

“Comparative Evaluation and Effectiveness of Audiovisual and Audiodistracton Aid in Managing Pediatric Dental Patients”.

Abstract:

Aim: The aim of the present study was to compare the efficacy of audiovisual and audio distraction aid in reducing anxiety of pediatric patients aged 4-8 years old while undergoing various stressful and invasive dental procedures.

Material and Method: 75 patients aged between 4-8 years were selected, out of which 73 were fulfilling the inclusion criteria and were enrolled in the study. Therefore, 73 children were randomly assigned into three group including control and experimental, the Audio Group, Audiovisual Group and Control Group. Each child underwent four dental visits. In each visit, after the procedures were completed, the anxiety levels of the children were measured by the following means- Venham's picture test, Venham's clinical anxiety rating scale, Measurement of Pulse rate.

Result: Both the audio and audiovisual distraction provided significant result by lesser anxiety in the children as compared to those without any distraction when measured physiologically (pulse oximeter). However audiovisual distraction was even better in reducing anxiety when measured psychologically (Venham Clinical Anxiety Rating Scale).

Conclusion: Audiovisual and audio distraction techniques provided effective distraction in children of age group 4-8 years, during complex dental procedures, in alleviating anxiety when compared to the children treated in normal dental setup.

Keywords: Dental fear, Pain, Anxiety, Behaviour Management, Audio Distraction, Virtual Reality.

Introduction:

Pain and anxiety are unpleasant feelings and emotional experiences, which are associated with real or possible traumas to the tissues.[1] Pediatric patients, during their visit to dentist, are mostly found anxious and apprehensive because of dental equipments and the newness of the experience[2] AAPD has outlined a series of non-pharmacological behaviour management techniques to deal with the behavior management problem ranging from the tell-show-do technique, to distraction, inspiration, modeling, hypnotism, voice control to physical restraint . Most recently, the use of audiovisual eyeglasses have been introduced as promising techniques.[3] The child's attention is focused on what happens in the virtual world rather than on the surrounding environment. [4]

The accomplishment of distraction technique has been affirmed in medical set-ups however insufficient matter is available to gauge the potency of this technique in terms of pediatric population. [5] Therefore, the present study aims to compare the efficacy of the audio and audiovisual distraction technique in management of anxious pediatric dental patients.

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Materials and Method:

The materials used in the study are –Venham's picture test (Annexure3), Venham's anxiety rating scale, Audiovisual eyeglasses, Head phones, Fingertip Pulse Oximeter (CONTECTM, model no: CMS50D), Audio MP3 files of popular movie songs, nursery rhymes and children stories. Children were randomly divided into one of the three groups.

1. Group 1:Audio Group-This group comprises of 25 children who listened to audio presentation through headphones throughout the course of treatment. (Annexure 4)
2. Group 2: Audiovisual Group- 23 children were placed in this group who were shown audiovisual presentation during the entire treatment. (Annexure 5)
3. Group 3: Control Group- In this group, treatment was performed under normal dental set up without any distraction aid. It comprises of 25 children. (Annexure 6)

Each child underwent four dental visits: First visit - Screening visit, Second visit -Oral Prophylaxis, Third visit - Cavity preparation and Restoration and .Fourth visit -Dental procedures involving administration of local anesthesia such as pulp therapy and extraction.

In each visit, after the procedures were completed, the anxiety levels of the children were measured by the following means- Venham's picture test-It is a self –reporting measure of state anxiety assessed by the patient himself/ herself which permits the child to respond non-verbally, minimizing the distortion produced by the subject's attempt to give socially desirable responses. It comprises of eight cards, with two pictures in each card one “anxious” figure and one “non-anxious” figure. The child was asked to point the picture they felt most like at that moment. . If the child pointed at the “anxious” figure, a score of one was recorded, if the child pointed at the “non-anxious” figure, a score zero was recorded. Therefore, the scale has a range of zero (minimum score) to eight (maximum score).It is quick to administer in 2-3 minutes.[6]

Venham's clinical anxiety rating scale -Using this rating scale the dentist rates the state anxiety of the child himself/herself. It is a six point scale, with scale point anchored in objective, specific and readily observable behavior. The rating produced by scale in simple quick and non-intrusive.7, 8

Score	Anxiety characteristics displayed by the child
0	Relaxed: smiling, willing, able to converse, displays behaviour desired by the dentist.
1	Uneasy: concerned, may protest briefly to indicate discomfort, hands remain down or partially raised, tense facial expression “high chest”, capable of cooperating.
2	Tense: tone of voice, questions and answers reflect anxiety during stressful procedure, verbal protest, crying, hands tense and raise, but not interfering very much. Protest more distracting and troublesome .Child still complies.
3	Reluctant: Pronounced verbal protest, crying. Using hands to try to stop procedure. Treatment proceeds with difficulty.
4	Interference: General crying, body movements sometimes needing physical restraints. Protest disrupts procedure.
5	Out of contact: hard loud swearing, screaming, unable to listen, trying to escape. Physical restraints required.

Measurement of Pulse rate:

Pulse rate is direct measure of physiological arousal and its increase is attributed to stress during dental procedure and therefore its measurement is an index of patient's response to dental stimuli.8 .In the present study the pulse rate measurement was done by finger tip pulse oximeter. (CMS50D)

Result:

On visit 1, mean pulse rate of patients of Group I (93.12±0.78 per min) and Group II (93.09±1.44 per min) was found to be

lower as compared to Group III (93.22±2.59 per min), on comparing the difference statistically was found to be significant. Mean pulse rate of patients of Group III was found to be significantly higher as compared to Group I and Group II at visit 3 (99.08±3.19 vs. 96.40±2.31 & 98.22±2.52 per min) and at Visit 4 (106.68±4.31 vs. 102.72±1.81 & 102.83±1.97 per min). (Table1, Fig1). Though at visit 1, Venham clinical rating scale of patients of Group I (0.64±0.68) and Group III (0.80±0.76) was found to be higher as compared to Group II (0.43±0.59) but was not found to be significant statistically (p=0.184). At visit 4, VCRS score of patients of Group III (1.08±0.70) and Group I (0.86±0.69) was found to be significantly higher as compared to Group II (0.57±0.51).(Fig 2,Table2).None of the between group difference of VCRS was found to be statistically significant at Visit 1, Visit 2 and Visit 3. At visit 4, VCRS of GroupIIIwas found to be significantly higher as compared to Group II. (Table2a)

Table 1: Intergroup Comparison of Pulse rate at different time intervals

	Group 1 (n =25)		Group 2 (n =23)		Group 3 (n=25)		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	F	P
Visit 1	93.12	0.78	93.09	1.44	93.22	2.59	14.306	<0.001
Visit 2	94.72	1.88	93.74	2.00	94.80	3.50	1.112	0.335
Visit 3	96.40	2.31	98.22	2.52	99.08	3.19	6.386	<0.001
Visit 4	102.72	1.81	102.83	1.97	106.68	4.31	14.426	<0.001

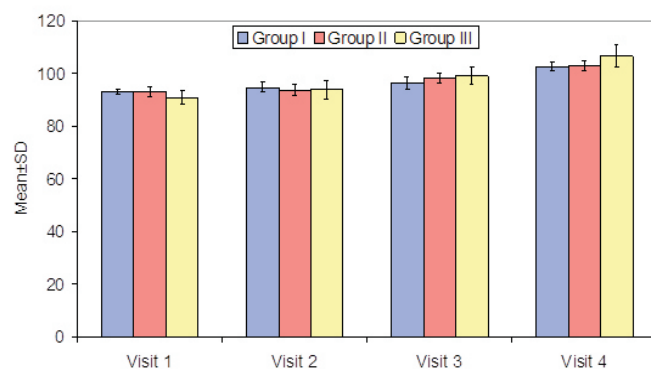


Fig 1: Intergroup Comparison of Pulse rate at different time intervals

Table 1(a): Between Group Comparison of Pulse rate at different time Intervals (Tukey HSD test)

	Group I Vs. II			Group I Vs. III			Group II Vs. III		
	Mean diff.	SE	'p'	Mean diff.	SE	'p'	Mean diff.	SE	'p'
Visit 1	0.03	0.51	0.998	2.33	0.51	<0.001	2.36	0.50	<0.001
Visit 2	0.92	0.73	0.392	0.06	0.75	0.423	0.98	0.75	0.996
Visit 3	-1.82	0.78	0.059	-2.68	0.76	0.002	-0.86	0.78	0.515
Visit 4	-0.11	0.85	0.992	-3.96	0.83	<0.001	-3.85	0.85	<0.001

Table 2: Intergroup Comparison of Venham clinical rating Scale (VCRS) at different time intervals

	Group I (n =25)			Group II (n =23)			Group III (n =25)			Kruskall Wallis test	
	Md	Mn	SD	Md	Mn	SD	Md	Mn	SD	H	'p'
Visit 1	1.00	0.64	0.68	0.00	0.43	0.59	1.00	0.80	0.76	3.384	0.184
Visit 2	1.00	0.74	0.45	1.00	0.71	0.54	1.00	0.76	0.52	1.026	0.599
Visit 3	1.00	0.99	0.57	1.00	0.88	0.53	1.00	1.00	0.52	1.295	0.523
Visit 4	1.00	0.86	0.69	1.00	0.57	0.51	1.00	1.08	0.70	6.847	0.033

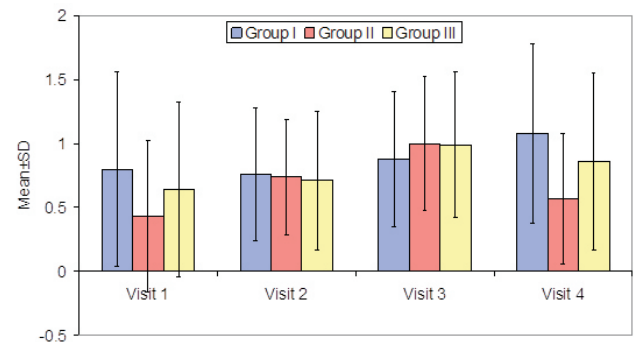


Fig 2: Intergroup Comparison of Venham clinical rating Scale (VCRS) at different time intervals

Table 2(a): Between Group Difference in VCRS at different time intervals

No of Visit	Group I Vs. II		Group I Vs. III		Group II Vs. III	
	Z	p	Z	P	Z	P
Visit 1	0.477	0.088	1.427	0.633	1.709	0.154
Visit 2	0.078	0.938	0.830	0.385	0.869	0.406
Visit 3	0.795	0.427	0.304	0.279	1.083	0.761
Visit 4	0.953	0.099	1.650	0.341	2.595	0.009

Discussion:

The present study was conducted on 75 children with no previous dental treatment of age group 4-8 years, as this is age group which shows most disruptive or negative behavior and is most difficult to manage reported by Ram et al,2010.9 In the present study four dental visits were opted as each child underwent the basic dental procedures, which include

diagnosis, oral prophylaxis, restoration and procedure under local anesthesia such as pulp procedures/therapy or extraction. When the self reported anxiety between control and experimental groups were compared, statistically no significant difference in VPT score was observed in all the visits. Thus the observation from this study indicated that Venham's picture test gave statistically inconclusive results. This observation was similar to the earlier observations made by Venham et al (1977)[10] and Alwin et al (1991)[11]. In addition to psychological, a physiological measurement of anxiety [8]

No statistically significant difference in pulse rate was observed between audio and audiovisual distraction group in all the four visits (Table 1a). Similar result was found by Nithani and Vishwanath (2014) in their study in which they observed no significant difference among audiovisual and audio distraction group when anxiety was measured using biological parameter. However in a study by Prabhakar et al (2007)[2] significantly higher pulse rates was reported in audio distraction group when compared with audiovisual distraction group. While Kaur et al (2015) reported higher anxiety among audio group as compared to audiovisual distraction group while measuring anxiety with physiological means during the visit involving local anesthetic procedures [12].

A significantly lower anxiety was reported in the subjects of audio distraction group when compared with the control group. In the same visit statistically insignificant difference in pulse rate was observed between audiovisual and control group. Thus it can be concluded that during the cavity preparation and restorative visit audio distraction turned out to be more effective, than the audiovisual distraction, in managing anxiety when compared with the children treated in normal setup without any audio or audiovisual distraction. (Table 1a) The probable reason for lower anxiety in audio group as compared to the control group may be due to the fact that music helped to cut down unpleasant noise of hand piece

or other anxiety inducing stimuli and it can also alter mood and emotional states thereby averting the patient's anxiety.[9] During fourth visit (i.e. procedures involving local anesthesia) both the audio and audiovisual distraction provided significant by lesser anxiety in the children as compared to those without any distraction when measured physiologically (pulse oximeter). Audiovisual distraction was even better in reducing anxiety when measured psychologically (VCRS). Thus audiovisual distraction produced superior result than the audiodistraction during the procedures involving anesthesia when compared to the control group by reducing anxiety both at the physiologic (pulse oximeter) and psychological (VCRS) level/measures. Seyrek et al also found that video techniques were more effective than audio programs.[13]

The reason for increased anxiety in the restorative visit in the sight, sound and sensation of the air-rotor, handpiece while doing cavity preparation. This was also observed by Kleinknecht et al. For the fourth visit the site and prick of the needle, the feel of anaesthetic solution inside the mucosa, the endodontic as well as extraction procedure were the most anxiety causing factors. Similar results were obtained in the previous studies.(1,2) Baldwin(1966) also witnessed extraction to be most stressful dental procedure[14]. The anticipation of injection provides sympathetic stimulation and catecholamine release, which account for increase in pulse rate.[15]

Like any other techniques, certain limitations are also faced by the clinician while using audio and audiovisual distraction procedure. The audio presentation may hamper communication and interaction between the patient and dentist. This may prevent building of proper rapport between the clinician and patient. However, this can be avoided if the volume of the presentation is adjusted to such a level that proper masking of the sound of the dental operatory instruments occur and the patient is able to properly receive the instructions from the dentist. Venham picture test has its

limitations such as the figure on the cards are all male, this may present problems if the young patient is a girl. In addition, some of the figures are vague in what they are depicting.[16] Further studies with larger sample size and modification of picture to suit a girl patient are needed. Since different age group exhibit different cognitive characteristics and behavioral patterns towards VR technique, it is recommended that different age-groups be evaluated in future studies.

Conclusion:

Audiovisual and audio distraction techniques provided effective distraction in children of age group 4-8 years, during complex dental procedures, in alleviating anxiety when compared to the children treated in normal dental setup. Audiovisual distraction technique proved to be superior in managing anxious children during the dental procedures involving local anesthesia when anxiety was measured physiologically (Pulse oximeter) as well as psychologically (Venham Clinical Anxiety Rating Scale). Patient acceptance levels for both audio and audiovisual distraction were good, with a majority of patients wanting to experience it again in subsequent dental visits.

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