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ORIGINAL ARTICLE

Use of auriculotherapy to control anxiety in dental clinical practice

El uso de la auriculoterapia en el control de la ansiedad en la práctica clínica odontológica

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ABSTRACT

Context: Alternative practices, such as auriculotherapy, can help control anxiety, positively influencing the patient's emotional state. In the dental office, anxiety is common and is related to fear, pain, and invasive procedures. The use of pharmacological and non-pharmacological methods by the dentist improves treatment adherence and reduces the risk of clinical complications.
Objective: To evaluate the effect of auriculotherapy on anxiety control during dental care.
Materials and methods: The research was conducted at the Clinic of the School of Dentistry of the Centro Universitário Católico do Leste de Minas Gerais and was divided into two phases: in the first phase, an initial assessment was performed and the auricular points established for anxiety control according to the principles of Traditional Chinese Medicine were inserted. The second phase took place one week after treatment and consisted of a reassessment of the individual's report on the impact of therapy on their anxiety. Sociodemographic information was collected, and the Modified Dental Anxiety Scale was used to measure participants' anxiety levels. The dental anxiety score was measured using principal component analysis (PCA) focusing on a single component and Varimax rotation. For the effects of sociodemographic and health variables on dental anxiety scores, GMM (Generalized Mixed Models) with linear distribution and identity link function was adopted.
Results: Initially, 184 people participated in the study, but 16 did not respond to the second part of the questionnaire. Therefore, 168 people completed the methodological procedure. Data analysis suggests statistical significance in the test application period (before and after) and lower reported anxiety.
Conclusion: The data from this study suggest that auriculotherapy can control anxiety related to dental treatment.

RESUMEN

Contexto: Las prácticas alternativas, como la auriculoterapia, pueden ayudar a controlar la ansiedad, influyendo positivamente en el estado emocional del paciente. En la consulta dental, la ansiedad es común y está relacionada con el miedo, el dolor y los procedimientos invasivos. El uso de métodos farmacológicos y no farmacológicos por parte del dentista mejora la adherencia al tratamiento y reduce el riesgo de complicaciones clínicas.
Objetivo: Evaluar el efecto de la auriculoterapia en el control de la ansiedad durante la atención dental.
Materiales y métodos: La investigación se llevó a cabo en la Clínica de la Facultad de Odontología del Centro Universitario Católico del Este de Minas Gerais y se dividió en dos fases: en la primera fase, se realizó una evaluación inicial y se insertaron los puntos auriculares establecidos para el control de la ansiedad según los principios de la medicina tradicional china. La segunda fase tuvo lugar una semana después del tratamiento y consistió en una reevaluación del informe del individuo sobre el impacto de la terapia en su ansiedad. Se recopiló información sociodemográfica y se utilizó la Escala Modificada de Ansiedad Dental para medir los niveles de ansiedad de los participantes. La puntuación de ansiedad dental se midió utilizando el análisis de componentes principales (PCA) centrado en un único componente y la rotación Varimax. Para los efectos de las variables sociodemográficas y de salud en las puntuaciones de ansiedad dental, se adoptó el GMM (Modelos Mixtos Generalizados) con distribución lineal y función de enlace de identidad.
Resultados: Inicialmente, 184 personas participaron en el estudio, pero 16 no respondieron a la segunda parte del cuestionario. Por lo tanto, 168 personas completaron el procedimiento metodológico. El análisis de los datos sugiere una significación estadística en el período de aplicación de la prueba (antes y después) y una menor ansiedad declarada.
Conclusión: Los datos de este estudio sugieren que la auriculoterapia puede controlar la ansiedad relacionada con el tratamiento dental.

INTRODUCTION

Auriculotherapy consists of stimulating the outer ear and is based on the principles of Traditional Chinese Medicine (TCM).[1] Stimulation of auricular points triggers neurological reflexes, releases neurotransmitters, and activates cytokines, acting on the immune system and modulating inflammation. [2] The use of unconventional therapeutic methods is widely discussed in the literature, with Traditional Chinese Medicine (TCM) being the most widespread and widely used. Its organization revolves around several principles developed over centuries in the East.[3]

Auriculotherapy is a microsystem of TCM that was already in use in the Chinese Empire between 2000 and 100 BC, based on the use of specific points located in the ear. These points correspond to reflex points related to the organs, sensations, structures, and functions of the body, and are used to treat physical and mental illnesses through stimulation with needles, ionized crystals, seeds, percutaneous electrical neurostimulation, or lasers. According to scientific literature, the auricle can be described as an isolated organ that connects to other regions and organs of the body through specific stimuli that elicit responses and reflexes from the central nervous system.

Alternative practices such as auriculotherapy can be used to treat anxiety by addressing a person's emotional state. Tension and worry are common in the dental office and are associated with pain, fear, and more invasive treatments.[6] The dental industry uses a variety of methods to treat anxiety, including pharmacological and non-pharmacological agents. When a dentist uses one of these methods to alleviate anxiety, they not only improve treatment adherence, but also prevent common complications such as fainting, high blood pressure, and changes in blood sugar levels, among others.[7]

Although the World Health Organization has recognized auriculotherapy as an effective therapeutic practice since 1997, there are still barriers to its use in clinical treatments.4 Results are difficult to compare due to the small number of studies with different approaches and methodologies.8,9 In the field of dentistry, studies have already shown good results in the use of auriculotherapy techniques. Clinical trials have been conducted comparing auriculotherapy points with midazolam, used as standard medication, to reduce pain and anxiety during third molar extractions, obtaining similar results without side effects,10 as well as the use of laser therapy on auricular points with good results.9,11

Considering the arguments presented, the objective of this article was to evaluate the effect of auriculotherapy on anxiety control in individuals undergoing dental treatment at the Outpatient Clinic of the Faculty of Dentistry of the Catholic University Center of Eastern Minas Gerais (Unileste).

MATERIALS AND METHODS

This study was conducted at the Unileste School of Dentistry Clinic, where the Informed Consent Form (ICF), the modified dental anxiety scale, and an interview-based questionnaire were administered. The study was registered in the Brazilian Clinical Trials Registry (ReBEC) under number RBR-648sztz. All ethical principles were observed, and the study was conducted in accordance with current national legislation for research involving human subjects, having been approved by the Research Ethics Committee (CEP) under ruling number 5,512,328.

A quasi-experimental study (single-group pretest-posttest design) was conducted with a sample of 184 people seeking treatment at the University Clinic, of both sexes and over 18 years of age. After initial selection, those who agreed to participate in the study signed the informed consent form, responded to an interview, and completed the modified dental anxiety scale. Subsequently, ear points were inserted before the start of treatment (approximately 15 minutes before). For the standardization of the research, the Shean Men, Kidney, Sympathetic, Tooth, TMJ, Anxiety, and Neurasthenia points were used. Participants were instructed to press the points three times a day and leave them in the ear for at least three days. The points were inserted into the left ear for men and the right ear for women, in accordance with TCM principles. One week after treatment, the interview and modified dental anxiety scale were applied again, focusing on post-treatment perception.

The study consisted of two phases: the first (F1) consisted of an initial assessment and insertion of the established anxiety control points. After one week of dental treatment, the second phase (F2) was carried out, which consisted of reassessing the patient's report on the impact of therapy on their anxiety using the Modified Dental Anxiety Scale. This instrument allows the patient to be defined as anxious or non-anxious, is easy to apply, and is validated for Brazil. During the reassessment, the participant was asked about the pressure applied to the points. The questionnaire was only administered if they confirmed that they had applied the pressure according to the instructions from the first consultation.

The study population consisted of individuals who sought treatment in the disciplines of dental internships (I and III) in restorative dentistry, periodontics, surgery (I and II), and endodontics, of both sexes, over 18 years of age, and who freely agreed to participate in the study. The sample for this study comprised 184 individuals who met the inclusion criteria and did not meet any of the exclusion criteria. The sample size calculation considered the treatment of 254 individuals over 18 years of age in the aforementioned clinics during the same period of the previous year, a sampling error of 5%, a confidence level of 95%, and increased the sample size by 20% to compensate for possible losses. The selection of participants initially involved accepting the invitation to participate in the study.

The inclusion criteria for patient selection were as follows: individuals treated at the dental school clinic; of both sexes; over 18 years of age; without cognitive impairment; who agreed to participate in the study after reading and signing the informed consent form. Patients who met the following criteria were excluded from the study: under 18 years of age, those who did not wish to participate in the study, and individuals with cognitive impairment.

The dependent variable was anxiety prior to dental treatment. The independent variables were gender, age, ethnic group, and socioeconomic indicators such as income, education, and family situation, among others. To characterize the sample with respect to sociodemographic and health variables and the anxiety scale, a descriptive analysis was used, adopting absolute and relative frequencies. To develop the dental anxiety score, principal component analysis (PCA) was used, focusing on a single component and using Varimax rotation. To evaluate the effects of sociodemographic and health variables on dental anxiety scores, GMM (Generalized Mixed Models) with linear distribution and identity link function were adopted. A p-value < 0.05 was adopted as the minimum value for statistical significance. Jamovi v 2.2.5 software was used for analysis and graphing.

RESULTS

The study initially evaluated 184 people, but 16 participants did not complete the second phase. Therefore, 168 participants completed the application and were included in the statistical analysis. The most requested clinics were restorative dentistry (29.9%), stage I and III (28.6%), with the highest demand from women (58.9%). The ages of the participants ranged from 41 to 60 years (54.8%). The predominant level of education was complete secondary school (57.7%). Regarding marital status, the majority declared themselves married (47.6%). During the interview, approximately 75% of participants reported not being afraid of dental treatment, 50.6% were anxious at the time, 83.3% had experienced toothache at some point in their lives, 52.4% reported considering themselves to be in good oral health, and 91.7% had never used auriculotherapy (Table 1).

The relationship between the following variables was evaluated: gender, dental clinic, educational level, marital status, anxiety reported before dental treatment, toothache, perception of oral health, previous unpleasant experience with treatment, previous use of auriculotherapy, and the period (before vs. after) of application of the modified dental anxiety scale. Data analysis suggests statistical significance in the test application period and in the anxiety report when analyzed separately and in relation to each other (Table 2). It is observed that when analyzing the relationship before and after the variables anxiety and period of application, there is a positive association, that is, the anxiety treatment protocol, when used during dental treatment, can reduce anxiety (Table 3 and Figure 1).

Table 1. Sociodemographic and health characteristics of individuals undergoing auriculotherapy before dental treatment

Variable	Group	Absolute frequency (n)	Relative frequency (%)
Treatment sector	Dentistry	50	29.8%
	Periodontics	17	10.1%
	Endodontics	7	4.2%
	Surgery I or II	39	23.2%
	Stages I or III	48	28.6%
	Not reported	7	4.2%
Sex	Female	99	58.9%
	Male	69	41.1%
Age range	Under 20 years	4	2.4%
	21 to 40 years	38	22.6%
	41 to 60 years	92	54.8%
	Over 60 years	34	20.2%
Education	Primary education	50	29.8%

	Secondary education	97	57.7%
	Preparatory education	17	10.1%
	Higher education	4	2.4%
Marital status	Single	56	33.3%
	Married	80	47.6%
	Divorced	18	10.7%
	Widowed	12	7.1%
	Cohabiting union	2	1.2%
Under treatment	Yes	42	25.0%
	No	126	75.0%
Anxious	Yes	85	50.6%
	No	83	49.4%
Toothache	Yes	140	83.3%
	No	28	16.7%
Good oral health	Yes	88	52.4%
	No	80	47.6%
Negative experience with treatment	Yes	75	44.6%
	No	93	55.4%
Previous use of auriculotherapy	Yes	14	8.3%
	No	154	91.7%

Table 2. General model to evaluate the effect of sociodemographic and health variables on dental anxiety scores

Variable	F	DFNum	DFDen	p
Request period (before vs. after)	19.726	1	149	< .001*
Sex	3.8466	1	149	0.052
Clinic of care	1.5769	5	149	0.17

Educational level	0.648	3	149	0.585
Marital status	1.4203	4	149	0.23
Anxiety	14.094	1	149	< .001*
Report of toothache	0.3896	1	149	0.533
Good oral health	2.3315	1	149	0.129
Unpleasant experience with treatment	1.9644	1	149	0.163
Previous use of auriculotherapy	0.5751	1	149	0.449
Period ✻ Sex	2.0156	1	149	0.158
Period ✻ Clinic	0.8293	5	149	0.531
Period ✻ Education	0.3159	3	149	0.814
Period ✻ Marital status	1.1239	4	149	0.347
Period ✻ Anxiety	10.7204	1	149	0.001*
Period ✻ Report of toothache	0.2012	1	149	0.654
Period ✻ Good oral health	0.0539	1	149	0.817
Period ✻ Unpleasant experience with treatment	1.182	1	149	0.279
Period ✻ Previous use of auriculotherapy	0.2534	1	149	0.615

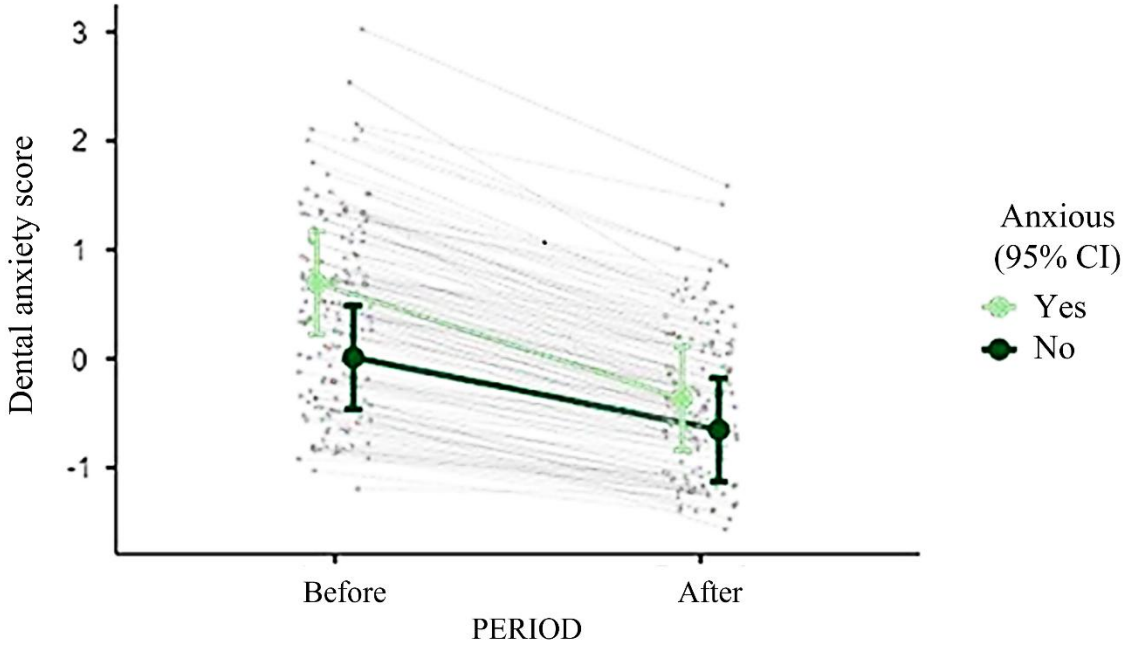
*Principal component analysis test

Table 3. Comparison of means of variables that showed statistical association with dental anxiety scores

Relation	Comparison	Difference	Standard error	DF	Pbonferroni
Period	Before vs After	0.863	0.194	149	< .001*
Anxious	Yes vs No	0.485	0.129	149	< .001*

	Before N vs After N	0.666	0.204	149	0.008*
	Before Y vs After N	0.682	0.142	211	< .001*
Period * Anxious	Before Y vs After N	1.348	0.233	259	< .001*
	Before Y vs After Y	1.06	0.203	149	< .001*
	After Y vs Before N	-0.379	0.233	259	0.635
	After Y vs After N	0.288	0.142	211	0.268

** Generalized Mixed Models Test*



DISCUSSION

Anxiety is a physiological emotional reaction, considered fundamental and natural in human life, linked to the individual's preparation for situations of fear and threat.[13] However, in some cases it can be exacerbated in relation to the stimulus, causing the individual to have difficulty performing their daily tasks, and is therefore considered pathological. Its symptoms can range from psychological symptoms, such as feelings of fear, tension, or discomfort, to physical symptoms, such as sweating, palpitations, and others.[14]

It is estimated that approximately a quarter of the adult population is afraid of going to the dentist, a complication of great relevance to daily clinical practice.[15] Its occurrence may be associated with past experiences, stories told by others, and sometimes it may have no apparent reason.[16] Physiological effects may include increased heart rate, respiratory rate, and blood pressure, which can lead to a number of complications during the procedure. Aversion to dental treatment results in lower adherence to dental appointments, which negatively affects oral and general health.[17] Therefore, in order to deepen the understanding of the effects of auriculotherapy on patient anxiety during dental treatment, this study sought an auxiliary method to be applied in the dental clinic.

Auriculotherapy is a complementary therapy of Traditional Chinese Medicine (TCM) that has undergone significant technical advancement over the past 60 years. Based on a set of overlapping anatomical maps on the ear, stimulation of a specific location affects the organs and functions associated with that point, resulting in beneficial effects for the individual. A systematic review of the literature has shown that auriculotherapy is effective in various clinical situations, such as in women in labor, university students, patients who discontinue the use of hypnotics, and in the control of stress, anxiety, or depression, reinforcing the use of the practice in various areas of health. In dentistry, auriculotherapy can complement conventional methods in analgesic therapy, muscle relaxation, treatment of paresthesia, control of orofacial pain, control of postoperative inflammation, and anxiety. The articles also discuss its beneficial use in the treatment of temporomandibular disorders, patients with burning mouth syndrome, and patients with bruxism, among others. However, no data are available on the exact mechanism of auriculotherapy, but it is suggested that the somatotopic orientation of the auricular points generates regionally specific effects on the relevant structures of the human brain.

Traditionally, dental anxiety has been treated with medications, with benzodiazepines being the most commonly used. These medications, or other prolonged sedation treatments, can cause adverse effects. Auriculotherapy may be an economical alternative for dental anxiety, without the risk of prolonged sedation or respiratory depression,[15] as the use of benzodiazepines is commonly associated with cases of retrograde amnesia. In dentistry, these adverse effects can intensify anxiety in people regarding the indicated treatments and worsen the acceptance of procedures and clinical practices.[20]

Stimulation of peripheral points triggers neurological reactions and promotes the release of mediators, such as endorphins and enkephalins, to the brain. Preliminary studies of auriculotherapy have demonstrated beneficial effects on various types of pain and anxiety, including pain associated with cancer, hip fracture, and postoperative knee and hip arthroscopy.[21] In contrast, a study evaluating the use of low-intensity laser on auricular points and its implication in reducing postoperative pain in lower third molar extractions showed no benefit. However, related factors, such as the surgical technique used, could have a direct impact on these results.[22]

Auriculotherapy may also generate a placebo effect, which influences anxiety reduction. This effect may be related to the expectations and beliefs of the people experiencing the technique. However, clinical trials show that the technique can not only modulate the effects of treatment and neural substrates, but also influence various bodily functions. In addition, it is not uncommon for acupuncture trials to be compared to standard treatment, i.e., without specific treatment for dental anxiety.[15]

During studies, it is also worth noting the Hawthorne effect, according to which people under investigation and observation behave differently once they realize they will be analyzed. This fact significantly influences the results, which must be considered by researchers. The Hawthorne effect refers to participation in research, the resulting

awareness of being studied, and its possible impact on behavior. The awareness of being observed or having one's behavior evaluated generates beliefs about the researcher's expectations. Considerations of conformity and social desirability induce changes in behavior according to these expectations,[23] although the literature indicates little interference from this factor in studies on TCM techniques.[15]

The limitations of this study were: the random inclusion of participants based on their acceptance, without forming groups through sample randomization processes; the absence of a control group without treatment; the lack of prior assessment of the presence of pain, which could increase fear or anxiety; and 16 participants who underwent the first consultation and did not respond to the questionnaire again. In addition, the psychological effect caused by other participants with positive personal reports during and after treatment may have influenced the results. However, this influence is insignificant, as these are isolated cases that did not occur frequently. If the researchers observed this, they asked the participant not to communicate it near a participant who had not been reevaluated.

When addressing information bias, it is important to consider the possible effects of clinical practice or familiarity, as the reduction in anxiety may be partially related to the patient's greater familiarity with the environment of the second consultation, and not exclusively to the auriculotherapy intervention. This process of adaptation to the environment, team, and procedures may, in itself, contribute to lower anxiety activation, which is a potential confounding factor. However, even acknowledging this methodological limitation, the study remains relevant, as the intervention allows for estimating the additional effect of auriculotherapy beyond simple habituation to the clinical context. Participating patients also reported improved anxiety outside the clinical setting.

The study proved to be easy to apply, minimally invasive, inexpensive, and without adverse effects similar to those of medications. It demonstrated positive results in reducing dental anxiety when comparing treatments before and after, and could represent a good clinical option for the treatment of people with anxiety in dental offices or clinics. This study may also enrich scientific knowledge, serve as a basis for further studies, and help professionals integrate auriculotherapy into dental clinical practice.

CONCLUSION

The results of this study suggest that auriculotherapy may be an effective method for controlling anxiety and could be used as a complementary therapy in the management of anxiety related to dental treatment.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that they have no conflict of interest related to this study.

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