

Is Virtual Reality Distraction Technique Effective to Cater Dental Pain and Anxiety Among Children?

RABIA SHAFIQUE¹, ALIYA EHSAN², SADIA AFIF³, DANIYAL NAEEM DAR⁴, SYED MUBASHIR HUSSAIN SHAH⁵, ASMA SHAKOOR⁶, AMINA TARIQ⁷

¹Demonstrator, Department of Sciences of dental materials, IOD, CMH, LMC

²Assistant Professor, Department of Operative Dentistry, University College of Medicine and Dentistry, University of Lahore

³Senior Registrar, Department of Operative, Dentistry, Azra Naheed Dental College, Lahore

⁴Post graduate resident, Department of prosthodontics, IOD, CMH, LMC

⁵Senior Demonstrator, Department of Medical education, University College of Medicine & Dentistry, University of Lahore

⁶Associate professor, Community & Preventive Dentistry Department, Institute of Dentistry, CMH-Lahore Medical College, National University of Medical Sciences (NUMS), Pakistan

⁷Research coordinator, Research cell, University College of Medicine and Dentistry, University of Lahore

Corresponding author: Amina Tariq, Email: aminatariq8@gmail.com

ABSTRACT

Objective: The current study investigated the virtual reality distraction technique as an indicator of pain and anxiety reduction in children with an age between 6 to 9 years during short invasive dental procedure using salivary cortisol level as an indicator for measuring level of anxiety

Method: This randomized clinical trial was conducted in a dental hospital of Lahore in the department of Pediatric dentistry. Data was collected from 30 patients which were divided in two groups. One group was containing patients who had screen time of less than 4hours whereas the other group contained patients who had screen time of more than 4hours in a day. Data was entered in SPSS version 25.0. Frequencies and percentages were calculated as descriptive analysis whereas comparison among both groups was made using Chi-Square test.

Results: The results of chi-square test revealed that there is a significant difference in the pain perception of patients using virtual reality distraction technique during dental treatment ($X^2=4.701$, $P=.030$). The results of paired sample t test revealed a significant difference between patients who has less than 4 hours screen time and patients who has more than 4 hours screen time in terms of salivary cortisol level ($P=.001$).

Conclusion: The application of virtual reality distraction technique for the dental treatment of children is more effective among those who have more screen time as compared to the children who have less screen time

Keywords: Virtual reality distraction, Pain, Anxiety, Dental treatment

INTRODUCTION

Anxiety and fear of pain during dental treatment normally develop due to any previous bad experience which causes the avoidance of visiting dentist for treatment.¹ so it is important for dentists to cope up with the dental fear and dental anxiety to ensure the regular visits of patients for dental treatment.^{2,3}

Modification in behavior when combined with local anesthesia techniques lay the foundation of delivering painless dental treatment.¹ There are many behavior modification techniques which help in minimizing the effect of pain and anxiety among children during dental treatment but the most inexpensive and safe technique is the distraction technique.⁴ Its implementation is quite effective as patient experience relaxation while having dental treatment categorizes as painful.⁴ The conceptual framework behind distraction technique is that the pain perception is largely based on the psychological component.⁵ So, according to above mentioned findings drawing away the attention of patient from aversive stimulus minimizes the pain perception.⁶ For application of distraction technique, introduction of a perfect distractor is needed which grabs the enough level of attention to compete with aversive stimulus while ensuring the multiple sensory modalities and emotional involvement making participation of patient.^{7,8}

Using virtual reality distraction technique may have more effective results in terms of distracting patient's attention from the aversive stimulus using computer generated environment as it deals with additionally mesmerizing images projected using headsets. The stimulus from surrounding get blocked and its level depends on the Visual reality device model. But little amount of literature is available on effectiveness of virtual reality distraction in pediatric dentistry.⁶

Dental treatment is commonly reflected as a source of provoking anxiety and is traumatic,⁹⁻¹¹ so far, scarce data is available on assessment of physiological stress due to the exposure towards dental treatment.^{12,13} Evidence concluded that physiological symptoms stress are induced by psychological perception,¹⁴ due to the increase level of cortisol in the body.^{15,16}

Levels of salivary cortisol are closely related to the level of cortisol which imitates the activity of hypothalamic-pituitary-adrenal.¹⁷ A study reported that the level of salivary cortisol estimation can serve as a biological assessment technique for stress assessment.¹⁸ There are some studies in which different interventions has been evaluated in terms of their effectiveness using salivary cortisol level.^{14,19,20} As per the literature search till date, few studies has been reported the effect of visual distraction technique on level of salivary cortisol in children had invasive dental procedure. So, the current study investigated the virtual reality distraction technique as an indicator of pain and anxiety reduction in children with an age between 6 to 9 years during short invasive dental procedure using salivary cortisol level as an indicator for measuring level of anxiety.

METHODOLOGY

This randomized clinical trial was conducted in a dental hospital of Lahore in the department of Pediatric dentistry. Data was collected from 30 patients which were divided in two groups. One group was containing patients who had screen time of less than 4hours whereas the other group contained patients who had screen time of more than 4hours in a day. Patients came to OPD of hospital were screened and recruited in the study. Patients' screening were done using SCARED questionnaire. Patients with score above 25 were included in the study. Data was collected after the study approval from the ethical review committee of institution. Consent forms were get signed by parent of patients as they were under 18years. Salivary cortisol level was assessed using salivary cortisol test while taking the sample using cotton ball and preserving it in tube covered with lid and sealed with wax. Saliva sample was taken before the treatment starts, then the favorite cartoon film was played on LCD for the patient, and after injecting local anesthesia, patient was asked to rate the level of pain on visual analogue scale. After that saliva sample was retaken as posttest value. Saliva samples were sent to the laboratory for evaluation and report generation. Data was entered in SPSS version 25.0. Frequencies and percentages were calculated as

descriptive analysis for gender whereas comparison among both groups (less than 4hours screen time and more than 4 hours screen time) was made using Chi-Square test and paired sample t test was used to explore the difference between both groups in terms of cortisol level.

RESULTS

Among 30 patients, 17(56.67%) were females whereas 13(43.33%) were males.

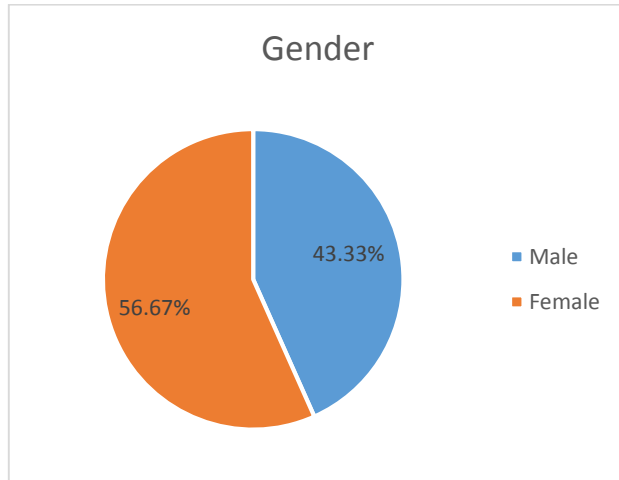


Figure 1: Gender wise data distribution

The results of chi-square test revealed that there is a significant difference in the pain perception of patients using virtual reality distraction technique during dental treatment ($X^2=4.701$, $P=.030$). Majority of patients who had less than 4hours screen time reported moderate pain 11(73.33%) whereas majority of patients who had more than 4hours screen time reported mild pain 10(66.67%).

Table 1: Pain perception with virtual reality distraction technique

	Pain Perception	
	Mild	Moderate
Group 1 (with less than 4 hours screen time)	4(26.67%)	11(73.33%)
Group 2 (with more than 4 hours screen time)	10(66.67%)	5(33.33%)
	$X^2=4.701$, $P=.030$	

The results of paired sample t test revealed a significant difference between patients who has less than 4 hours screen time and patients who has more than 4 hours screen time in terms of salivary cortisol level ($P=.001$). The mean salivary cortisol level before and after intervention was 75.64 and 63.46 respectively in group 1. In group 2, mean salivary cortisol level before and after intervention was 77.56 and 69.34 respectively.

Table 2: Comparison of level of salivary cortisol among children

	Salivary Cortisol		Sig.
	Before intervention (ng/ml)	After Intervention (ng/ml)	
Group 1 (with less than 4 hours screen time)	75.64	63.46	.000
Group 2 (with more than 4 hours screen time)	77.56	69.34	.000

DISCUSSION

Non-pharmacological methods of treating anxiety and pain are getting more popular since last decade. Distraction is based on the cognitive behavioral approach deals with grabbing attention for

specific purpose. It involves visual, tactile or/and auditory stimulus helps in distracting patients from pain.²¹

The findings of current study revealed a significant difference in the pain perception of patients using virtual reality distraction technique during dental treatment ($X^2=4.701$, $P=.030$). Majority of patients who had less than 4hours screen time reported moderate pain 11(73.33%) whereas majority of patients who had more than 4hours screen time reported mild pain 10(66.67%). The results of a similar study reported that virtual distraction technique effectively reduces anxiety among children exposed to dental treatment.⁶ on the other hand, no significant difference was reported in another study.²²

Pain perception of children significantly declined due to visual distraction technique who had more than 4 hours screen time in current study. Reduction in pain perception was reported in children and adults in numerous studies.^{5, 6,23} Level of stress decline with the application of virtual reality distraction technique in several studies.⁴⁻⁶

Level of cortisol has not been explored properly in terms of application of virtual reality distraction during dental treatment where both groups were having habit of screen watching regularly. Numerous investigations reported salivary cortisol as a precise tool for measuring the function of adreno-cortical.^{9,12,13,19,20} The findings of current study revealed a significant difference between patients who has less than 4 hours screen time and patients who has more than 4 hours screen time in terms of salivary cortisol level ($P=.001$). The mean salivary cortisol level before and after intervention was 75.64 and 63.46 respectively in group 1. In group 2, mean salivary cortisol level before and after intervention was 77.56 and 69.34 respectively. These findings are consistent with the finding of a similar study reported the decreased level of cortisol in saliva due to the virtual reality distraction technique.²⁰

In conclusion, the application of virtual reality distraction technique for the dental treatment of children is more effective among those who have more screen time as compared to the children who have less screen time.

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