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Do massage and music therapy reduce dental anxiety in children?

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ABSTRACT

Introduction: Dental anxiety is a widespread and important phenomenon, especially when it comes to dental treatments in children. There are various methods to reduce it. The aim of this study was to investigate the effect of massage and music therapy on reducing dental anxiety.

Materials & Methods: This descriptive study was conducted on children referred to the Pediatric Department of Tehran Islamic Azad University of Medical Sciences in 2020. A total of 76 girls aged 8-9 years with Class 1 caries on the first permanent molar requiring restoration were randomly selected from the patient list. The samples included four groups of 19 subjects: a control group, a massage-intervention group, a music-intervention group, and a massage+music-intervention group. In all groups, the children's Venham's clinical anxiety rating scale (VCRS) was measured before and after the treatment. Moreover, blood pressure and pulse rate were recorded before and after dental treatment. A Repeated Measure ANOVA was used to compare the changes in the physiological parameters.

Results: The mean diastolic blood pressure and VCRS differed significantly between the groups (p=0.025, p=0.001). The lowest Venham anxiety score was found in the music+massage group.

Conclusion: It appears that music and massage therapy are effective in reducing anxiety and that the combination of these two interventions is as effective as the sum of the two.

Keywords: Anxiety, Massage Therapy, Music Therapy, Pediatrics.

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Introduction

Many studies have shown that anxiety is a common problem in pediatric dentistry. [1-3] It has been shown that patients with high anxiety have a lower pain threshold. [4] Treating an anxious child has unpleasant consequences and the child leaves the clinic with unpleasant experiences. It also wastes the patient and dentist's time and may not end up with the ideal treatment results. Fear and anxiety also deprive the child of simple treatment, sometimes with preventative measures. [1] Therefore, reducing

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anxiety in the treatment session and increasing the child's desire for regular visits also allows the dentist to provide effective and better service. [5, 6]

Several methods reduce anxiety, such as drug therapies, behavioral therapy, and mindfulness (non-drug therapy). The side effects of non-drug therapies are lower. Behavioral therapy focuses on promoting activities that generate anxiety. [3, 7] Recently, some new methods have been developed to reduce anxiety, such as integrative medicine, massage and music therapy, aromatherapy, etc. Studies have suggested that massage therapy reduces daily stress, muscle contraction and fluid retention, increases circulation, improves absorption, digestion, and elimination, promotes relaxation and increases endorphins. [8, 9] Music therapy also increases endorphin release and lowers stress hormones, relieves muscle tension, improves motor skills, enhances skills and learning, concentration and improves memory. Despite a high percentage of anxiety patients using complementary therapies, the lack of recommendations for clinicians to inquire about and document the use of complementary therapies for anxiety represents a major missed opportunity for shared decision-making. Guidelines have also been conservative and cautious in recommending the use of complementary therapies. [10-12]

Recent studies have indicated that massage and music therapy are successful for many medical conditions. They have been found to reduce anxiety, depression, and other negative emotions to improve physical and mental well-being efficiently.[12] Due to the importance of anxiety control in pediatric dental treatments and the contradictory results of previous studies, this study was conducted to investigate the effect of /massage and music therapy in reducing anxiety in children referred to the Pediatric Department of Tehran Islamic Azad University of Medical Sciences.

Materials & Methods

This descriptive study was conducted on 76 8-9-year-old girls randomly selected from the children referred to the Pediatric Department of the Faculty of Dentistry, Tehran Islamic Azad University of Medical Sciences in 2020. After the initial examination and X-ray examination by a pediatric dentist, the need for restorative treatment of class 1 first permanent molars under anesthesia was confirmed. Physically and mentally healthy children who had at least one permanently decayed first molar were included in the study. Non-cooperative children ranked first on the Frankl classification who had systemic problems such as anxiety, depression, cognition, hearing impairment, skin disorders, allergies, and touch-related diseases were excluded from the study with the help of the child's parents.

Ethical considerations:

After the necessary explanations about the aims of the present study, the child's parents completed the written informed consent form. Ethics approval for the study was obtained from the Ethics Committee of Tehran Medical Science Islamic Azad University (Ethical code: IR.IAU.DENTAL.REC.1399.171). The study was done in a special room in the pediatric Department of the Dental Clinic, which was separate, quiet and safe. To avoid any stress, all study procedures for both the control and study groups were done in a single room supervised by a single operator and a pediatrician on different days. The researcher, a dental student, was fully instructed in the facial massage protocol by a professional and experienced masseur prior to the study. [14]

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The classification of groups:

The participants were randomly divided into 4 groups of 19 subjects each: control group, massage-intervention group, music-intervention group, and massage+music intervention group. Control group: In this group, the dental treatment was performed without any intervention. Before and after the treatment, the child was tested on Venham's clinical anxiety rating scale (VCRS), and blood pressure and pulse rate were measured before and after the dental treatment Nabzazma Digital(NB-01) (Nabzazma Electronic Company, Islamshahr, Iran). [14-.17]

Massage group: In this group, before the start of the dental treatment, parts of the face were massaged in the safe massage room according to the facial massage protocol shown in

Figure 1 by a researcher with a very pleasant scent of children's face cream (protective and moisturizing baby cream) from Firooz hygenic group, Tehran, Iran. After 10 minutes of massage, the child received dental treatment. VCRS, blood pressure and pulse rate were measured before and immediately after the massage and after the treatment. [14] Music therapy group: In this group, familiar music, such as kindergarten or cartoon music, was played via headphones during the dental treatment according to the child's interests and the sound of the music was adapted to the child. The VCRS, blood pressure and pulse rate were recorded before and after the dental treatment. [14-.17] Massage group+music: In this group, parts of the face were massaged by the operator according to the facial massage protocol before the dental treatment started, as shown in

Figure 1. After 10 minutes of massage, the dental treatment started with the child's favorite music. The VCRS test, blood pressure, and pulse rate were recorded before and after the treatment. [14-17]

The VCRS and blood pressure estimation methods:

In all groups, after completing the apron and sterilization protocol, the infection status and coronary artery assessments of all children were conducted. The sphygmomanometer cuff was closed to the patient's bare right arm while in a sitting position, and the pulse rate was measured and recorded using a brachial sphygmomanometer before treatment. Nabzazma Digital (NB-01) (Nabzazma Electronic Company, Islamshahr, Iran). The children's anxiety was measured by their response to the standardized tests and examinations shown in

Figure 2. In this test, eight binary pictures (one of the pictures expressed the anxious state, the other the non-anxious state) were presented to the child by the examiner, and the child chose one of the two pictures that corresponded to her current feelings. The test results were as follows: If the non-anxious picture is selected, a score of zero is given, and if the anxious picture is selected, a score of one is given for each of the eight pictures. Finally, all the images were added together and the child's anxiety level was graded from zero (no worries and no stress) to eight (severe anxiety). Repeated Measure ANOVA (Analysis of Variance) was used to compare the changes in physiological and psychological parameters. A value of $P<0.05$ was considered significant.

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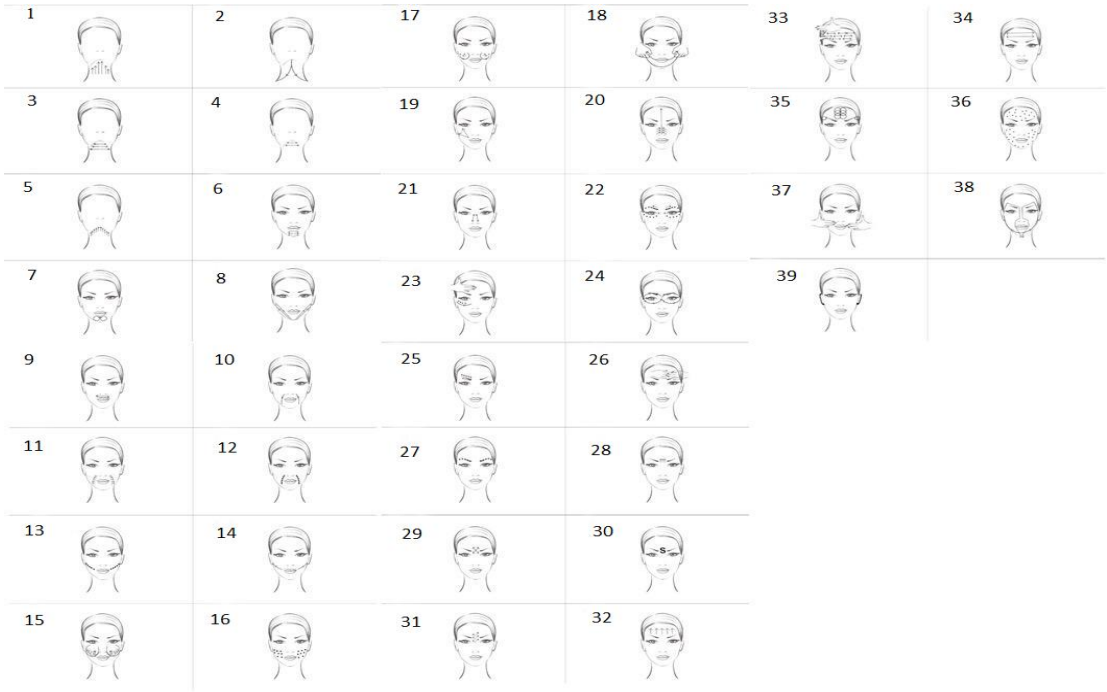


Figure 1. Facial massage protocol: all parts of the face, scalp, cheeks, forehead, eye area, and muscles were treated according to the operator's facial massage protocol.

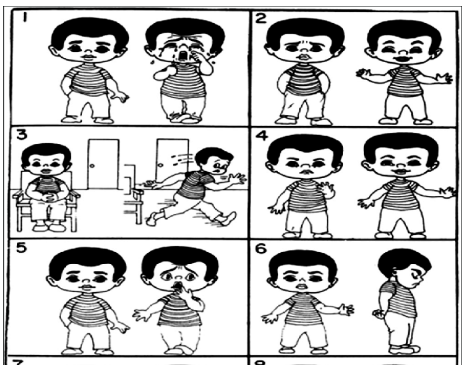


Figure 2. **The VCRS (Wenham's clinical anxiety rating scale): anxious image = a score of one. The child's anxiety level was rated from zero (no worry and no stress) to eight (severe anxiety).**

Results

There was no significant difference between the groups on the pre-treatment variables (p=0.982), and the interaction term between the pre-and post-treatment variables and the group variables was not significant (p=0.591). Age had no significant effect on the physiological and psychological parameters (P=0.261, P=0.885). The MANOVA (Multivariate analysis of variance) test illustrated that at least the distribution of one physiological and psychological parameter was significantly different between the study groups (p<0.001). The post hoc univariate ANOVA showed that the mean diastolic blood pressure and the Venham anxiety score differed significantly between the groups (p=0.025, P=0.001)

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(Table1). Figure 3 represents that the stress decreases in both groups (the music and massage groups) separately, but after the combination in the music+massage group, stress decreases even more and it can be seen that the (VCRS) is by far the lowest in the music+massage group.

Table 1. Comparison of mean heart rate, mean systolic blood pressure, diastolic blood pressure, and mean Venham anxiety score in the study groups and time of measurement

Dependent Variable	Group	Time of measurement	Mean	CI 95%		F Test	
				Lower limit	Upper limit	P-value[1]	P-value[2]
Heartbeat	Control	Before treatment	92.1	85.9	98.2	0.155	0.627
		After treatment	95.1	88.9	101.2		
	Music	Before treatment	91.8	85.7	98.0		
		After treatment	90.9	84.8	97.1		
	Massage	Before treatment	88.2	82.0	94.3		
		After treatment	87.4	81.2	93.6		
	Music+Massage	Before treatment	90.3	84.1	96.4		
		After treatment	84.6	78.4	90.8		
Systolic	Control	Before treatment	105.9	102.9	108.9	0.513	0.912
		After treatment	109.4	106.4	112.4		
	Music	Before treatment	105.7	102.7	108.7		
		After treatment	105.1	102.1	108.1		
	Massage	Before treatment	106.5	103.5	109.5		
		After treatment	106.2	103.2	109.2		
	Music+Massage	Before treatment	107.5	104.5	110.5		
		After treatment	104.5	101.5	107.5		
Diastolic	Control	Before treatment	72.8	70.7	75.0	0.025*	0.797
		After treatment	75.5	73.3	77.6		
	Music	Before treatment	71.2	69.0	73.3		
		After treatment	70.7	68.5	72.8		
	Massage	Before treatment	73.4	71.2	75.5		
		After treatment	72.7	70.5	74.8		
	Music+Massage	Before treatment	73.3	71.1	75.4		
		After treatment	71.0	68.9	73.1		
Venham anxiety score	Control	Before treatment	1.6	1.0	2.2	0.001*	0.261
		After treatment	2.5	1.9	3.1		
	Music	Before treatment	2.1	1.5	2.6		
		After treatment	1.5	.9	2.1		
	Massage	Before treatment	1.3	.7	1.8		
		After treatment	1.1	.5	1.6		
	Music+Massage	Before treatment	1.5	.9	2.1		
		After treatment	.4	-.2	1.0		

[1] Univariate ANOVA test for group variable
[2] Univariate ANOVA test for Time variable

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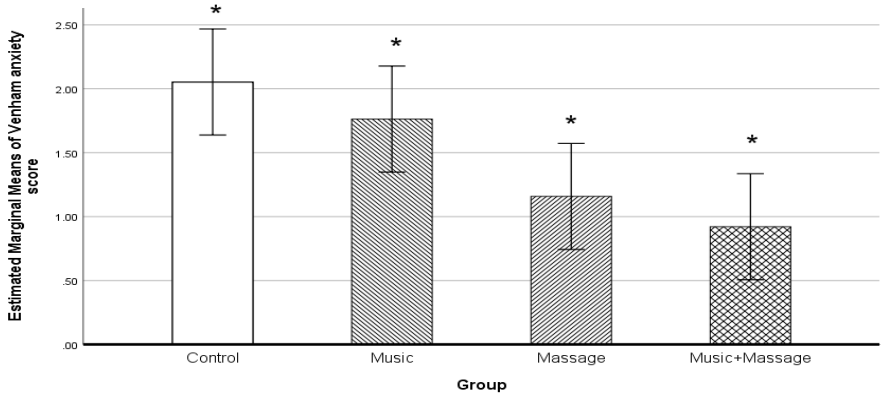


Figure 3. Comparison of the Venham anxiety mean±SD of the study groups; the mean of the groups having the same symbol is significantly different (P≤0.05).

The data displayed in figure 4 reveal that the diastolic blood pressure is significantly higher in the control group than in the music group (p<0.001). MANOVAs were used to evaluate the difference between the study groups and time based on physiological and psychological parameters.

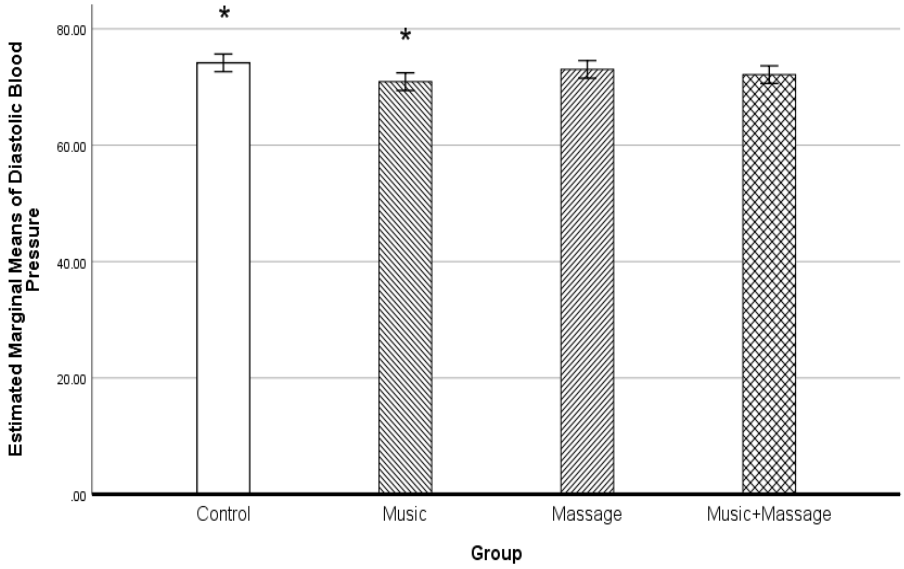


Figure 4. Comparison of diastolic blood pressure mean±SD of the study groups; the mean of the groups having the same symbol is significantly different (P≤0.05).

Discussion

The current study suggested that the lowest Venham anxiety score was found in the music+massage group. In a study by Marwah et al., the effect of musical distraction on the management of anxiety in pediatric dental patients in children was measured using Venham's picture test (VPT) and VCRS and was observed that the pulse rate, test rate and beat rate decreased with the use of music, [15] which confirms the results of the present study. Navit et al. measured the effectiveness and comparison of different types of speech distraction aids in controlling anxiety in dental patients. The children's anxiety levels were measured using the VPT and VCRS. A significant

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stress reduction was observed in the music group compared to the control group. In addition, there was a clear difference in the mean pulse rate between all groups. The audio aids generally reduced anxiety compared to the control group, and the most significant reduction in anxiety level was observed in the group with the audio stories. [17] However, no significant difference was observed in VPT and VCRS scores between all groups the reason could be based on the mean age of children. Calvenkar et al. found that eye massagers could help reduce the stress and anxiety associated with dental procedures by weakening the gag reflex. This technique may be a valuable aid in making short dental procedures more successful, which establishes a positive relationship with the patient by instilling confidence in the dental treatment, [18] this is consistent with the result of the ongoing study as a new treatment aid modality. Unlike the present study, Kurebayashi et al. carried out in the adult age group, it was shown that at the beginning and end of the anxiety treatment, there was a decrease in the intervention group compared to the control group. [19]

Najafi et al. investigated the effect of Swedish massage and music preferred by patients on anxiety in patients with chronic heart failure. Swedish massage and preferred music significantly reduced anxiety in patients with chronic heart failure, and Swedish massage reduced anxiety more than preferred music. [20] It was observed that children who were familiar with the selected music were more interested in listening to music, and the effect of music on reducing their stress was greater. [15, 16] the methods are different with our study but the effects are similar as well. In a study by Fux-Noy et al., the relationship between the effect of music in the waiting room and children's anxiety before dental procedures was investigated. [21] In their method, music was played in the waiting room before the child received dental treatment. No significant difference was observed in the mean scores of the two groups with and without music, which is inconsistent with the results of the ongoing study.

Aitken et al. investigated whether auditory distraction can reduce patient anxiety, pain, and disruptive behavior during dental procedures in children [4] Nazari et al. also suggested in their study that massage therapy can be used as a suitable method for nurses working in intensive care units to reduce stress, promote mental health and prevent a reduction in the quality of nursing work. [22] Aligailani et al. investigated the effect of music on stress reduction and academic performance of dental students in Iraq. Their wok suggested that music might have a positive impact on stress reduction in dental students during their academic years in dentistry. [23] Davis et al. determined that massage had no effect on occupational stress in the Role Overload, Role Ambiguity and Responsibility scales. The reasons for the lack of effect of massage therapy in this study may be that the experimental group was used as a control group or that it was a single group. [24] The researcher concluded that audio distraction was not an effective means of reducing anxiety, pain, or uncooperative behavior during pediatric restorative dental treatments. Their study is inconsistent with the findings of the current study.

Strengths: Compared to all similar articles in this field, the present study tested individuals with a narrower age range and also examined a larger number of variables. All patients were physically healthy, so confounding factors were excluded as much as possible in this study. Limitation: All samples were selected from children referred to a medical center. It seems that the results would be more generalizable if the sample had been selected from multiple medical centers. COVID-19 was a problem to find enough samples, but it was accomplished with effort.

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Previous experience with dental treatment plays an important role in the child's anxiety level, but this was a limitation of the study. The restorative operation in a general dental clinic could influence the results, but due to the conditions, this is not possible. The massage and music therapy can decrease the salivary cortisol level in the samples, reduce stress levels in them and make the VST lower than the others. Further study is needed to define the mechanism. Suggestion: due to increasing patient demand for complementary medicine [25] and music, as well as considering that massage therapy is a simple and time-saving method to reduce stress and anxiety associated with dental procedures while providing quality care for their patients, patient satisfaction and care should be improved. [25] Finally, the question remains whether these therapies have been integrated and recommended to clinical professionals to manage anxiety. Furthermore, are there CAM therapies that have been specifically identified as ineffective or not? Bridging these knowledge gaps is of crucial clinical importance and the aim of the present study.

Conclusion

Massage and music therapy significantly reduced dental anxiety. Treating anxiety in children has a lasting impact on the overall medical experience for both the child and the family's response to future medical procedures, making these interventions effective ways to alleviate anxiety. Additionally, the combination of these two interventions enhances the effectiveness of each.

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Conflict of interest:

All authors declare no conflict of interest.

Author's Contribution:

Zahra Ghorbani, Arezoo Alaee developed the original idea. Arezoo Alaee,Gholam Hosein Ramezani summarized the data, drafted the manuscript, and edited the article. Arzoo Alaee and Sima Alemi wrote the methodology of this project and they supervised the project and critically revised the manuscript for important intellectual content. The study was supervised by Arezoo Alaee,Gholamhosein Ramezani and edited by all authors.

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