



RESEARCH ARTICLE

MANAGING CHILD'S DENTAL ANXIETY BY VIRTUAL REALITY DISTRACTION AND 3D AUDIO-VISUAL DISTRACTION TECHNIQUE: A COMPARATIVE STUDY

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ABSTRACT:

Introduction: The child's emotional response towards dental treatment is a matter of concern to the dental surgeon. Children commonly respond to dental treatment with some fear and anxiety. Therefore, the main aim of the present study was to evaluate and compare two distraction techniques, namely visual reality distraction and 3-d audio-visual distraction for the management of tensed pediatric patients.

Material and Methods: The study comprised of 60 children aged between 4-12 years divided into 3 groups of 20 each viz control, visual reality distraction and 3-d audio-visual distraction group. The children were then subjected to 4 visits; screening at the first visit followed by various treatment modalities in the next three visits and at the end of each visit the anxiety levels were assessed using Venham Picture Test (VPT).

Results: The results of our present study showed that there was a significant reduction in child anxiety with 3d audio visual aids compared to other groups ($p < 0.001$).

Conclusion: It was concluded that 3-d audio-visual distraction was superior to other distraction modalities

KEY WORDS: Anxiety, audio distraction, 3-d audio-visual distraction, child fear.

INTRODUCTION

Dental fear and/or anxiety are a constant challenge posed to every dentist in everyday dental practice. In the Indian population, an estimated 6.3- 9.4% of children between the age group of 10-15 years suffered from dental fear.[1] The child's hesitancy or uncooperative behavior may curb the effective delivery of dental care that may



compromise the quality of treatment provided. A vast array of behavior management techniques are available to the dentist to help tackle the fearful child and help promote a positive dentist child relationship.[2] The success of techniques like Tell Show Do have been well documented in the past, nevertheless it is not always suitable or adequate for every patient. Papoose board and hand over mouth techniques can also be effective; however the attitude of parents and dental professionals toward these techniques is changing. Distraction is the technique of diverting the patient's attention from what may be perceived as an unpleasant procedure.[3] The accomplishment of distraction technique has been affirmed in medical setups however insufficient matter is available to gauge the potency of this technique in terms of pediatric population.[2] In addition to the dental practitioner, the parent also has an equally important role in making a child's initial dental experience a positive one. Hence, the parents view on their progeny's dental fear and/or anxiety is essential information to be gained.[4] Therefore, the objective of this study was to evaluate and compare audio and 3d audio-visual distraction techniques in the management of anxious pediatric patients.

MATERIAL AND METHODS

The study was conducted in private clinics of Jabalpur city. Sixty children aged between 4 to 12 years, with no previous dental experience were selected from patients who came for their first dental visit. Consent was taken from patient's parents on the first visit along with brief medical and dental history.

The children were randomly divided into three groups of 20 each. First group was the control group (group A) on whom the treatment was performed under normal dental setup. The second group (group B) was shown a video through a virtual reality box throughout the course of the treatment [Figure 1]. The third group (group C) was shown a 3D audiovisual presentation through television during the entire treatment [Figure 2]. The study was conducted through four dental visits. The first visit employed screening methods followed by next three visits which employed treatment modalities like cavity preparation restoration, oral prophylaxis or extraction under local anesthesia. Child's anxiety level in each visit was assessed using Venham's picture test. The values obtained were tabulated and subjected to statistical analysis.

RESULTS

In the inter-group comparisons, during the first visit (Table-1), a statistically significant difference ($P < 0.05$) was observed between the control group and the 3D-audiovisual distraction group. Slight difference was reported between control group and visual reality distraction group, and between audiovisual distraction group and visual reality distraction group which was not statistically significant. In the second visit (Table-2), statistically significant difference ($P < 0.01$) was seen between the control group and the 3D audiovisual distraction group. Slight significant difference was reported between control group and visual reality distraction. In the third visit (Table-3), statistically significant difference ($P < 0.01$) was seen between the control group and the 3D audiovisual distraction group. Slight difference was reported between control group and virtual reality distraction group. In the fourth visit (Table-4), there was a statistically significant difference ($P < 0.01$) between the



control group and the 3D audiovisual distraction group and also between visual reality distraction and 3D audiovisual distraction groups.

Table 1: Comparison of three groups (A, B, C) with different parameters in visit 1 by one-way ANOVA

Groups	VPT	
	Mean	SD
A	3.88	0.97
B	2.48	0.82
C	0.88	0.97
A vs B	0.001*	
A vs C	0.001*	
B vs C	0.001*	

Table 2: Comparison of three groups (A, B, C) with different parameters in visit 2 by one-way ANOVA

Groups	VPT	
	Mean	SD
A	3.20	1.08
B	1.52	1.12
C	0.60	1.15
A vs B	0.001*	
A vs C	0.001*	
B vs C	0.0134	



Table 3: Comparison of three groups (A, B, C) with different parameters in visit 3 by one-way ANOVA

Groups	VPT	
	Mean	SD
A	2.88	1.42
B	1.16	0.94
C	0.68	0.95
A vs B	0.001*	
A vs C	0.001*	
B vs C	0.2943	

Table 4: Comparison of three groups (A, B, C) with different parameters in visit 4 by one way ANOVA

Groups	VPT	
	Mean	SD
A	4.04	1.17
B	2.32	1.22
C	1.40	0.96
A vs B	0.001*	
A vs C	0.001*	
B vs C	0.0135*	



FIGURE 1



FIGURE 2



DISCUSSION

The age group of the patients selected for the study was 4-12 years as this is the age group, which shows most disruptive or negative behavior and is most difficult to manage. Venham's picture test, [3] which was used in the study, is among one of the reliable measures of self-reported anxiety in children. [5]

The observations from this study indicated that Venham's picture test gave statistically conclusive results since the choice of the picture by the children was varying during all



the four visits showing that the picture test was an effective measure of the emotional state of the child at that particular instance. This observation was similar to the earlier observations made by Venham *et al.* [3] and Alwin *et al.* [6]

The reason for increased anxiety in the cavity preparation and restoration visits is because of the sound and the sight of the hand piece. This was also observed by Kleinknecht *et al.* [7] The peak of anxiety in the last visit is due to the highly stressful event of extraction. This finding was also observed by Baldwin. [8] The increase in anxiety in the last visit can also be due to the sight of the injection.

Virtual reality (VR) has been used to manage pain and distress associated with a wide variety of known painful medical procedures. In clinical settings and experimental studies, participants immersed in VR experience reduced levels of pain, general distress/unpleasantness and report a desire to use VR again during painful medical procedures. Investigators hypothesize that VR acts as a nonpharmacologic form of analgesia by exerting an array of emotional affective, emotionbased cognitive and attentional processes on the body's intricate pain modulation system. While the exact neurobiological mechanisms behind VR's action remain unclear, investigations are currently underway to examine the complex interplay of cortical activity associated with immersive VR.

The results from this study showed that 3D audiovisual distraction was the most effective means of managing the anxiety in children. Although not many studies have shown the effectiveness of audiovisual distraction in managing anxious pediatric dental patients, some studies have shown its effectiveness in managing anxious adult dental patients. [11]

It is possible that our results differ because of the different methods and techniques that we have used. Reduction in anxiety in the 3D audiovisual distraction technique may be attributed to a variety of reasons. Firstly, in our study, the patient chose the choice of distraction. According to Mungara *et al.*, [12] this will help the children to gain control over the unpleasant stimulus and give them a feeling of being in a familiar environment. Secondly, the child seeing the audiovisual presentation will have multi-sensory distraction as he/she will tend to concentrate on the TV screen, thereby screening out the sight of dental treatment, [11], [13] and the sound of the program will help the child to eliminate the unpleasant dental sounds such as the sound of handpiece. [10]

SUMMARY AND CONCLUSION

3 D audiovisual distraction technique was more effective in managing anxious pediatric dental patient as compared to audio distraction technique and normal dental setup. Dental anxiety is seen commonly during routine dental procedures and is maximum during the extraction procedure.

The patients had an overwhelming response to 3D audio visual presentation and wanted to have same experience at their subsequent visits.

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