

Original Research

Comparative Evaluation of VR Distraction Technique in Management of Pediatric Dental Patients

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ABSTRACT:

Aim: The aim of present study was to evaluate the effect of virtual reality distraction technique on anxiety of pediatric patients during restorative treatment. **Material and method:** In present study 50 children of 6-10 years were randomly selected and equally divided into two groups of 25 each. The first group was Control group (group A) and the second group was VR distraction group (group B). Children requiring restoration in primary or permanent mandibular molar were included in the study. The anxiety scores were recorded by Venham's Clinical Anxiety Rating Scale and subjected to statistical analysis. **Result:** There was a statistically significant difference between the pre and post anxiety level of the child in VR distraction group. **Conclusion:** VR distraction technique was found to be an effective tool in management of anxious pediatric dental patient.

Keywords: Dental Anxiety, VR distraction, Venham's Clinical Anxiety Rating Scale

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INTRODUCTION

Dental anxiety can be defined as a state where an individual is evoked and prepared for something to happen, with a nonspecific feeling of apprehension associated with abnormal conditions. The etiology of dental anxiety can be attributed to traumatic or painful dental experiences as well as fearful attitudes learned from a dentally anxious family member.¹ Unlike adults, many children are not able to express their anxiety and fear; this can affect their behaviour during dental treatment. As a result, the child may be labelled as "uncooperative". The American Academy of

Pediatric dentistry has a vital role in decreasing dental fear and anxiety by proposing many pharmacological and non-pharmacological behavior management techniques.^{2,3}

In modern pediatric dentistry, the use of distracters has proven its effect in child management besides it being safe and economical.⁴ Distraction is a tactic designed to divert a patient attention away from their current behavior to focus their interest in something else. It is a behavioural strategy useful in helping patients cope with brief stress.⁵

As the result of digital dentistry evolution the development of Virtual Reality (VR) has been paving its way on dental treatments and in patient education.⁴ VR helps in forgetting the likely environment and it takes the child into a computed generated stress free atmosphere thereby it stands advanced than other distracting techniques.⁶ In recent days, number of researches has been conducted based on behavioural pattern in VR and virtual world. It cheers and distracts from pain perception and allows the patients to be drowned in the virtual stimulated world by utilizing advanced technologies. By using a virtual reality glass, the child's senses like vision, hearings are actively engaged there by distracting the child from anxiety.⁷

MATERIAL AND METHOD

Present randomized control trial was conducted in the Department of Pedodontics and Preventive Dentistry, Coorg Institute of Dental Sciences, Virajpet, Karnataka. Study was conducted after obtaining ethical approval from institutional scientific committee and voluntary informed consent from parent/guardian. A total of 50 subjects aged between 6-10 years, were selected from the OPD.

INCLUSION CRITERIA

1. All subjects were healthy individuals free of medical co morbidities, post traumatic stress disorder and anxiety disorders.
2. Children with first dental visit
3. Children between 6 to 10 years of age
4. Patient requiring restoration in Primary or permanent mandibular molar.

EXCLUSION CRITERIA

1. Uncooperative patient
2. Children with previous dental experience.
3. Children with any visual defect or auditory defect.
4. Mentally or physically challenged child.
5. Children with learning disability.

The selected children for the study were randomly divided into two groups;

GROUP A: Control group

Group B: VR distraction group

Parents were given a brief introduction explaining the procedure and purpose of the study. The Children were seated on the dental chair to acclimatize themselves with the dental setup. The level of anxiety was assessed by Venham's Clinical Anxiety Rating Scale before starting the restorative procedure. Venham's clinical anxiety rating scale (VCRS) - used to measure the situational anxiety of the child by the clinician. It is an interval rating scale in which the rating procedure is reliable, valid and can be easily integrated in clinical or research activities. It is a six-point scale, with scale points anchored in objective, specific and readily-observable behaviour (**Table no. 1**).⁸ Subjects in the control group under went for treatment without any distraction. The patients in the Virtual reality distraction group watch audiovisual presentation by VR box throughout the treatment procedure (**Figure 1**). Cavity was prepared and restored with glass ionomer cement. After completion of the treatment the level of child's anxiety was again measured using Venham's clinical anxiety rating scale. The data were entered over a spreadsheet, and statistical analysis was performed using SPSS software version 16 (IBM, Chicago, United States).

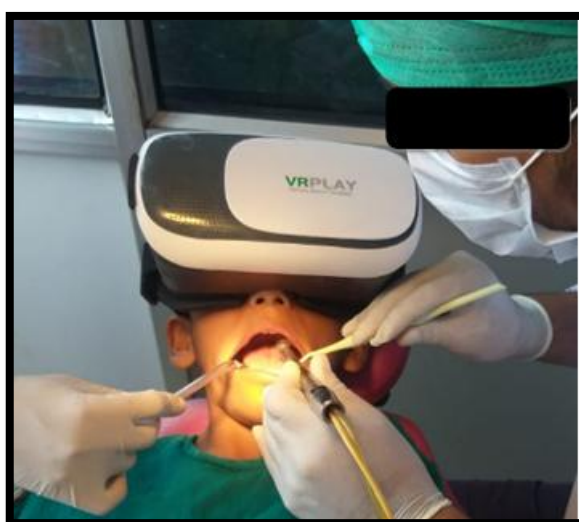


Figure no 1: VR box

Table no. 1: Venham's Clinical Anxiety Rating Scale (VCRS)	
0	Relaxed, smiling, willing and able to communicate
1	Uneasy, concerned, indicates discomfort. Hands shows discomfort signals. Child agreeable 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,

	child protests verbally and cries. Child interprets situation and copes with his/her anxiety.
3	Shows unwillingness to enter situation. Pronounced verbal protest, crying. Try to stop procedure with his/her hands.
4	Anxiety interferes with ability to assess situation. General crying not related to treatment.
5	Child out of contact as he/she actually feels threat. General loud crying and do not listen to verbal communication. Physical restrain required.

RESULT

Table no. 2 shows distribution of sample; total 50 subjects with the mean age of 7.4 years participated in the study.

Table no. 3 shows mean VCRS; the mean reported pre-treatment anxiety score for the control group was 4.51 ± 1.01 which was reduced to 3.92 ± 0.90 after the

treatment but this reduction in mean anxiety was not statistically significant with $P \geq 0.05$. In VR distraction group the mean pre treatment anxiety was 4.63 ± 1.15 which reduced to 1.89 ± 1.04 after treatment. This reduction in mean anxiety was found statistically significant with $p \leq 0.05$.

Group	Mean age
Control group (n=25)	7.6 ± 0.4
VR group (n=25)	7.2 ± 0.2
Overall Mean age	7.4 ± 0.3

Group	Mean VCRS	P value
Control group	Pre treatment 4.51 ± 1.01	$P \geq 0.05$
	Post treatment 3.92 ± 0.90	
Acupressure group	Pre treatment 4.63 ± 1.15	$P \leq 0.05$
	Post treatment 1.89 ± 1.04	

DISCUSSION

Pain and anxiety are two unpleasant feelings and emotional experiences experienced during dental treatment. In order to overcome fear and anxiety clinicians need to reduce distress during dental treatment in children. This distress modalities and are basically divided into two broad categories. The first and commonly used module consists of behavioural techniques includes the tell-show do technique, distraction, inspiration, modeling and hypnotism. The second category of behavior management involves pharmacologic techniques. Distraction is the most effective and easy to use technique. The concept behind application of distraction is that pain perception has a large psychological component in that the amount of attention directed to the noxious stimuli which modulates the perceived pain. Distraction technique involves use of audio distraction as well as audio visual distraction.^{9,10}

The present in-vivo study was conducted to explore the feasibility of using a new generation of mass produced commercially available Virtual Reality to distract children during restorative procedures. In the present study the subjects in the age group of 6-10 years were selected because dental problems are difficult to treat in this age group as they exhibit more disruptive behavior and dental anxiety and are most difficult to manage in dental clinic. The same age group was enrolled in the study conducted by Chaturvedi S et al. (2016)¹¹, Al-Halabi MN et al. (2018)¹², Bansal A et al. (2018)¹³.

In present study, a statistically significant difference was noted between the post treatment of anxiety perceived by the children in the VR group as compared to control group. The effect of VR distraction in decreasing perceived pain and anxiety can be attributed to a number of reasons. The application of VR distraction is based on the assumption that pain perception has a large psychological component and that pain attracts a strong attentive response because of the potential threat of damaged tissue associated with the sensation. The redirection (distraction) of this attention manipulates the pain perception, thereby reducing the intensity of pain. Recently, it has also been found that VR changes the way people interpret incoming pain signals and actually reduces the amount of pain related brain activity.¹⁴ Moreover, it can be concluded that VR engages the conscious attention of the patient, resulting in less pain perception by the patients.¹⁵ Result of our study is in accordance to study conducted by Ram et al. (2010)¹⁶; they concluded that the use of AV eyeglass system was shown to be more efficient than a regular television screen, and it also could be used instead of nitrous oxide gas. Similarly El-Sharkawi et al. (2012)¹⁷ found that AV eyeglasses effectively reduced pain during the local anesthetic injections. Chaturvedi et al. (2012)¹¹ stated that AVD system may be a beneficial option for patients with mild to moderate fear and anxiety associated with dental treatment in children.

The results of this study differ from those of a study conducted by Sullivan et al, (2000) who found that the use of VR during dental treatment had no significant effect on the behavior (measured using the Frankl behavior rating scale) or anxiety (measured using the Koppitz method of evaluating drawings) in 26 children aged 5 to 7 years, however, significantly reduced the pulse on injection of local anesthesia in children wearing VR glasses as compared to children without VR glasses. The difference in results could be due to the difference in measuring scales used.¹⁸

CONCLUSION

According to our study VR distraction technique was an efficient technique to control children's anxiety and to achieve cooperative behavior during dental treatment.

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