

# EVALUATION OF REDUCTION IN ANXIETY LEVELS WITH THE USE OF MUSIC THERAPY – A STUDY ON 5 TO 12 YEAR OLD CHILDREN

Original Article

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## ABSTRACT

Pain and anxiety has been associated with dental treatments in patients of all age groups since centuries. The advent of conscious sedation and general anesthesia in medicine and its use in pediatric dentistry has created possibilities of treating anxious or fearful children. Audio distraction or music therapy is one non-pharmacological modality which aims at making the dental treatment more acceptable to the pediatric patients and their parents.

**Aims and Objectives:** The aim of the study is to evaluate the effect of familiar Gujarati folk music in reducing the level of anxiety as compared to non-familiar vocal music in 5 – 12 year old boys and girls.

**Materials and Methods:** The study consisted of 104 children in 5 – 12 year age group with no previous dental experience. The children were divided into two groups of 52 children each, one group requiring use of airtor and another requiring local anaesthesia for their treatment. The children in each group were then randomly divided into further two groups of 26 children each, the first group children were made to listen to Gujarati rhymes/folk music while the second group children were made to listen vocal unknown music. Child's anxiety level is assessed by using a combination of Venham's picture test, Venham's anxiety rating scale, pulse rate and oxygen saturation as objective measurements of anxiety level.

**Results:** A significant reduction in anxiety levels was noted in children of both groups with the use of familiar music therapy as compared to unknown music therapy. However, the anxiety reduction was better in familiar music therapy group as compared to non familiar music therapy group.

**Conclusion:** Children showed better involvement in the procedure when asked for music selection and given familiar folk song/rhymes music therapy. Hence, familiar music therapy is an effective tool in reducing the anxiety levels in pediatric dental patients in the unfamiliar dental clinical environment.

**KEYWORDS:** Music Therapy Venham's Picture test. Venham's Anxiety Rating Scale.

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## INTRODUCTION & REVIEW

Complementary and alternative medicine and dentistry such as aroma therapy, herbal therapy and music therapy have been a burning topic these days because of the need for increasingly high quality medical and dental care.<sup>1</sup> Interventions aimed at improving the health and wellbeing of children may also cause pain and anxiety. Managing the behavior and anxiety of a child so as to become a co-operative patient is critical to the success of dental treatment.<sup>2</sup>

Recently, the term psychosomatic medicine has been coined to refer to a point of view which regards all illness, even health, as having a psychological, as well as physical aspect, in both its cause and manifestations. We have become very much aware of the importance in treating "the whole person" as an integrated functioning unit, recognizing psychological factors along with structure.<sup>3</sup>

Pharmacotherapy has been shown to be effective in reducing some of the pain and anxiety associated

with medical procedures but it may come with worrisome side effects. Thus although, traditional techniques may be successful, the attitude of parents and dental professionals towards these techniques is changing. This is the reason why new non-aversive techniques, which are more effective and more acceptable to the parents, are being used. Audio distraction is one such non-aversive technique in which patient listens to music during the dental procedure. Because of its success in medical settings<sup>4</sup> and in adult dental patients, many dentists believe that this technique may be successfully used in managing the pediatric dental patients.<sup>2</sup>

A familiar clinical environment created using familiar music therapy may help reduce/eliminate anxiety in young dental patients. The aim of the study is to evaluate the effect of familiar Gujarati folk music/rhymes in reducing the level of anxiety in children and adolescents as compared to non-familiar vocal music. The objectives are to evaluate

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the effectiveness of familiar Gujarati musical poems and folk music in reducing the level of anxiety in children 5 – 12years old as compared to unknown vocal music group during fear provoking situations and to compare the effectiveness of familiar Gujarati musical poems and folk music in reducing the level of anxiety in girls and boys.

## MATERIALS & METHODS

➤ The study was conducted in the Pedodontics and Preventive Dentistry Department of the institute.

### Selection of subjects

➤ The study included 104 randomly selected subjects (consisting of 52 boys & 52 girls) selected from the outpatient attending the department of Pedodontics and Preventive Dentistry having chronologic age ranging from 5 years to 12 years.

➤ The subjects who required the use of either airotor or local anaesthesia (LA) for dental treatment and whose guardians agreed for the dental treatment and for participation in the study were included in the study.

➤ The subjects who did not require the use of airotor or LA for dental treatment and those who were physically or mentally challenged or had behavioural problems were excluded from the study.

➤ After selection of the subject for the study, the subject and their guardian were informed about the procedure of the study and informed consent was obtained from them.

### Study groups

➤ The children were divided into two main groups:

- One group consisted of 52 children who required use of airotor for their treatment
- Second group consisted of 52 children who required local anaesthesia for their treatment

### Study subgroups

➤ The children in both of the above groups were then randomly divided into further two subgroups:

- Subgroup 1 (consisting of 26 children) was Gujarati rhymes/folk music group for whom the choice of the type of music whether Gujarati

rhyme or folk song depended upon the patient's selection. The patients in the music group listened to the selected audio presentation through headphones throughout the treatment

- Subgroup 2 (consisting of 26 children) was Vocal unknown music group who listened to the unknown music audio through headphones throughout the treatment

## Method

### Anxiety level assessment

➤ Child's anxiety level was assessed by using a combination of following four measures:

- Venham's picture test using Venham picture scale as a subjective measurement of anxiety (Figure 1 & 2)

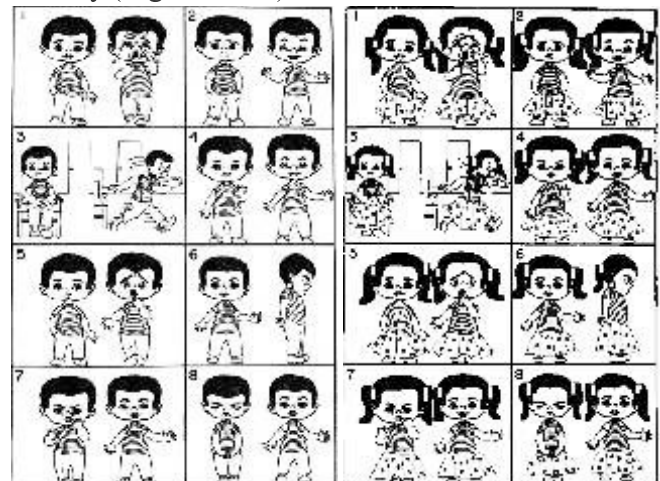


Figure 1: Venham picture scale for Boys

Figure 2: Venham picture scale for Girls

- Venham's anxiety rating scale as an objective measurement by the dentist (Figure 3)

**Anxiety rating scale**

0. Relaxed, smiling, willing and able to converse.
1. Uneasy, concerned. During stressful procedure may protest briefly and quietly to indicate discomfort. Hands remain down or partially raised to signal discomfort. Child willing and able to interpret experience as requested. Tense facial expression, may have tears in eyes.
2. Child appears scared. Tone of voice, questions and answers reflect anxiety. During stressful procedure, verbal protest, (quiet) crying, hands tense and raised, (not interfering much — may touch dentist's hand or instrument, but not pull at it). Child interprets situation with reasonable accuracy and continues to work to cope with his/her anxiety.
3. Shows reluctance to enter situation, difficulty in correctly assessing situational threat. Pronounced verbal protest, crying. Using hands to try to stop procedure. Protest out of proportion to threat. Copes with situation with great reluctance.
4. Anxiety interferes with ability to assess situation. General crying not related to treatment. More prominent body movement. Child can be reached through verbal communication, and eventually with reluctance and great effort he or she begins the work of coping with the threat.
5. Child out of contact with the reality of the threat. General loud crying, unable to listen to verbal communication, makes no effort to cope with threat. Actively involved in escape behavior. Physical restraint required.

**Behavior rating scale**

0. Total cooperation, best possible working conditions, no crying or physical protest.
1. Mild, soft verbal protest or (quiet) crying as a signal of discomfort, but does not obstruct progress. Appropriate behavior for procedure, i.e., slight start at injection, "aw" during drilling if hurting, etc.
2. Protest more prominent. Both crying and hand signals. May move head around making it hard to administer treatment. Protest more distracting and troublesome. However, child still complies with request to cooperate.
3. Protest presents real problems to dentist. Complies with demands reluctantly, requiring extra effort by dentist. Body movement.
4. Protest disrupts procedure, requires that all of the dentist's attention be directed toward the child's behavior. Compliance eventually achieved after considerable effort by dentist, but without much actual physical restraint. (May require holding child's hands or the like to start). More prominent body movement.
5. General protest, no compliance or cooperation. Physical restraint is required.

**Figure 3: Venham's anxiety rating scale**

- Pulse rate and
  - Oxygen saturation as objective measurements of anxiety level
- These measurements were taken three times in the same visit:
- first, in the waiting area with no music therapy and then with either type of music being played
  - second, while sitting on dental chair (Figure 4)
  - third, while LA delivery or airtor use



**Figure 4: Patient undergoing treatment while listening music with headphones**

➤ Pulse rate and oxygen saturation were measured by using pulse oximeter (Figure 5)



**Figure 5: Pulse rate and Oxygen saturation measurement using pulse oximeter**

➤ All the values were noted down in the individual patient proforma specially designed for the study by the principal investigator

**Statistical analysis**

➤ The statistical analysis was done using independent t test

**RESULTS**

In our study, the Venham anxiety scores were significantly higher in girls as compared to boys while they were in the waiting room before any intervention. (Table 1)

In the airtor group with unknown music therapy,

**TABLE 1: Measured Values of Anxiety Level in the Waiting room before Music therapy or Any Intervention**

Sex	No.	Pulse rate Mean (std dev)	O <sub>2</sub> saturation Mean (std dev)	VPT score Mean (std dev)	Venham anxiety Mean (std dev)	Venham behavior Mean (std dev)
MALE	59	90.56 (12.8)	96.98 (1.06)	0.93 (1.127)	0.71 ( 0.697)	0.61 ( 0.64)
FEMALE	45	92.89 (8.77)	97.29 (1.44)	1.89 (1.555)	1.00 ( 0.70)	0.82 ( 0.65)
<b>SIGNIFICANCE</b>		<b>0.2974 (ns)</b>	<b>0.2088 (ns)</b>	<b>0.0004 (s)</b>	<b>0.0383 (s)</b>	<b>0.1027 (ns)</b>

**ns= non-significant, s= significant**

pulse rate increased significantly on sitting on chair. However upon use of airtor there was no significant difference in pulse rate and hence the anxiety level. There was no significant difference in oxygen saturation at any point of time during the visit. (Table 2)

Venham picture score reduced significantly indicating reduction in anxiety level both on sitting on the chair and on use of airtor. The Venham anxiety and behavior score showed significant reduction in anxiety upon airtor use. (Table 2)

In the airtor group with familiar Gujarati music therapy, pulse rate reduced significantly (p= 0.004) on airtor use thus reducing the anxiety level. Venham picture test score showed reduction indicating reduction in anxiety. Venham anxiety and behavior ratings showed significant reduction of anxiety upon sitting on chair and listening to familiar music. (Table 2)

In the local anaesthesia group with familiar Gujarati music therapy, pulse rate showed non -significant difference indicating no change in anxiety level. Oxygen saturation showed non-significant difference on L.A. delivery while significant difference on sitting on the chair showing reduced anxiety. (Table 2)

Venham picture test showed significant reduction in anxiety levels during sitting on chair and upon L.A. delivery while Venham anxiety and behavior score showed significant reduction of anxiety upon sitting on the chair, but non-significant difference upon L.A. delivery. (Table 2)

In the local anaesthesia group with unknown music therapy, pulse rate showed significant increase on L.A. delivery indicating higher anxiety levels, Oxygen saturation showed significant increase on

L.A. delivery indicating higher anxiety level. Venham picture test showed significantly lower scores both during sitting on dental chair and upon L.A. delivery. Venham anxiety and behavior score showed non-significant difference upon sitting on the chair, but significant decrease upon L.A. delivery. (Table 2)

The anxiety level is reduced significantly upon delivery of anaesthesia and use of airtor when familiar music was used as music therapy compared to unknown music group considering pulse rate, O<sub>2</sub> saturation, and Venham scales as measures of anxiety level. (Table 3)

**TABLE 2: Comparison of groups and subgroups based on the differences between the measured values upon sitting on chair and baseline value (in the waiting room) & upon L.A. delivery/airotor use and baseline value**

GROUPS		Measured values upon sitting on chair– Base line value		Measured value upon L.A. delivery/airotor use – Base line value	
		Mean	Significance value	mean	Significance value
<b>AIROTOR UNKNOWN MUSIC GROUP</b>	PULSE	3.154	0.015 (s)	-1.577	0.136 (ns)
	O <sub>2</sub>	-0.231	0.523 (ns)	0.692	0.089 (ns)
	VPT	-2.111	0.016 (s)	-3.734	0.002 (s)
	Venham anxiety	-0.535	1.000 (ns)	-4.332	0.000 (s)
	Venham behavior	-0.206	1.265 (ns)	-4.613	0.000 (s)
<b>AIROTOR GUJARATI MUSIC GROUP</b>	PULSE	0.423	0.719 (ns)	-3.308	0.004 (s)
	O <sub>2</sub>	1.192	0.001 (s)	1.308	0.000 (s)
	VPT	-2.835	0.005 (s)	-2.508	0.012 (s)
	Venham anxiety	-4.491	0.000 (s)	-1.265	0.206 (ns)
	Venham behavior	-4.025	0.000 (s)	-0.832	0.405 (ns)
<b>L.A. GUJARATI MUSIC GROUP</b>	PULSE	-2.385	0.075 (ns)	0.615	0.206 (ns)
	O <sub>2</sub>	-0.615	0.043 (s)	-0.154	0.516 (ns)
	VPT	-2.835	0.005 (s)	-2.508	0.012 (s)
	Venham anxiety	-4.491	0.000 (s)	-1.265	0.206 (ns)
	Venham behavior	-4.025	0.000 (s)	-0.832	0.405 (ns)
<b>L.A. UNKNOWN MUSIC GROUP</b>	PULSE	4.615	0.001 (ns)	5.423	0.000 (s)
	O <sub>2</sub>	0.731	0.095 (ns)	1.231	0.007 (s)
	VPT	-2.111	0.035 (s)	-3.734	0.000 (s)
	Venham anxiety	-0.535	0.593 (ns)	-4.332	0.000 (s)
	Venham behavior	-1.265	0.206 (ns)	-4.613	0.000 (s)

s= significant, ns= non-significant

**TABLE 3 Comparison between familiar Gujarati music and unknown music groups**

		Score on sitting on chair: Mean	Standard Deviation	Score on LA. Delivery/airotor use: Mean	Standard deviation	Mean of score (column 3)and score (column 5)
<b>GUJARATI MUSIC GROUP</b>	Pulse rate	88.23	10.182	87.87	12.193	<b>88.05</b>
	O <sub>2</sub>	97.42	1.319	97.71	1.194	<b>97.56</b>
	VPT	0.50	0.642	0.73	0.68	<b>0.615</b>
	Venham anxiety	0.46	0.641	0.83	0.43	<b>0.645</b>
	Venham behaviour	0.33	0.513	0.67	0.47	<b>0.5</b>
<b>UNKNOWN MUSIC GROUP</b>	Pulse rate	97.81	9.896	95.85	9.995	<b>96.83</b>
	O <sub>2</sub>	97.35	1.235	98.06	0.777	<b>97.70</b>
	VPT	1.75	1.412	2.46	1.553	<b>2.1</b>
	Venham anxiety	0.83	0.617	2.15	0.872	<b>1.49</b>
	Venham behaviour	0.52	0.610	1.87	0.687	<b>1.195</b>
<b>P VALUE</b>	Pulse	0.0001 (s)		0.0004 (s)		
	O <sub>2</sub>	0.251 (ns)		0.0794 (ns)		
	VPT	0.215 (ns)		0.0001 (s)		
	Venham anxiety	0.0034 (s)		0.0001 (s)		
	Venham behaviour	0.0886 (ns)		0.0001 (s)		

**s= significant, ns= nonsignificant, std deviation = standard deviation**

## DISCUSSION

Music is a set of information, which in the form of impulses, reaches the human nervous system. By affecting the metabolism it can change our behavior, develop emotions or bring memories to our minds. In all the above literature term 'suitable music' is used.<sup>5</sup> Best<sup>6</sup> obtained very favorable results in dentistry by supplying music via earphones built into the headrest. Brown, Livingston, and Willard<sup>7</sup> reported the use of "silent music" to soothe surgical patients. They reported that the selection of the correct type of music is very important. It must be a melody that will calm and soothe the patient and not excite or stimulate him, yet it must hold his attention.<sup>3</sup> Thus the aim of this study was to evaluate the efficacy of familiar folk or cultural music distraction therapy in management of anxious pediatric dental patients as compared to the unknown music in the unfamiliar dental clinical set up and to know which type of music influences pediatric dental patient's tension and behavior.

In this study, 104 Gujarati children were assessed, sample size being quite larger as compared to few previous studies.<sup>8,9</sup> They were divided into two groups according to whether use of airtor or local anaesthesia syringe is required, because sight of syringe, receiving L.A. injection and getting the tooth drilled are the most fear provoking dental situations according to a survey done.<sup>10</sup>

Children in each of these groups were further divided into known Gujarati folk song/rhymes and unknown music groups randomly. It has already been proven that music therapy is effective for pediatric dental patients.<sup>11,12</sup> However, there are few studies that showed little or no effect of music distraction.<sup>13,14</sup> Using familiar and unfamiliar music could make a difference. In children and adults, factors that influence music preference include increased repetition or exposure, degree of liking, and cultural environment (Hargreaves, 1984; Morrison, 1998; Morrison & Yeh, 1999; Siebenaler, 1999; Stratton & Zalanowski, 1984; Thaut & Davis, 1993). Walworth (2003) found that playing an individual's preferred genre or artist is as effective in reducing anxiety as playing a specific song indicated as relaxing by the person when compared with the anxiety levels of a person receiving no music.<sup>15</sup> The choice of music in our study was left to the patient as indicated by Klein and Winkelstein<sup>16</sup>

because playing familiar songs will help child gain control over the unpleasant stimulus, make themselves feel connected to the dental clinical set up and give them a feeling of being in the familiar environment.

Venham's picture test, which is used in this study, is the most reliable measure of self-reported anxiety in children.<sup>17</sup> The drawback of Venham picture scale which shows only images of boys was overcome in this study by designing similar scale with images of girls for female patients.<sup>18</sup> Venham's anxiety rating scale is also an effective means of assessing anxiety in children.<sup>17</sup> Since, pulse oximetry is a direct measure of physiologic arousal and its increase is attributed to stress during dental procedure and therefore pulse rate and O<sub>2</sub> saturation is an index of patient response to dental stimuli.<sup>19</sup>

In other studies, anxiety levels were assessed in multiple visits.<sup>9</sup> Few studies showed that anxiety levels reduce with increase in number of visits whereas few others showed no difference.<sup>20</sup> So in the present study anxiety levels of all children were assessed in the same visit so that all the subjects were exposed to the unknown dental stimuli for the first time.

Distractors such as music that can involve or interest a person can block certain pain pathways and diminish the amount of perceived pain.<sup>8</sup> The results obtained in this study that there was an overall reduction of anxiety with music therapy were similar to those previously done by Marwah et al (2005)<sup>2</sup> and Yamini et al (2010)<sup>9</sup> in smaller age group children and in multiple visits respectively. Walworth (2003) found that playing an individual's preferred genre or artist is as effective in reducing anxiety as playing a specific song indicated as relaxing by the person.<sup>15</sup> Similarly in our study it was observed by the results obtained that music preference and involvement into the played familiar folk song/rhymes resulted in reduced anxiety in more fearful situations like sight of local anaesthesia syringe and receiving an anaesthesia injection as compared to the unknown music group.

## CONCLUSION

- The girls showed higher anxiety levels, while they were in the waiting room than the boys.
- In both the unknown and familiar music groups, there was a reduction in anxiety levels.

- Anxiety levels reduced considerably with the familiar music therapy especially on local anaesthesia delivery and during use of arotor.
- Children showed better involvement in the procedure when asked for music selection and given familiar folk song/rhymes music therapy
- The present study concludes that familiar music therapy is an effective tool in reducing the

anxiety levels in pediatric dental patients in the unfamiliar dental clinical environment.

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