

## Effect of Audiovisual Distraction on Behaviour and Anxiety of Children During Induction of General Anesthesia: A Randomized Control Study

Research Article

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### Abstract

**Background:** Dental fear and anxiety often hinders in rendering the patient a proper and smooth dental care. Full mouth rehabilitation for extremely uncooperative paediatric patients are done under General Anaesthesia (GA). The aim of this study is to determine the effect of audio-visual distraction (AVD) on behaviour and anxiety of children during induction of GA.

**Materials and Methods:** The randomized control study was done with a sample size of 15 in each group with no gender specificity and age of less than 4 years. The children in the AVD group were distracted using VR box, i-pads or mobile phones and the parameters used to measure the behaviour and anxiety were Frankl's behaviour rating scale, Face Leg Activity Cry Consolability (FLACC) Scale and Heart rate using digital pulse oximeter. The data were collected by a single operator and statistical analysis was done using SPSS software version 23.

**Results:** The children who were distracted using AVD showed better cooperation with less anxiety clinically. Statistically significant results ( $p < 0.005$ ) were obtained when heart rates and behaviour rating scores are compared.

**Conclusion:** Distraction using audio-visual aids proved efficient in reducing the anxiety and improving the behaviour of the children during induction of GA.

**Keywords:** Distraction; Audio Visual Distraction; Behaviour Management.

### Introduction

Every paediatric dentist desires to treat their patients in a stress and anxiety free environment. In order to achieve this experimentally learned skills has to be implemented by the dentist to render a high quality dental care. Behavioural methods for dealing with a patient's stress and pain have become increasingly more common in dentistry, and there are lots of behaviour management techniques available in paediatric dentistry [1]. The commonly used non-pharmacological behaviour management techniques in paediatric dentistry are Tell-show-Do, Modelling, De-sensitization, positive reinforcement, aversive conditioning etc [2].

However, with patients who show definitely negative behaviour in Frankl's behaviour rating scale, pharmacological management such as General Anaesthesia (GA) is advised. G Dental treatments especially full mouth rehabilitation under General Anaes-

thesia (GA) is an effective pharmacological behaviour management technique used in paediatric dentistry most commonly for full mouth rehabilitation procedures and for children with special health care needs [3]. But still, the anxiety provoking environment in an operation theatre and the fear of needles during establishing central IV lines will lead to disruptive behaviour before inducing anaesthesia. Folayan et al. in his study, have shown that the dental fear that a child perceives not only derange the behaviour but also increases pain perception, nervousness and anxiety [4]. So, in order to reduce these outcomes, the child should be distracted from this fear provoking situation and taken into a comfortable and enjoyable state. Many studies have shown the importance of distraction in reducing anxiety and pain [5-7]. It has also been shown that use of audio-visual (AV) distraction serves well in distracting a child from a fearful environment and induces a positive emotional reaction resulting in a relaxed experience [8, 9]. Our department is passionate about child care, we have published numerous

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high quality articles in this domain over the past 3 years [10-28]. With this inspiration we planned to pursue research on effect of audiovisual distraction on behaviour and anxiety of children during induction of general anesthesia: A randomized control study. In this study we evaluated the efficiency of audio-visual aids as a distraction tool in the operating room during induction of GA which involves gowning the child, establishing central IV line and connecting pulse oximeters.

**Materials and Methods**

This randomized control trial was approved and given ethical clearance by the institutional review board of Saveetha Dental College and hospital and was conducted from September 2019 to December 2019 at the department of Paediatric & Preventive dentistry, Saveetha dental college. The study design followed the 25 item checklist of CONSORT, which was specifically developed to guide standardized reporting of randomized controlled trials. Sample size calculation was done by calculating the effect size from previous studies as 1.15. Once, the level of significance was set at 0.05 and power at 80% the sample size of 30 (15 in each group) was determined to be essential. Patients who were categorized under definitely negative Frankl'sbehaviour rating and posted for treatment under general anaesthesia were recruited. All parents and guardians of the children were informed about the study. Patients who are not comfortable in using audio-visual aids and those who are with reduced audio-visual capabilities and psychological disorders were excluded from the study.

Data collected using Wong-baker faces scale, FLACC (Face, Leg, Activity, Cry, and Consolability) scale, Frankl'sbehaviour rating scale and pulse rates using digital pulse oximeter during induction of GA. During the child's first visit, once he/she is found to be having definitely negative behaviour according to Frankl's scale are selected for the study and are allocated randomly into two groups. On the day of procedure, the children were taken into the gowning room outside the operating theatre along with their parents. The children who are allocated in the AVD group were distracted using an audio-visual aid during establishment of central IV line and while monitoring vitals. The audio-visual aids

used were commercially available virtual reality boxes in which mobile phones are inserted and videos are played with attached earphones. In cases where the children are not comfortable in wearing the VR box, distraction was gained by playing videos through i-pads or mobile phones with attached earphones.

The response of the patient was recorded using the above mentioned parameters by a single person. Given the nature of the study design, blinding was not possible. The data were analysed statistically using a software (IBM SPSS version 23). The intergroup comparison of pulse rates were analysed using Mann Whitney Test, the franks behaviour rating scores and FLACC scores were analysed using Independent Samples t test.

**Results**

There were no major differences in the AV group and CTR group regarding, age and sex. According to Frankl's behaviour rating scale, out of 30 selected patients, 27 were found to be definitely negative and 3 were found to have negative behaviour lacking cooperative ability for dental treatments by chair-side.

The comparison between the Frankl'sbehaviour rating scores of the two visits for the case group showed a significant result (Table a) whereas no statistical significance was found in the control group. The FLACC scores were given to the patients based on their performance and were analysed. There is no statistical difference between the groups. (Fig a & b). The intergroup comparison of the heart rates during establishment of establishment of central IV line by the anaesthesiologist or OT nurse, gave a significant result (Table b). The difference between the heart rates of the two groups are depicted in Fig c & d.

**Discussion**

From the above results, this study showed that AV distraction using VR box during induction of GA for an uncooperative child was successful in altering the coping ability of the child to the procedure providing the anaesthetist and the OT nurses an easy and calm environment to work on. The behaviour of the child

**Table 1. Frankl'sBehaviour rating score of both the groups compared with first and second visits using Mann-Whitney test, its mean, Standard deviation and significance (p<0.005 = significant\*).**

FRANKL'S BEHAVIOUR RATING SCALE			
	Mean	Std. deviation	P value
Group 1 (control) Baseline vs Intervention	-0.267	0.458	0.041
Group 2 (Case) Baseline vs Intervention	-0.667	0.488	0.001*

**Table 2. Heart rates of both the groups measured using digital pulse oximeter; intra group comparison done using Wilcoxon signed rank test , its mean, Standard deviation and significance (p<0.005 = significant\*).**

HEART RATE MEASURED USING DIGITAL PULSE OXIMETER DURING ESTABLISHING CENTRAL IV LINE			
	Mean	Std. deviation	P value
Group 1 (control)	134.67	7.537	0.000*

Figure 1. X- axis represents FLACC scores of Group 1 and Y-axis represents the frequency of occurrence of each score. The graph shows that score 6 is the most commonly observed score which denotes a high response to pain during establishing the central intravenous line.

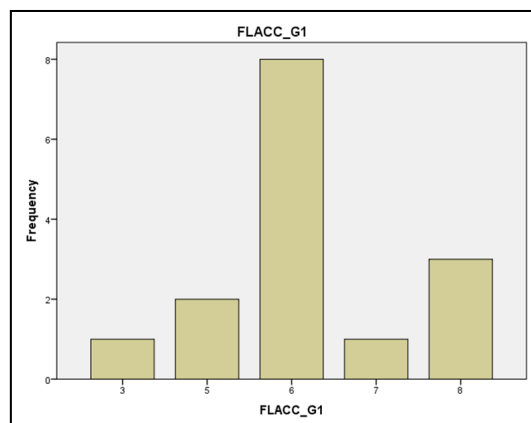


Figure 2. X- axis represents FLACC scores of Group 2 and Y-axis represents the frequency of occurrence of each score. The graph shows that score 0 is the most commonly observed score which denotes a very diminished or no response to pain during establishing the central intravenous line.

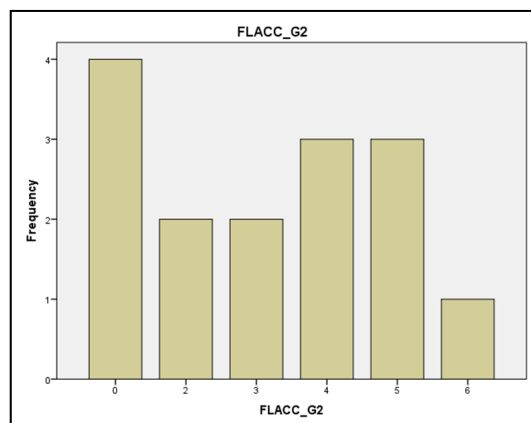
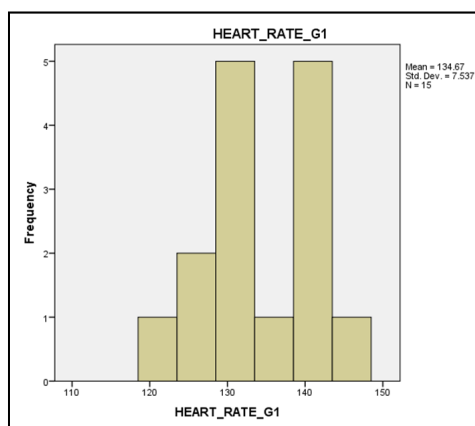


Figure 3. X- axis represents Heart rates of Group 1 and Y-axis represents the frequency of occurrence . The graph shows that heart rate ranging from 120-140 bps was highly noticed among the participants of group 1 during establishing the central intravenous line.



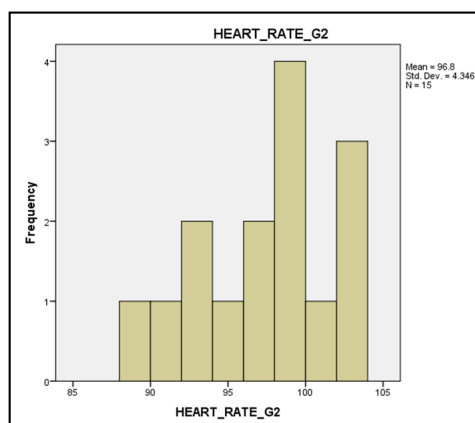
improved significantly and also there was an enormous difference in FLACC scale between the groups. This shows the efficiency of AV distraction during the induction of GA.

Fear of needles and anxiety towards the hospital environment is a big hurdle for the physicians to render proper care to the patients and in children it is way more problematic. Audio-visual distraction had proved to be an efficient tool in distracting them and reducing the anxiety and fear. Preschool age groups have shown to have high fear and anxiety levels than school children [9].

Not only reducing anxiety and fear, AV distraction also reduces the pain perception during injection of needles. EL-Sharkawiet. Al (2012) found that pain perception is reduced when a video eyewear device is used as a method of distraction in children aged 4-6 years [7]. Baghdad (2000) reported the efficiency of AV distraction in reducing the perception of pain during cavity preparation [29].

Many studies have shown the efficiency of AV distraction during dental treatments. Flicheck et al., (2004) reported the effect of

Figure 4. X- axis represents Heart rates of Group 2 and Y-axis represents the frequency of occurrence . The graph shows that heart rate ranging from 90-105 bps was highly noticed among the participants of group 1 during establishing the central intravenous line.



attention-grabbing videotaped material in distracting the children from feared stimuli and it was found as one of the most effective methods for modifying children's behaviour during dental treatment [30]. Prabakar et al., (2007) found that the use of audiovisual distraction during dental treatment was more effective in managing the children [9]. Similar to this current study Patel et al (2006) showed that children who enjoyed playing hand-held video games had less anxiety during the induction of anaesthesia [31].

Most of the children in this present study were allowed to choose the video they like to watch on their own. This also added to the beneficiary effects of the distraction method. Studies done by Silberte in, 1977 and Ingersoll et al 1984 have reflected on the importance of children choosing audio-visual material themselves and how this influences their behaviour [32, 33].

However there are few studies where AV distraction showed no significant results. Sullivan et al., (2000) and Aitken et al., (2002) did not find any differences upon the application of a product that was based on music [34, 35].

The limitation of this study was that few children were not comfortable in using the virtual reality box and were provided with videos played through i-pads or mobile phones and hence standardized methods couldn't be obtained.

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## Conclusion

\* The use of audio-visual material used as a method of distraction improves the behaviour and reduces the anxiety of the children during induction of General Anaesthesia.

\* Distracting the child using audio-visual aids in the OT eases the job for the anaesthetist and nurses.

\* More studies has to be carried out with an increased sample size on the distraction material so that a standardised instrument will be used throughout paediatric dentistry during all the dental related procedures in children.

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