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INFLUENCE OF MUSIC THERAPY ON ANXIETY, PAIN PERCEPTION, HEART RATE AND BLOOD PRESSURE OF PATIENTS UNDERGOING ENDODONTIC TREATMENT – A RANDOMIZED CONTROL TRIAL

Dental Science

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ABSTRACT

Background: Dental anxiety is a significant and challenging problem in patients seeking dental treatment. During any dental procedure patients often experience severe pre-operative and intra-operative anxiety which makes the procedure more difficult. Anxiety during endodontic therapy often leads to increased pain perceptions and instability of the physiological parameter throughout treatment. Aim: The purpose of this study was to evaluate the influence of music as a nonpharmacologic aid on anxiety, pain perception and physiological parameters (heart rate, systolic blood pressure, and diastolic blood pressure) at three different time period - before, during, and after endodontic treatment.
Methods: A total of 100 patients were recruited in the present study. Before starting the endodontic treatment, the interviewer administered the Modified Corah Dental Anxiety Scale (MCDAS) to assess the baseline level of anxiety and Visual Analog Scale (VAS) for pain assessment. Patients were randomly divided into 2 groups: the first one listened to the music during endodontic treatment and the second one did not. Before, during, and after the endodontic procedure, the physiological parameters (i.e. heart rate, systolic and diastolic blood pressure) were recorded. All the data were collected and statistically analyzed.
Results: Direct contrasts between patients listening or not listening to music showed that all the measured physiological parameters improved considering the overall period (during and after the root canal therapy) in the group of patients listening to music ($P < .05$). Conclusion: Within the limitation of the study, music administered to subjects with different levels of anxiety during endodontic treatment significantly decreased pain levels and improved physiological parameters during the endodontic procedures. Clinical Significance: Music and medicine always work together and the soothing effects of sounds and musical frequencies make this union an extraordinary tool of synergistic care. Music therapy can be considered as a valid nonpharmacologic aid to manage anxiety during endodontic treatment.

KEYWORDS

Music Therapy, Endodontic Treatment, Dental Anxiety, Pain, Physiologic Parameters, Heart Rate, Blood Pressure

INTRODUCTION

Anxiety is a one of the most common reason many patients give for not visiting a dentist (1). Anxiety can arise as a conditioned response to a previous painful or traumatic experience with a dentist or can result from negative beliefs and perceptions of dental situations (2). During a dental visit, many patients will normally experience some type of tension or fear, with some patients experiencing moderate to severe anxiety. Several studies support the hypothesis that pain or fear of pain is a primary source of this anxiety, as well as being a major obstacle to seeking dental care (3). Anxious patients feel more pain during injections of local anaesthesia than less anxious patients(4).

According to Spielberger Dental Anxiety is defined as "an abnormal fear or dread of visiting the dentist for preventive care or therapy and unwarranted anxiety over dental procedures". It is reported in the literature that one in six adults suffer from dental anxiety (5) and in children, it ranges from 5.8% to 19.7% in US population (6). However, no current data exist regarding the prevalence of dental anxiety in Indian population. Furthermore, no prevalence data is present regarding the association of dental anxiety with endodontic treatment.
Many people associate dental treatment with pain and see this as a cause of their dental anxiety. There are various studies that have reported a direct relationship between the level of anxiety and level of pain during dental treatment. In addition to the above findings, highly anxious patients appear to be more sensitive to pain(1).

According to Cohen *et al*, dental anxiety affects an individual's personality in numerous ways. It can have physiological, behavioural and cognitive impacts on an individual's character. The physiological impacts include signs and symptoms of the fright response and feelings of exhaustion after a dental appointment, while the cognitive impacts include an array of negative thoughts, beliefs, and fears. The behavioural impacts include not only avoidance of dental care but also other behaviours related to eating, oral hygiene, self-medication, and aggression(7).

Patient-dentist initial interaction can fairly reveal the occurrence of anxiety and fear. In these situations, subjective and objective evaluation of anxiety can enhance the pre-treatment diagnosis which can further lead to successful treatment. The subjective analysis includes semi-structured interview, anxiety questionnaires, psychophysiological, behavioural, and emotional responses (8). Modified Corah's Dental Anxiety Scale (MCDAS) is one of the most commonly used anxiety questionnaire. It is a simplified 5-point scale consisting of 5 questions and the scores range from 0 to 4 for each question, 0 stating not anxious to 4 representing extremely anxious patient(9). Based on the scores, the patients can be categorized as a not anxious, mild, moderate and severe anxious patient. Literature evidence is very scarce on the use of these questionnaires in routine clinical practice.

Objective analysis include assessment of heart rate, blood pressure, pulse rate, finger temperature, and galvanic skin response. Anxiety is often considered to have a direct causal relationship with high blood pressure but hardly any studies have shown any long ⊣term direct link between blood pressure and anxiety(10). Even though anxiety does not cause persistent high blood pressure, there is evidence in literature stating that it can cause temporary spikes in systolic and diastolic blood pressure(10).

Dental anxiety broadly can be managed by using pharmacological intervention, psychotherapeutic interventions (non-pharmacological) or a combination of the above-mentioned techniques. Pharmacological interventions include sedation and use of general anaesthesia and should only be used when the patient is not responding to any of the non-pharmacological (psychotherapeutic) interventions(11).

Psychotherapeutic interventions can be categorized with either behavioural or cognitive approach (8). Most commonly used non-pharmacological aids for management of endodontic related anxiety

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include relaxation techniques and music distraction. According to Lahmann *et al.,* music distraction has proved to be beneficial in reducing state anxiety in comparison with no intervention, with its greatest effect among subjects with moderate anxiety (12). Furthermore, Lai *et al.,* showed that music distraction could decrease the procedure ‐related anxiety of patients undergoing endodontic treatment(13).

There is currently mixed evidence regarding the effectiveness of music therapy in the dental office. At present, very limited literature is available on the effects of music therapy during endodontic treatment on pain perception and changes in physiological parameters, especially in Indian hospital-based clinical scenario. Hence this study was performed to evaluate the influence of music as a non-pharmacological aid in anxious patients based on their pain perception and physiologic parameters (i.e. heart rate, systolic blood pressure, and diastolic blood pressure) at three different time period i.e. before, during, and after endodontic treatment.

The objective of this study was; (a) to assess the influence of music on patient's pain perception, before and after endodontic therapy by using Visual Analog Scale (VAS); (b) to assess the influence of music on heart rate, systolic (SBP) and diastolic blood pressure (DBP) before, during, and after endodontic therapy; (c) to compare physiological parameters in patients receiving endodontic treatment with or without music therapy. The null hypothesis was formulated that there is no significant difference between pain perception and physiological parameters of the patients receiving and not receiving music therapy during endodontic treatment.

METHODOLOGY

Source of Data and Study Setting

The study was designed as a single-centre, randomized, parallel-group and single-blinded controlled trial. The study was conducted in the Department of Conservative Dentistry and Endodontics, Faculty of Dental Sciences, Ramaiah University of Applied Health Sciences (RUAS), Bengaluru. The research protocol was reviewed and approved by the Ethics Committee of the Institution (Ramaiah University of Applied Sciences, Bangalore).

Method for Data Collection

Sampling Frame:

Patients requiring endodontic therapy who reported to Department of Conservative Dentistry & Endodontics, from the duration of June 2017 to April 2018, at Faculty of Dental Sciences (FDS)- Ramaiah University of Applied Health Sciences (RUAS), Bengaluru, were recruited for this study.

Sample size Determination:

A total of 100 patients (50 patients per group) were evaluated to reject the null hypothesis of equality between patients listening to music (Group A) and not listening to music (Group B) in terms of pain scores, systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR).

Selection Criteria:

Inclusion Criteria:

Patient requiring endodontic treatment between 18 - 50 years of age; Teeth that are restorable and periodontally sound (for placement of rubber dam for isolation); Patients who are able to hear easily without a hearing aid; Patients who had normal cognitive function

Exclusion Criteria:

Patient receiving anxiolytic or sedative medications; Patient with medical diagnosis of seizures or hypertension and pregnancy

Randomization:

For randomization, standard sealed envelope system was used. In this participants were given randomly generated treatment allocations within sealed envelopes. Once a patient has consented to enter the study, an envelope was selected and opened by the patient and then the patient was offered the allocated treatment regimen.

One hundred participants were enlisted from among all the patients scheduled for endodontic treatment. Patients were the age of 18 to 50 years and free of any systemic health problems preventing them from endodontic treatment, and had self-reported anxiety about root canal treatment.

Endodontic treatment procedures were explained in a simple language understood by the patient. If after this conversation the patient agreed to participate in the study, they were enrolled and an appointment was scheduled. All patients underwent a review of their medical history as well as an endodontic examination. This consisted of any radiographs required, as well as intra and extra-oral examinations. After collecting all the pre-operative data, a consent form to perform a root canal treatment and consent to participate in the research project were explained in the language understood by them and then signed by the patient.

After taking consent, the patients were asked to complete a questionnaire, Modified Corah's Dental Anxiety Scale. The scale contains five multiple choice questions dealing with patient's subjective reactions about dental visits, waiting in the clinic for the procedure, the anticipation of drilling and scaling, and about the local anaesthetic injection. Points were assigned for the patients' choices, with points ranging from zero (not anxious) to four (severe anxious). To obtain the total score for the scale, the scores for each of the 5-item responses were summed, with a total range from 0–20. Based on the results of the Modified Corah Dental Anxiety Scale, the patients were classified into 4 anxiety levels: no anxiety (score <4), mild (4–8), moderate (9–12), and severe (>12).

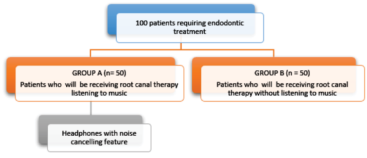


Figure 1: Experimental design

Patients were then provided with Visual Analog Scale (VAS) and were asked to note down the pre-operative pain score accordingly. The Visual Analog Scale (VAS) is presented as a 100-mm horizontal line on which the patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable."

After the completion of pain assessment and the questionnaire, the patient was given a sealed enveloped which had treatment groups, Group A and B. Group A stated patients receiving music therapy during endodontic treatment and Group B represents patients not receiving music therapy. After the selection of groups according to the sealed envelope method for randomization of samples, the patients were explained about the allocated treatment regimen.

Patients were made to sit on the dental chair and then the vital signs were recorded which included the systolic blood pressure(SBP), diastolic blood pressure (DBP) and heart rate (HR) with a digital sphygmomanometer (Accusure, B.P. Monitor). These readings were then recorded on to the master data sheet by an assistant.

Patients who were assigned to Group A (i.e. who received music therapy) were asked to wear noise-cancelling headphones (Sony headphones MDRZX110NC, Sony, Japan) and play their own playlist which they like and are familiar with on their mobile phones with the volume in which they are feeling comfortable. Patients who were assigned to Group B (i.e. control group, not receiving music therapy) received instructions to be comfortable and relaxed on the dental chair. Patients were then anaesthetized by using 2% lidocaine hydrochloride with adrenaline (1:200000) (Xylocaine, Zydus Healthcare, India) in a 2 mL 26-gauge needle (Unolok, Faridabad, India). After waiting for 10 minutes, the tooth undergoing root canal treatment was tested to check its level of anaesthesia by subjective and objective signs and symptoms. After achieving adequate anaesthesia, rubber dam isolation was performed on the concerned tooth. The patient then underwent the endodontic procedure in a standardized manner and the treatment was provided by one operator with the assistant to avoid operator bias. At the mid-point of the treatment, another set of readings of vital signs (i.e. SBP, DBP, and HR) were taken and noted down in the master chart by the assistant.

Upon completion of the endodontic treatment, the noise cancelling headphones were removed (in case of Group A patients) and final set of readings of vital signs (i.e. SBP, DBP, and HR) were recorded and noted down. After this, the patients were asked to wait in the waiting area for another one hour and were again provided with a Visual Analog Scale to note the post-operative pain scores in the datasheet.

STATISTICALANALYSIS

The statistical software namely SPSS version 20.0 was used to evaluate descriptive data analysis and comparative analysis by using paired sample t-test, independent sample t-test, Chi-Square test and Repeated measures ANOVA and post-hoc Bonferroni test.

RESULTS

A flow diagram of a parallel group trial of music therapy group compared with the control group with no music intervention for the management of dental anxiety in patients during endodontic treatment was prepared. This diagram shows a single centred, randomized and parallel group study design of the present study (Figure 2).

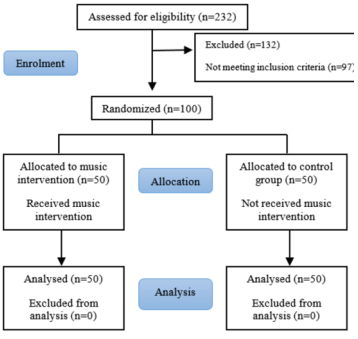
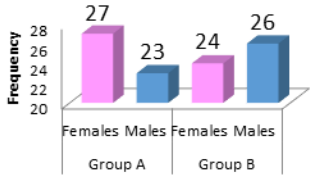


Figure 2: Flow diagram of a single-centre trial of music therapy group compared with the control group with no music intervention for the management of dental anxiety during endodontic treatment.

One hundred subjects were randomly assigned into two groups, Group A (patients receiving music therapy) and Group B (patients not receiving music therapy). In Group A, 27 subjects were female and 23 were male, while in the control group (Group B), 24 subjects were female and 26 were male. Chi-square analysis was performed to assess the distribution of male and females among the groups. The results show that there was the homogenous distribution of gender among the groups.

Figure 3: Distribution of the Subjects Based on Gender



The participants were categorized in 4 categories according to the scores calculated by Modified Corah's Dental Anxiety Scale (MCDAS). According to the data collected, both the groups (i.e. experimental and control group) had an almost equal distribution of subjects according to different levels of anxiety suggesting that there was no selection bias and proper randomization was achieved. The data revealed 16% of participants reported with no anxiety, 33% with mild anxiety, 33% with moderate anxiety and 18% of the participants reported to have severe anxiety.

Mean Change in Pain Perception:

The mean change in pre-operative pain scores according to Visual Analog Scale (VAS) for patients in the music intervention group (Group A) compared to the control group (Group B) was 0.36 (p=0.21). This shows that there was no difference in the pain score among both the groups pre-operatively.

The mean change in post-operative pain scores according to Visual Analog Scale (VAS) for patients in the music intervention group (Group A) compared to the control group (Group B) was -0.5 (p=0.007*). This data shows that there was a difference in the pain score among both the groups postoperatively. In group A, i.e. patients who received music therapy showed a significant reduction (p<0.05) in pain level as compared to group B patients who did not receive any music therapy during endodontic treatment (Table 1).

Table 1: Comparison of Mean Distribution Based on Pain Score (pre and post-operatively) using Independent Sample t-Test

	Groups	Mean	S.D	Mean difference	p value
Pre	Group A	7.48	1.555	0.36	0.21
	Group B	7.12	1.288		
Post	Group A	.52	.735	-0.5	0.007*
	Group B	1.02	1.040		

* significant value

Mean Change in Heart Rate:

The heart rate of the patients showed variations in the music intervention group as compared to the heart rate of patients in the control group, during and after the endodontic treatment.

The data were analyzed by using the independent sample t-test. The results revealed that the patients with music intervention group had a mean baseline pre-operative reading of 88.66 ± 10.23, which decreased to mean value of 80.92 ± 7.93 during the treatment and then slightly increased to mean value of 82.12 ± 7.19. These data indicate a statistically significant difference in the heart rate during and after endodontic treatment ($p < 0.05$) as compared to the control group which does not have any evident change in the heart rate before, during and after endodontic treatment (Table 2).

Table 2: Comparison of the Mean Distribution of the Subjects Based on Heart Rate (beats/min) (before, during, and after) Using Independent Sample t-Test

	Groups	Mean	S.D	p value
Before	Group A	88.66	10.237	0.12
	Group B	85.74	8.738	
During	Group A	80.92	7.933	0.018*
	Group B	85.08	9.352	
After	Group A	82.12	7.199	0.02*
	Group B	85.86	8.795	

Repeated measures ANOVA showed a significant difference in the heart rate of patients in Group A (music intervention) with respect to different time intervals (p=0.00) whereas there was no significant difference seen with respect to the heart rate of patients in Group B (p=0.08). Post-hoc Bonferroni showed a significant difference between before and during (p=0.00); before and after (p=0.00); during and after (p=0.00) in Group A (Table 3).

Table 3 Post-hoc Bonferroni test for correlation of Heart Rate in Study and Control Group

		Mean difference	p-value
Group A	Before * During	7.74	0.00*
	Before* After	6.54	0.00*
	During * After	-1.2	0.00*
Group B	Before * During	0.66	0.29
	Before* After	-0.12	1.00
	During * After	-0.78	0.17

* significant value

Mean Change in Systolic and Diastolic Blood Pressure:

In the case of blood pressure, the systolic and diastolic blood pressure of the patients showed variations in the music intervention group as compared to the patients in the control group, during and after the endodontic treatment.

The data were analyzed by using the independent sample t-test. For systolic blood pressure, results revealed that the patients with music intervention group had a mean baseline pre-operative reading of 134.84 ± 14.17, which decreased to mean value of 126.90 ± 12.14 during the treatment and then slightly increased to mean value of 133.06 ± 13.87.

These data indicate a statistically significant difference in the systolic blood pressure during endodontic treatment (p=0.02) as compared to the control group which does not have any evident change in the systolic blood pressure during endodontic treatment.

Table 4: Comparison of the Mean Distribution of the Subjects Based on SBP (mm/Hg) (Before, During and After) Using Independent Sample t-Test

	Groups	Mean	S.D	p-value
Before	Group A	134.84	14.157	0.96
	Group B	134.98	15.191	
During	Group A	126.90	12.144	0.02*
	Group B	128.56	12.408	
After	Group A	133.06	13.847	0.06
	Group B	133.50	14.109	

* significant value

Repeated measures ANOVA showed a significant difference in the systolic blood pressure of patients in Group A (music intervention) and Group B (no intervention) with respect to different time intervals (p=0.00). Post-hoc Bonferroni showed a significant difference between before and during (p=0.00); before and after (p=0.00); during and after (p=0.00) in Group A.

Table 5: Post-hoc Bonferroni test for correlation of SBP in Study and Control Group

		Mean difference	p-value
Group A	Before * During	7.94	0.00*
	Before* after	6.28	0.00*
	During * after	-1.66	0.00*
Group B	Before * During	1.92	0.01*
	Before* after	1.48	0.01*
	During * after	-0.44	0.89

* significant value

In regards to diastolic blood pressure, results revealed that the patients with music intervention group had a mean baseline pre-operative reading of 85.32 ± 8.28, which decreased to mean value of 78.34 ± 7.39 during the treatment and then slightly increased to mean value of 79.24 ± 7.58. These data indicate a statistically significant difference in the diastolic blood pressure readings during and after endodontic treatment ($p<0.05$) as compared to the control group which does not have any evident change in the diastolic blood pressure during endodontic treatment.

Table 6: Comparison of the Mean Distribution of the Subjects Based on DBP (mm/Hg) (Before, During and After) Using Independent Sample t-Test

	Groups	Mean	S.D	p value
Before	Group A	83.52	8.289	0.29
	Group B	85.84	13.270	
During	Group A	78.34	7.392	0.005*
	Group B	84.44	13.200	
After	Group A	79.24	7.585	0.007*
	Group B	85.08	12.917	

* significant value

Repeated measures ANOVA showed a significant difference in the diastolic blood pressure of patients in Group A (music intervention) and Group B (no intervention) with respect to different time intervals (p=0.00). Post-hoc Bonferroni showed a significant difference between before and during (p=0.00); before and after (p=0.00); during and after (p=0.00) in Group A.

Table 7: Post-hoc Bonferroni test for correlation of DBP in Study and Control Group

		Mean difference	p-value
Group A	Before * During	5.18	0.00*
	Before* after	4.28	0.00*
	During * after	-0.90	0.019*
Group B	Before * During	1.40	0.002*
	Before* after	0.76	0.034*
	During * after	-0.64	0.14

* significant value

DISCUSSION

Dental treatment is considered an invasive treatment and a primary source of anxiety and fear for many patients. The present study aimed to evaluate if the presence of music could help improve the patient's pain perception and physiological parameters during endodontic treatment. In the present study, music has shown to be a significant variable for change in pain perception and cardiovascular readings.

Since the beginning of medical science, music interventions have been proven an effective adjunct in reducing anxiety in a variety of medical field. There is ample evidence from various systematic reviews that music interventions have a moderate to large effect on anxiety in patients with cancer, patients with coronary heart disease, and patients on mechanical ventilation (14). Anxious patient does not fully cooperate with the dental practitioner. Such situation prolongs the procedure and makes it more difficult. As a result, elimination of patient's anxiety may improve the quality, effectiveness, and success of dental treatment – and hence improve the overall health of patients (15).

In dental care, the use of music has been limited to music medicine practice in which patients are offered the opportunity to listen to music through headphones or free field. A survey examining anxiolytic intervention preference of dental practitioners found that ambient background music was the most commonly used anxiolytic intervention (83%) in dental practices (16). Studies by Olszewska and Żarow *et al.* state that patients who were listening to music during dental treatment showed: lower level of tension, better approachability, and adjustment to all types of treatments.

Music can influence emotions, intellect, and psyche. Soothing and suitable music has been shown to have a strong influence on human brain waves, which leads to a state of deep relaxation resulting in alleviating pain and anxiety (17). Furthermore, music reduces the activity of the neuroendocrine and sympathetic nervous system. Music easily reaches all parts of the brain and activates them by creating new and more complex connections and bypassing damages in the existing cell connections. Music uses rhythm to change neural activity in the lateral temporal lobe and cortical area that control movements and triggers expression of opioid receptor morphine-6-glucuronide and interleukin 6 (18). In addition, other significant effects of music therapy are increased level of excreted immunoglobulin and decreased serum cortisol level (19). It is well-known that certain music can have a positive influence on concentration, patience and significantly reduce anxiety (15).

Music also has an impact on the autonomous nervous system (heart rate and breathing), since it reduces blood pressure, increases immunity, decreases muscle tension and pain intensity.

In the present study, a decrease in physiological parameters such as heart rate and blood pressure (systolic and diastolic) were observed which are in accordance with other relevant studies. The mean baseline pre-operative reading of heart rate was 88.66 ± 10.23, which decreased to mean value of 80.92 ± 7.93 during the treatment and then slightly increased to mean value of 82.12 ± 7.19. These data indicate a statistically significant difference in the heart rate during and after endodontic treatment ($p< 0.05$) as compared to the control group.

For systolic blood pressure, the results revealed that the patients with music intervention group had a mean baseline pre-operative reading of 134.84 ± 14.17, which decreased to mean value of 126.90 ± 12.14 during the treatment and then slightly increased to mean value of 133.06 ± 13.87. These data indicate a statistically significant difference in the systolic blood pressure during endodontic treatment ($p<0.05$) as compared to the control group which does not have any evident change in the systolic blood pressure during endodontic treatment. With regards to diastolic blood pressure, patients with music intervention group had a mean baseline pre-operative reading of 85.32 ± 8.28, which decreased to mean value of 78.34 ± 7.39 during the treatment and then slightly increased to mean value of 79.24 ± 7.58. These data indicate a statistically significant difference in the diastolic blood pressure readings during and after endodontic treatment ($p<0.05$) as compared to the control group which does not have any evident change in the diastolic blood pressure during endodontic treatment. These findings are in accordance with various other studies performed in different clinical setups ——(2023).

In the present study, there was no difference between the pre-operative pain scores according to Visual Analog Scale (VAS) for patients in the music intervention group (Group A) compared to the control group

(Group B). In Group A, i.e. patients who received music therapy showed a significant reduction ($p<0.05$) in pain level post operatively as compared to group B patients who did not receive any music therapy during endodontic treatment. This is in accordance with several studies that have examined the effects of listening to music on anxiety and pain in dental patients and showed positive results as seen in the present study(20,23,24).

In the present study, music selection and volume control were according to the patient's preference. In various studies where the music was pre-recorded and selected by the clinician, authors have reported that some participants did not enjoy the music throughout the treatment and were not comfortable with the volume of the music. According to Lai *et al.,* if the music is unknown to the patient it can increase anxiety (13). Hence, the efficient application of music during dental treatment may be compromised by the use of inadequate music (13). Therefore, it is necessary and very important that patients listen to familiar and preferred music during a medical procedure (if possible, a patient should choose their own music). Furthermore, in the present study, patients who received music therapy reported that throughout the endodontic treatment, they were in a relaxed state as they were familiar and comfortable with the music played. In addition to the above, the patients stated that the music distracted them from the instrument noises and the voices of the dental staff and surroundings.

However, there are several studies that did not find support for the anxiolytic effects of music during dental treatment. Several studies found that the distraction with music did not reduce pain or anxiety in dental patients (25). The inconclusive findings regarding the impact of music listening on dental anxiety, may be due to several factors related to intervention implementation as well as research methodology.

First, it is well possible that the use of music in the form of passive distraction to mask fear-enhancing noises and divert attention from the expectation of pain during treatment is not adequate (12). Second, most studies had the start of the music listening condition coincide with the onset of dental treatment. Researchers should consider starting the intervention prior to the onset of the dental treatment so that escalation of pre-treatment anxiety is prevented '(26). Third, in the majority of the studies, patient preference was not taken into account. Instead, researcher-selected music was used. Fourth, several of the studies included very brief music listening periods (e.g., 5 min in Aitkin study). This duration may not be sufficient for music to impact high anxiety.

The present study is one of the few studies investigating the effects of music therapy on dental anxiety during endodontic procedures. As endodontic procedures are among the most common dental treatment which causes dental anxiety in the majority of the patients seeking dental care. However, the literature primarily reports on the use of music therapy in cases of dental surgery and in pediatric patients. Therefore, this study could present a future scope for further research in the management of anxiety in adult patients during endodontic treatment.

In the present study, 2 possible limitations can be identified: the first one is that all the patients enrolled came to the endodontic department and could not reflect the demographic characteristics of a private endodontic practice. The second is that blinding of the observer was not a consideration with this study because during the treatment patients in the experimental group were wearing headphones and physiological readings were observed and recorded.

CONCLUSION:

As dental anxiety poses a challenge for a dental clinician during endodontic treatment or any other invasive dental treatment, it is important not only to identify anxious individuals but also to manage them appropriately when they arrive at the dental office. The clinician should focus on alleviating the fear and anxiety in such a manner that these patients are positively motivated and reinforced for future dental visits.

Within the limitation of this study, music therapy administered to participants with different levels of anxiety during endodontic treatment significantly decreased level of pain, systolic blood pressure, diastolic blood pressure, and heart rate during the endodontic procedures.

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