



EFFECTIVENESS OF KALEIDOSCOPE ON PAIN AND ANXIETY LEVELS DURING INFERIOR ALVEOLAR NERVE BLOCK IN 6-9-YEAR-OLD CHILDREN

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ABSTRACT:

Aim: The aim of this study was to evaluate the effectiveness of distraction technique using kaleidoscope in management of pain and anxiety in 6-9-year-old children receiving inferior alveolar nerve block (IANB).

Methodology: Fifty children aged 6-9 years were screened to be included in the study who required dental treatment and had no prior history of dental treatment. A simple randomization technique utilizing a computer-generated lottery method was used to allocate the participants into an experimental and control group. The experimental group was distracted using kaleidoscope during administration of local anesthesia whereas the control group did not receive any such intervention.

Results: Statistically significant reduction in the anxiety level was seen in children who received distraction ($P < 0.05$). The pain levels of children in the experimental group reduced but was not statistically significant ($p < 0.22$).

Conclusion: Distraction technique using kaleidoscope was an effective approach for reduction of pain and anxiety in children during inferior alveolar nerve block.

KEYWORDS:

DISTRACTION, KALEIDOSCOPE, PAIN, ANXIETY, INFERIOR ALVEOLAR NERVE BLOCK, LOCAL ANESTHESIA.

INTRODUCTION

Pain is a highly prevalent problem in children as well as in adults. Majority of times it is subjective in nature which affects the quality of one's life.¹⁰ Procedures which require use of needle are the most common sources of pain, anxiety, distress and fear in children.^{4,17} Anxiety is defined as the fear of the unknown. One of the most anxiety provoking experience in dental operatory for children is

administration of local anesthesia⁸, in particular, IANB (inferior alveolar nerve block).¹² Pharmacological and non-pharmacological approaches are used for pain management.¹⁵ It has been shown that distraction with kaleidoscope is a beneficial method to provide optimal pain control.¹⁶

Reinforcing a positive dental experience is the primary goal of the paediatric dentist. In order to accomplish this, a variety of behaviour guidance techniques are employed by

American Academy of Pediatric Dentistry. These include communication, tell-show-do (TSD), voice control, nonverbal communication, positive reinforcement, distraction, parental absence/presence, and advanced behavior guidance such as protective stabilization, sedation, and general anesthesia.² Distraction is a technique of redirecting a child's focus away, from what may be perceived as an unpleasant procedure. It also helps to reduce the child's fear and anxiety.

Kaleidoscope is a cylindrical instrument with colourful beads with three mirrors set at an angle of 60° to each other. It works on the principle of multiple reflections.⁵ The purpose of this experimental study is to determine the effect of distraction with a kaleidoscope on the pain and anxiety level in 6-9-year-old children while they received inferior alveolar nerve block (IANB).

MATERIALS AND METHODS

OBJECTIVE: In order to assess the change in pain and anxiety in children during the administration of local anaesthesia in the dental clinic, a randomized controlled study design was chosen for this study.

INCLUSION CRITERIA: Children who required dental treatments that needed mandatory administration of local anaesthesia were chosen for this study. The children were supposed to be in the age range of 6-9 years.

EXCLUSION CRITERIA: Children who had previous history of dental treatment and who were medically compromised were excluded from the study.

SAMPLE SIZE CALCULATION: The total sample was calculated using beta power method that considered an effect size and mean and standard deviations. The resulting value indicated a sample size of 44 – 22 in each study. Based on this, the sample size was adequate for our study which divided the samples into two groups; each containing 25 participants.

ENROLMENT: 61 children were assessed initially, out of which 11 did not meet the inclusion criteria. Out of the 50 children chosen for the study, 37 were boys and 13 were girls.

RANDOMIZATION: A simple randomization technique utilizing a computer-generated lottery method was used to allocate the participants into an experimental and control group of equal sample size (n=25).

ALLOCATION CONCEALMENT: Participants were assigned a number that was computer-generated. Participants and the researchers were unknown of this allocation.

BLINDING: The assignment of the participants into a control and an experimental was unknown to the researcher who administered the local anesthesia and from the researcher who would be analysing the pain and anxiety levels during the procedure.

ETHICAL APPROVAL:

- Ethical clearance was obtained from the Institutional Ethics Committee College of Dental

Sciences & Research Centre, Ahmedabad.

- Participants were included in the study only if their parents signed the written consent for participation of their child in the study.



FIGURE 1 MATERIALS USED FOR THE STUDY

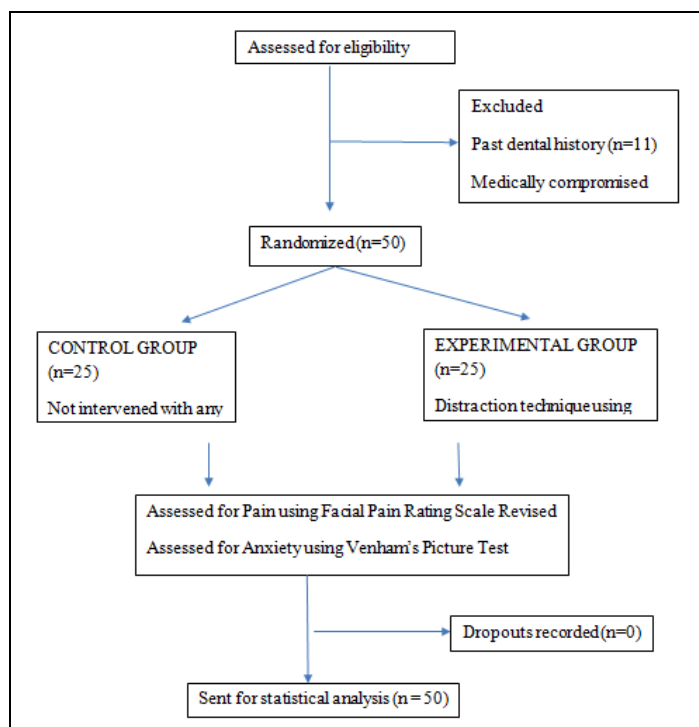


FIGURE 2: CONSORT FLOW DIAGRAM

METHODOLOGY

Participants in the control group were administered 2% lidocaine local anesthesia using a 27-gauge needle. Participants in the experimental group were administered 2% lidocaine local anesthesia using a 27-gauge needle. However, children in the latter group were also given a kaleidoscope through which they were supposed to see during administration of local anesthesia. Another researcher assessed the pain and anxiety scales after administration of local anesthesia using valid and reliable scales.

Faces Pain Rating Scale Revised (FPS-R): The FPS-R is a scale used in children between 4 to 16 years of age. Depending on the perception of pain of the children, six

different facial expressions are scored in a range of 0 to 10 score. The score between 1 to 4 indicates mild pain, 4 to 6 indicates moderate pain and 7 to 10 indicates severe pain. This scale is a valid and reliable tool for measuring facial pain⁹.

Venham's Picture Test (VPT): VPT comprises of eight cards, with two figures on each card present, one is anxious figure and one is non anxious figure. The children are asked to choose one image based on the way they feel following the administration of local anesthesia. This tool has been a valid and reliable scale for assessing anxiety in children.¹⁸

Statistical Analysis: Statistical analysis were carried out using SPSS 21.0 software. An independent t-test was used in order to calculate the significance between the control (n=25) and the experimental group (n=25).

RESULTS

The recruitment, randomization, allocation of the children for the study was done based on the CONSORT diagram as presented (Figure 2). A two-tailed independent t-test was done for carrying out the intergroup comparison at 95% confidence level. There was a statistically significant difference in the anxiety levels in the experimental group as compared to the control group. However, no statistically significant difference was observed in both groups after assessment of pain levels. The mean scores of the outcome variables of both groups are presented in Table 1.

TABLE 1 STATISTICAL ANALYSIS DONE USING INDEPENDENT T-TEST. FPSR: FACES PAIN SCALE REVISED; VPT: VENHAM'S PICTURE TEST

	PAIN (FPSR)		ANXIETY LEVEL (VPT)	
	CONTR OL	EXPERIMEN TAL	CONTR OL	EXPERIMEN TAL
MEAN \pm SD	2.66 \pm 1.88	1.4 \pm 1.35	2.86 \pm 1.54	0.66 \pm 0.86
SIGNIFICA NCE	(p<0.22)		(p<0.05)	

DISCUSSION

Behaviour Guidance is a terminology used to describe the way a child can be tamed in the dental clinic in order to instil within him/her, a positive dental attitude. Guiding a child's behaviour can be done by pharmacological and non-pharmacological means. While pharmacological methods utilize a range of chemicals and sedatives, non-pharmacological methods focus mainly on communication and behaviour shaping. One of the commonly used non-pharmacological techniques is distraction.² It has two variants: active and passive. Passive Distraction is one which requires the child to remain silent and the dental professional actively distracts him/her during the procedure. Active distraction is one which requires the child's first-hand participation. One such active distraction is using kaleidoscope.¹³

Fear of needle injury is the most anxiety inducing stimuli in the children who are having their first dental visit. So it can be beneficial to use an intervention like distraction.¹⁴ One of the most painful and stressful procedures in paediatric dentistry is inferior alveolar nerve block. Thus it was the procedure of choice in assessing pain and anxiety in children.¹²

The most reliable method of self-reported anxiety in children is Venham's Picture Test (VPT). It comprises of eight cards, each of which bears two images – one representing anxious and the other representing a non-anxious child. All cards are shown to children in an ordered manner. Children were asked to choose an image that they could relate to at that moment. Score 1 was recorded if the child pointed at an anxious image. If he/she pointed at a non-anxious image the score was recorded as 0. The minimum score possible is zero, and the maximum score is eight.¹⁸ The result of this study showed that the group that received distraction through kaleidoscope had a significantly lower mean VPT scores compared to non-distraction control group.

Faces Pain Scale-Revised (FPS-R) was developed for self-reporting measurement of pain for children. It was adapted from Faces Pain Scale.⁹ It consists of six facial expressions that correspond to a range between 0 and 10. These faces depict the level of pain a person may experience. An advantage of this scale is that there are no smiles or tears in any of the images.¹⁰ This scale is a valid and reliable tool for measuring pain in school-age children, as children understand this scale easily and quickly after a brief explanation.³

Active distraction in this study was done using kaleidoscope. The kaleidoscope was invented by Sir David Brewster in 1816. It is a cylindrical toy containing a number of loose, coloured objects (like beads) with three mirrors set at a 60° angle. Due to a 60° inclination hexagonally, a symmetrical pattern is formed. One has to look into one end of kaleidoscope and the light entering from the other end frames colourful symmetrical pattern inside when the cylinder is rotated.⁵ Distraction with kaleidoscope started before administration of local anesthesia and was continued until it was completely deposited.

In the age group of mixed dentition, distraction with kaleidoscope is more effective compared to older age groups.¹ Varying results have been observed with respect to the effect of kaleidoscope on pain sensation in children. The kaleidoscope has been shown to be effective than coloured cards in reducing pain levels.¹¹ Moreover, during venepuncture, nausea and vomiting, children have shown reduced pain levels when distracted with a kaleidoscope.^{16,6,19} On the other hand, Carlson et al have showed that no significant difference in pain reduction was observed in children during venepuncture.⁷ The results of the current study are similar to the ones reported by Carlson et al. The data shows that the kaleidoscope did reduce the pain levels during local anesthesia administration in children. However, the

results were not statistically significant.

The current study found that distraction with kaleidoscope reduces pain and anxiety. The limitations of the present study include smaller sample size and other parameters were not taken into consideration to assess the anxiety levels in children. One of the drawbacks of VPT is that images on the scale are identical, which might be confusing for a young patient. Assessment of pain was based on subjective response shown by children. Given its limitations, it should be kept in mind that these scales allow the collection of information regarding pain and anxiety directly from children.

CONCLUSION

Given the range of behaviour guidance techniques that a pediatric dentist can apply, distraction is one of the most common ones. Within the limitations of the study, it can be said that active distraction using kaleidoscope was able to reduce both pain and anxiety in children during IANB administration.

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