

# A Comparative Evaluation of Heart Rate and Blood Pressure on Two Different Behaviour Management Techniques in Children

Dr Sruthi P<sup>1</sup>, Dr Shivaprakash P.K<sup>2</sup>, Dr Hina Noorani<sup>3</sup>

<sup>1</sup>Post-Graduate Student, Department of Pediatric and Preventive Dentistry, P.M.N.M Dental College and Hospital, Bagalkot, Karnataka, India

psruthinambiar[at]gmail.com

<sup>2</sup>Professor and Head, Department of Pediatric and Preventive Dentistry, P.M.N.M Dental College and Hospital, Bagalkot, Karnataka, India

drshivaprakashbgk[at]gmail.com

<sup>3</sup>Professor, Department of Pediatric and Preventive Dentistry, P.M.N.M Dental College and Hospital, Bagalkot, Karnataka, India

drnoorani21198[at]gmail.com

**Abstract:** Background: Dental practitioners have numerous methods to control anxiety and pain in children, and distracting the child appears to be the most common technique used for behavior management during dental procedures. Aim: To compare between two behaviour management techniques: audiovisual technique and parental presence based on heart rate and blood pressure among boys and girls of age group 5 to 10 years. Materials and Methods: Sixty children, thirty boys and thirty girls, aged between 5 to 10 years were selected and divided into three groups - Control group, Audio visual group, Parental presence group. Minor restorative procedures were done by the same operator for every child. The blood pressure of children was recorded before and after the procedure. Heart rate was recorded before, during and after the procedure using pulse oximeter. Chi Square Test was used to compare the Blood pressure among study participants. Repeated measures of ANOVA test followed by Bonferroni's Post hoc Analysis was done to compare the mean Heart Rate between different time intervals in each study group. Results: Children in VR group showed lesser variation in BP and also a decrease in heart rate post treatment than the parental presence group. Conclusion: Use of audio visual technique is effective compared to parental presence in controlling the anxiety in children undergoing short dental treatments.

**Keywords:** Virtual reality, Parental presence, Heart rate, Blood pressure

## 1. Introduction

Behaviour management is considered a keystone entity in paediatric dentistry<sup>[1]</sup>. The major aspect of child management in the dental care is managing dental anxiety and fear as it is considered to be the main barrier for successful completion of dental treatment<sup>[2]</sup>. Negative dental experiences, especially those resulting from dental pain, can lead to the development of fear and anxiety, which in turn can lead to the avoidance of further dental treatment<sup>[3]</sup>. Thus, the fear of painful dental treatments and dental anxiety are confounding problems with which dentists must cope up<sup>[4]</sup>.

Dental practitioners have numerous methods to control anxiety and pain in children, and distracting the child appears to be the most common technique used for behavior management during dental procedures<sup>[5]</sup>. The application of virtual reality as a distraction technique could possibly be superior to traditional distraction techniques because it offers more immersive images via the occlusive headsets that project the images right in front of the eyes of the user. Depending on the model of VR device used, it may block out the real-world (visual, auditory, or both) stimuli. However, a literature review revealed sparse investigations on the potential application of VR distraction in the paediatric dental setting<sup>[6]</sup>.

Parental factors such as child-parent relationship, parental anxiety, parent's perceptions for child's behavior in the dental operatory, parent's past dental experiences, and parental presence or absence in the operatory during dental treatment have a major role in the behavior of the child in the

dental operatory during treatment. However parental presence in dental operatory is considered a controversial issue<sup>[7]</sup>.

Hence, the present study was planned to compare between two behavior management techniques: audiovisual technique and parental presence based on heart rate & blood pressure among boys & girls of age group 5 to 10 years.

## 2. Objectives

To compare between two behaviour management techniques: audiovisual technique and parental presence based on heart rate and blood pressure among boys and girls of age group 5 to 10 years.

## 3. Materials and Methods

The study was carried out in the Department of Pediatric and Preventive dentistry, P.M.N.M Dental College, Bagalkot. Sixty children, thirty boys and thirty girls, in the age group 5 to 10 years were selected after obtaining written consent from parents.

### 3.1 Inclusion criteria

- Children who were willing to participate in the study with parental consent.
- Children of the age group 5 to 10 years undergoing 1st dental visit.
- Children without any history of systemic disorder or infectious diseases.

Volume 8 Issue 12, December 2019

[www.ijsr.net](http://www.ijsr.net)

[Licensed Under Creative Commons Attribution CC BY](https://creativecommons.org/licenses/by/4.0/)

### 3.2 Exclusion criteria

- Children who were not willing to participate in the study.
- Children suffering from any systemic disease or with any history of illness.
- Children whose parents were not willing to give the consent.

### 3.3 Data collection

The blood pressure (BP) of the child was recorded using a sphygmomanometer. The patient was seated on a chair with arm flexed and elbow at the level of heart. The cuff was wrapped around the upper left arm and inflated. Both systolic and diastolic pressure was noted. The variation in BP before and after the procedure was recorded.

Pulse oximeter was used to monitor the heart rate of the child during entire treatment. The oximeter was clipped to the index finger of the child's left hand. To reduce the risk of recording errors, it was ensured that the child did not move hand. An assistant manually transcribed the data posted on the pulse oximeter screen into the child's file at each interval for a total of 3 data points; before, during and after the treatment.

### 3.4 Study design

Sixty children, thirty boys and thirty girls, in the age group 5 to 10 years who reported to Department of Pediatrics and Preventive dentistry, P.M.N.M Dental College, Bagalkot were selected. The informed consent from the parent, as well as institutional ethical clearance was obtained. They were randomly divided into three groups:

- Control group – 20 children to whom communication and tell show do technique was used during treatment.
- Audio visual group- 20 children to whom along with communication and tell show do technique, video using virtual reality (VR) glasses was shown during treatment.
- Parental presence group- 20 children whose parents were made to be present in the dental operatory during treatment.

Children who came for their first dental visit and had to undergo minor restorative procedures were selected. The entire treatment was completed by the same operator for every child. Using communication and tell show do technique the children were explained about the dental procedure.

The children in Group II received the VR device, which was to be worn during the dental treatment. It was introduced to the children using Tell-Show-Do technique. These children were given a choice of episodes from their favourite cartoon shows (like Tom and Jerry, Chotta Bheem, and Ben 10) and were asked to view them in the dental operatory for 5 minutes, before start of the dental treatment. The children were then asked to relax and continue watching their favourite shows while the dental treatment was carried out. Once the dental treatment was completed, the eye-glasses were removed.

For the children in group III, parents were made to be present in the dental operatory during the entire treatment.

### 3.5 Statistical analyses

Statistical Package for Social Sciences [SPSS] for Windows, Version 22.0. Released 2013. Armonk, NY: IBM Corp., was used to perform statistical analyses.

**Descriptive Statistics:** It includes expression of the study variables in terms of mean & SD for continuous variables, whereas in frequency and proportions for categorical variables.

**Inferential Statistics:** Chi Square Test was used to compare the Blood pressure among study participants.

ANOVA test followed by Tukey's HSD Post hoc Analysis was used to compare the mean Heart Rate between different study groups at different time intervals.

Repeated measures of ANOVA test followed by Bonferroni's Post hoc Analysis was used to compare the mean Heart Rate between different time intervals in each study group.

The level of significance [P-Value] was set at  $P < 0.05$ .

## 4. Results

The mean ages of the subjects in group I was 8.4 years (range, 6-10); group II was 7.9 years (range, 6-10), and in group III was 7.7 years (range, 5-10) respectively. On comparison of Blood pressure among study participants using Chi Square Test, it was noticed that 55% in group I, 10% in group II and 25 % in group III showed variation before and after the treatment. This was statistically significant with a p value of 0.007. [Table-1]

**Table 1:** Comparison of Blood pressure among study participants using Chi Square Test

Blood Pressure	Group 1		Group 2		Group 3		x <sup>2</sup> value	P-Value
	n	%	n	%	n	%		
Variation	11	55%	2	10%	5	25%	10.000	0.007*
Normal	9	45%	18	90%	15	75%		

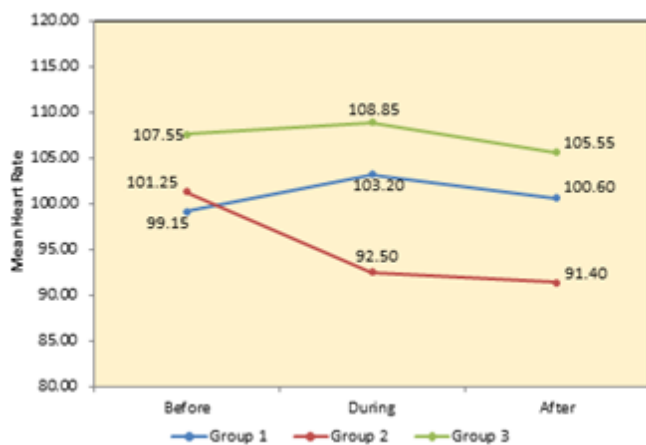
On multiple comparison between different groups the p-values between, group I vs group II was 0.002 and group I vs group III was 0.04, which were statistically significant. Comparison between group II vs group III was 0.21 which was not statistically significant. [Table-2]

**Table 2:** Multiple comparisons between different groups

Groups	G1 Vs G2	G1 Vs G3	G2 Vs G3
P-Value	0.002*	0.04*	0.21

\*-Statistically significant

On comparison, the mean Heart Rate between different time intervals (before, during and after) in each study group, were: group I-99.15, 103.20, 100.60; group II -101.25, 92.50, 91.40; group III-107.55, 108.85, 105.55, respectively, which were statistically significant with a p value of  $< 0.001$ . [Figure- 1].



**Figure 1:** Comparison of mean Heart Rate between different time intervals in each study group

## 5. Discussion

“Behavioural management and prevention coupled with local anaesthetic techniques when required, form the basis for delivery of pain-free dentistry”<sup>[1]</sup>. The use of virtual reality (VR) as a distraction tool is receiving growing attention in medical contexts. VR distraction during aversive experiences can improve coping with pain and reduce the perceived duration of procedures<sup>[8]</sup>. A recent systematic review of eleven studies looked at the effectiveness of virtual reality distraction on pain reduction. They concluded that more sophisticated VR techniques, capable of completely immersing the individual were associated with greater pain relief<sup>[9]</sup>. According to Gold and colleagues VR provides a powerful means of modifying affect, because of its immersive nature<sup>[10]</sup>.

In our daily practice, we observe that the majority of the parents do not want to get separated from their children during a dental procedure, and the same is with children too. A wide diversity exists in practitioner philosophy and parental attitude regarding parents’ presence or absence during pediatric dental treatment<sup>[7]</sup>. According to Kamp, separation of the child from the parent eliminated many behavior related problems and excluding the parent from the dental operatory allows the dentist to develop a rapport with the child without any interference<sup>[11]</sup>. Starkey strongly advocated separation of the parent and child<sup>[12]</sup>. While According to Olsen, one should avoid separation of the child from parents during their initial visits as their presence may help in the prediction of future child’s behavior<sup>[13]</sup>.

In this study, among the children who underwent treatment using VR technique, only 10% showed elevation in BP after the treatment compared to control group (55%). It was also observed that the heart rate of these children was lowered post treatment compared to control group. This was in accordance with the studies conducted by Das et al<sup>[14]</sup> and Aminabadi NA<sup>[5]</sup> et al. Several children using VR device also reported that they found the system to be “a unique and interesting experience” and that they would like the same in all their future appointments. However, the results are not consistent with those of Sullivan et al, where they concluded that VR had no significant effect on the behaviour or anxiety of children<sup>[15]</sup>. Dahlquist et al showed that use of VR

technique is more effective in older children than in younger children compared to simple distraction techniques<sup>[16]</sup>.

On comparing the heart rate of children in parental presence group, it was noticed that there was an increase during and after treatment, but there was no much variation compared to control group. 25% of children in this group exhibited an elevation in BP post treatment. This was in accordance with the studies by Venham et al<sup>[17]</sup>, Vasiliki et al<sup>[18]</sup> and Ahuja et al<sup>[7]</sup>. At the age of 4–7 years, psychological and emotional development occurs and after the age of 7 years, there is a development of trust and autonomy, so the parental presence or absence does not play a significant role. In contrast to the above, in a recent study of Nathan et al, parent’s presence played an important role for children 30 months of age or older<sup>[19]</sup>.

On comparing VR group and parental presence group it was observed that the children in VR group showed lesser variation in BP and also a decrease in heart rate post treatment than the parental presence group. On gender wise comparisons of Blood Pressure and Heart Rate there were no statistically significant differences in each study group. This denotes that in the children of age group 5 to 10 years, the use of distraction method using audio visual aids serves as a better behaviour management technique compared to the parental presence irrelevant of gender.

## 6. Conclusion

Use of virtual reality technique is effective compared to parental presence in controlling the anxiety in children undergoing short dental treatments.

## 7. Future Scope

Techniques which enhance the behavioral response in children should be considered for a better pediatric dental practice. Future research should involve well-controlled efforts to develop and evaluate other techniques or devices that can reduce anxiety and which require minimal time.

## References

- [1] Wilson S, Cody WE; An analysis of behavior management papers published in the pediatric dental literature. *Pediatr Dent* 2005; 27(4):331-8.
- [2] Sharma A, Tyagi R; Behavior Assessment of Children in Dental Settings: A Retrospective Study. *Int J ClinPrev Dent* 2011; 11(4):35-9.
- [3] Hosey M. Managing anxious children: the use of conscious sedation in paediatric dentistry. *Int J Paediatr Dent* 2002; 12(5): 359-72.
- [4] Locker D, Liddell A, Shapiro D. Diagnostic categories of dental anxiety: a population-based study. *Behav Res Ther* 1999; 37(1): 25-37.
- [5] Aminabadi A, Erfanparast L, Sohrabi A, Naghili A. The Impact of Virtual Reality Distraction on Pain and Anxiety during Dental Treatment in 4-6 Year-Old Children: a Randomized Controlled Clinical Trial. *J Dent Res Dent Clin Dent Prospect* 2012; 6(4) :117-24

- [6] Wismeijer A, Vingerhoets A. The use of virtual reality and audiovisual eyeglass systems as adjunct analgesic techniques: A review of the literature. *Ann Behav Med* 2005; 30(3): 268-78.
- [7] Ahuja S, Gandhi K, Malhotra R, Kapoor R, Maywad S, Datta G. Assessment of the effect of parental presence in dental operator on the behavior of children aged 4–7 years. *J Indian Soc Pedod Prev Dent* 2018; 36:167-72.
- [8] Tanja-Dijkstra K, Pahl S, White MP, Andrade J, Qian C, et al. (2014) Improving Dental Experiences by Using Virtual Reality Distraction: A Simulation Study. *PLOS ONE* 9(3): e91276.
- [9] Malloy KM, Milling LS. The effectiveness of virtual reality distraction for pain reduction: A systematic review. *Clin Psychol Rev* 2010; 30: 1011–8.
- [10] Gold JI, Belmont KA, Thomas DA. The neurobiology of virtual reality pain attenuation. *Cyber Psychol Behav* 2007; 10: 536–44.
- [11] Kamp AA. Parent child separation during dental care: A survey of parent's preference. *Pediatr Dent* 1992; 14:231-5.
- [12] Starkey PE. Training office personnel to manage children. In: Wright GZ, editor. *Behavior Management in Dentistry for Children*. Ch. 12. Philadelphia, USA: WB Saunders; 1975; 225-7.
- [13] Olsen NH. The first appointment – A mutual evaluation session. *J Dent Child* 1965; 32:208-11.
- [14] Das DA, Grimmer KA, Sparon AL, Mc Rae SE, Thomas BH. The efficacy of playing a virtual reality game in modulating pain for children with acute burn injuries: a randomized controlled trial. *BMC Pediatr* 2005; 5:1.
- [15] Sullivan C, Schneider PE, Musselman RJ, Dummett Co Jr, Gardiner D. The effect of virtual reality during dental treatment on child anxiety and behavior. *ASDC J Dent Child* 2000; 67:193-6, 160-1.
- [16] Dahlquist LM, Weiss KE, Clendaniel DL, Law EF, Ackerman CS, McKenna KD. Effects of video game distraction using a virtual reality type head mounted display helmet on cold pressor pain in children. *J Pediatr Psychol* 2009; 34:574–84.
- [17] Venham L. The effect of mother's presence on a child's response to dental treatment. *J Dent Child* 1979; 46:51-7.
- [18] Vasiliki B, Konstantinos A, Vassilis K, Nikolaos K, van Loveren C, Jaap V, et al. The effect of parental presence on the child's perception and co-operation during dental treatment. *Eur Arch Paediatr Dent* 2016; 17:381-6.
- [19] Nathan JE, Rayman MS, Golden BE, Vargas KG. Discretionary parental presence in the dental operator: A survey of pediatric dentists and parents. *Pediatr Neonatal Nurs Open J* 2015; 2:50-61.

## Author Profile



**Dr Sruthi P** received the bachelor's degree in Dental Surgery from KMCT Dental College in 2012. She is now pursuing her Masters in Pediatric and Preventive Dentistry.