that demonstrate the effectiveness, benefits and harm of alternative and/or complementary therapies such as chromotherapy, Bach floral, aromatherapy, hypnosis [32,33], acupuncture[34] , musicotherapy[35] ,body and mind therapies, among others. These therapies were regulated and recognized by the Federal Council of Dentistry through resolution CFO-82[36], and in 2015[37]the Council recognized acupuncture and homeopathy as dental specialties, legitimizing and inserting even more the use of these therapies. Studies carried out in the area demonstrate that acupuncture has beneficial effects to patients, highlighting decreased anxiety and fear, decreased nausea and vomiting, increased anesthetic effect, increased immune response and especially as a complementary analgesic method[38,39].

The stimulation promoted by acupuncture through the introduction of micro-needles, and/or seeds and crystals in specific points of the energetic meridians, activates the nerve endings that lead to the CNS this stimulus where it will be identified and translated at the hypothalamic level, spinal cord level and mesencephalon level[40]. When the hypothalamic level is stimulated there is activation of the hypothalamic-pituitary axis that causes the release of endorphins β (analgesics) into the bloodstream and cerebrospinal fluid. At the level of mesencephalon there will be activation of neurons of the gray substance, where it will release endorphins that will lead to the production of norepinephrine and serotonin. In the spinal cord there is the activation of the interneurons in the gelatinous substance, thus generating the release of dynorphins. Thus,

with the release of these neurotransmitters, there is a blockage of the propagation of painful stimuli, preventing the perception of the brain, where it obtains as a result a significant process of analgesia [40.41].

Michalek-Sauberer *et* al.[42] demonstrated a significant reduction in the level of anxiety in adult patients submitted to auricular acupuncture before elective dental treatment. Dellovo *et* al.[43] also observed a positive response of acupuncture auricle (pre, trans and postoperative) in patients undergoing exodontia from third molars, verifying that the therapy had an anxiolytic effect equivalent to midazolam, but without the undesirable effects usually attributed to benzodiazepines. Other studies show the benefits of acupuncture in various aspects for the patient undergoing dental surgical treatments[44]. The efficacy of the acupuncture in anxiety of children submitted to restorative dental treatments was also evidenced in the study of Avisa *et* al.[45].

Ceranto, Alves, Alende 18 evaluated the analgesic efficacy of systemic acupuncture in points IG4 and E6 previously performed, under pain from post-orthodontic adjustment. The results showed that there was a statistically significant reduction in the overall pain index for both men and women, with no adverse effects. The reduction of pain observed in this study was probably due to the activation of the descending system of pain inhibition and the release of antinociceptive substances, such as β-endorphins (analgesics), cortisol (anti-inflammatory) and serotonin (antidepressant) into the bloodstream and brain-spinal fluid.

According to Boleta-Ceranto and Miura[40], during the acupuncture session, some classical points (acupoints) are mainly used for anxiety control (anxiety 1 and 2, tension, *shen* men, sympathetic, heart), hemostasis (kidney, metabolism, adrenal) and for improvement of conditions in the maxillary (subcortex, upper pingchuan), local points (maxilla and jaw, teeth) and classic analgesic points (analgesia). Taking into account such data, the acupoints chosen for the application of auriculotherapy in the present work were: Opening points (SNC- *Shen Men* , kidney, SNA, analgesia and subcortex) being the same applied to the dominant ear (right ear and left ear we use the left ear) and associative points, being applied to the opposite ear (jaw, maxilla, tooth, dental pain and anxiety).

Other studies corroborate the results that indicate that acupuncture is a relatively simple, safe and potentially efficient technique in the management of symptomatology, including pain caused by DTMs[46]. The data obtained in our pilot study suggests the efficacy of auriculotherapy (acupuncture) as a complementary treatment in the trans and post-operative before the sensitivity generated by the whitening procedure. Sensitivity reduction was observed in group 1 volunteers when compared to volunteers who did not receive auriculotherapy before the procedure. This is of paramount importance, since almost all patients who are submitted to the bleaching procedure described in several studies [23,24]report mild to moderate sensitivity during and after bleaching treatment.

4 Conclusion

Based on the data obtained in this pilot study, it can be suggested that auriculotherapy was effective in reducing dentin sensitivity during and after the whitening procedure. The technique was safe, effective, cheap and with minimal risks to the participants. However, new studies are necessary in order to increase the sample number and provide evidence on the use of auricular acupuncture in reducing dentin sensitivity resulting from dental whitening.

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