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COMPARATIVE EVALUATION OF VARIOUS DISTRACTION TECHNIQUES WHILE ADMINSTERING LOCAL ANAESTHESIA ON THE DENTAL ANXIETY, BEHAVIOUR

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ABSTRACT

Back ground: Distraction involves diverting children's attention away from painful stimuli during invasive dental procedures, helps to alleviate the child's fear and anxiety and is most effective when tailored to the child's developmental level**.** ***Aim:*** Comparative evaluation of various distraction techniques while adminstering local anaesthesia on dental anxiety, behavior and pain levels of children. ***Materials & Methodology:*** 45 Healthy children aged 6-12 years were included in the study and were randomly allocated into following three groups: GROUP A- Control group, GROUP B- Active form using Distraction Cards and GROUP C- Passive form using Kaleidoscope. Each child in Groups A, B, and C were given 5 min to get habituated to the distraction, before the inferior alveolar nerve block (IANB) procedure began. Prior to administration of the local anaesthetic agent, dental anxiety of the child was measured using the faces version of the Modifed Child Anxiety Dental Scale (MCDAS(f)). Following the administration of local anaesthesia, each child was asked to rate the pain they felt using the Wong Baker Faces Pain Rating Scale (WBFPRS).To overcome the drawback of the self-reported scale, FLACC scale (Faces Legs Activity Cry and Consolability scale), was used. Assessment of child's behaviour was done using the Venham'sbehavior rating scale. ***Result:*** The data obtained was statistically analyzed using One-Way ANOVAand Tukey Post-Hoc Test. ***Conclusion:*** Active distraction techniques generally result in lower anxiety, pain, and physiological responses (as indicated by lower scores and pulse rates) compared to conventional techniques. Passive distraction shows intermediate results, often not significantly different from either group

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INTRODUCTION

Anticipation of pain during dental treatment is a frequently reported reason for dental anxiety and fear. Dental anxiety comprises of various physical, mental as well as social components. Anxiety has been defined as a "vague, unpleasant feeling accompanied by a premonition that something undesirable is about to happen".[1] In the terms of Dental Fear and Anxiety (DFA), Dental anxiety is characterized as significant negative or unpleasant feeling about a dental office and dental procedures; whereas dental phobia is an irrational form of dental anxiety.[2] Pediatric dental anxiety is a global concern in clinical practice, impacting 13.3–36.5% of children or adolescents across different countries. This anxiety has adverse effects on children's physiological, mental, and social well-being.[3]The primary goal of the paediatric dentist is to reinforce a positive dental experience, and to accomplish this, a variety of behaviour guidance techniques are employed.[4] The American Academy of Pediatric Dentistry (AAPD) collectively terms this series of interventions as behavior management techniques (BMT). The latest guidelines classify BMT into two types: basic behavior guidance and advanced behavior guidance. Basic behaviorguidance encompasses communication guidance, positive pre-visit imagery, direct observation, tell-show-do, ask-tell-ask, voice control, non-verbal communication, positive reinforcement and descriptive praise, as well as distraction and desensitization. On the other hand, advanced behavior guidance includes protective stabilization, sedation, and general anesthesia.[5] Consequently, parents prefer non-invasive techniques over invasive methods. Distraction, which involves diverting children's attention away from painful stimuli during invasive dental procedures, helps to alleviate the child's fear and anxiety and is most effective when tailored to the child's developmental level.[6] Distraction appears to be safe and inexpensive, and it can result in a shorter procedure duration.[7] Distraction techniques are of the following two types: active and passive. Active forms of distraction promote the child's engagement in an activity during the procedure therefore, tend to involve several sensory components. In the passive form, distraction is achieved through the

child's observation of a stimulus rather than his/her active participation.[8] Methods such as playing games, singing songs, using virtual reality glasses, and participating in breathing and relaxation exercises require the active participation of children. Methods such as watching videos, listening to music, and reading books redirect children's attention in a passive manner.[9] The distraction cards consisted of visual cards of5cmx8 cm, covered with various pictures and shapes. In thismethod, the children first carefully examined the cards. Then, the examiner asked some questions about those cards to be answeredby the children, such as "How many monkeys are there in thepicture?" "How many frogs are there in the picture?"or "Can you see the comet?.[10]The exercise requires face-to-face and verbal interaction; therefore, use of the cards is considered an active method of distraction.[11] Results from several studies indicate that they are effective for reducing pain; therefore, they were also chosen for use in this study. Kaleidoscope is an instrument that shows an infinite number of fascinating geometric shapes in the form of a flower, repeating and reflecting images of coloured goggle fragments in the front section in a prism mirroring the inner surface. Increased blinking of the eyes is directly proportional to task difficulty, which in turn produces stress. In a relaxed situation, such as during kaleidoscope viewing, the number of blinks decreases and thus it controls the general physiological excitation. Kaleidoscope is being increasingly recognized for its therapeutic and healing value in medical procedures but very few studies on it are available for its use in pediatric dentistry.[1]A study by Aditya *et al*. was conducted on the pediatric dental population with a kaleidoscope and virtual reality and a positive reduction in VPT scores and pulse rate was reported.[4] Therefore, the current study intended to employ distraction cards, kaleidoscope, and without any distraction methods and observe the effects on the anxiety, behaviour and pain levels of children undergoing inferior alveolar nerve block (IANB).

MATERIAL AND METHODS

A total of 45 children aged between 6 to 12 years irrespective of their sex who rated positive and definitely positive on Frankle's behaviour rating scale were undertaken in the study. Patient and their parents were informed about the objective of the study and the methodology to be employed. Written informed consent will be obtained from the parent/guardian of the patient. The study was conducted in the Department of Pediatric and Preventive Dentistry, College of Dental Sciences, Davangere. Children who required extraction/pulp therapy/restoration for deep carious lesion in mandibular primary and first permanent molars under IANB were selected for the study, whereas children with medically compromised, cognitive delay and were allergic to any of the anaesthetic agents used were excluded from the study. Participants were randomly allocated into following three groups consisting of 15 participants in each group: group A: Control group (basic behavior guidance technique without distraction), group B: Active form of distraction technique (Distraction Cards), group C: Passive form of distraction technique (Kaleidoscope). Each child in Groups A, B, and C were given 5 min to get habituated to the distraction aid before the IANB procedure began. All the distraction methods implementation and administration of IANB were performed by one paediatric dentist. Prior to administration of the local anaesthetic agent and introducing the child to the intervention, dental anxiety of the child was measured using the faces version of the Modifed Child Anxiety Dental Scale (MCDAS(f)). The dental anxiety of the child was re-recorded soon after the administration of local anaesthetic agent. The variations in the pulse rate were recorded by another investigator before the intervention, during the injection of the local anaesthetic and 1 minute after the removal of the needle from the tissue, using a pulse oximeter. Following the administration of local anaesthesia, each child was asked to rate the pain they felt during the injection using the Wong Baker Faces Pain Rating Scale (WBFPRS). To overcome the drawback of the self-reported scale due to infuence of the child's cognitive ability and situational factors on the outcome, FLACC scale (Faces Legs Activity Cry and Consolability scale), that is assessed by an observer for five categories (faces, legs, activity, cry, consolablity) of the child's behaviour, was used as an adjunct. Assessment of child's behaviour during the entire length of the procedure was done using the Venham'sbehavior rating scale that ranges from zero (signifying total cooperation) to five.

Statistical Analysis: The data obtained will be statistically analyzed using One-Way ANOVA and Tukey Post-Hoc Test. Results were subjected to statistical analysis and p value </= 0.005 was considered significant.

RESULTS

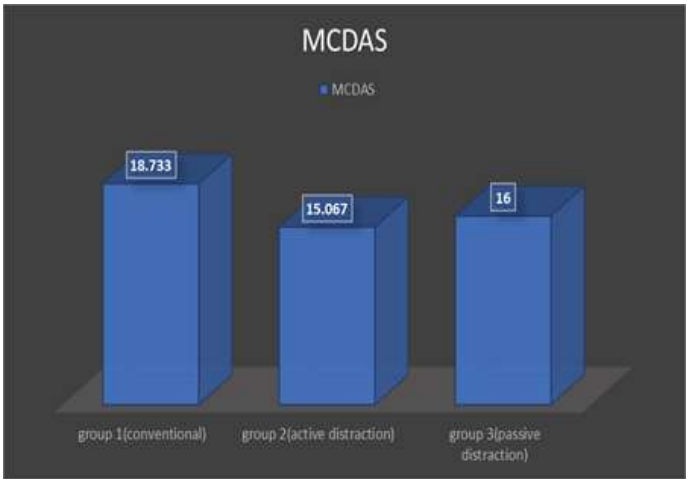
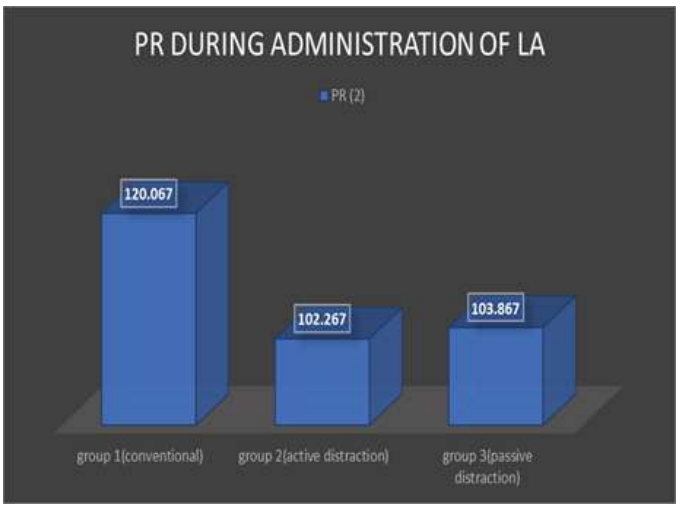


Figure 1

Figure 2



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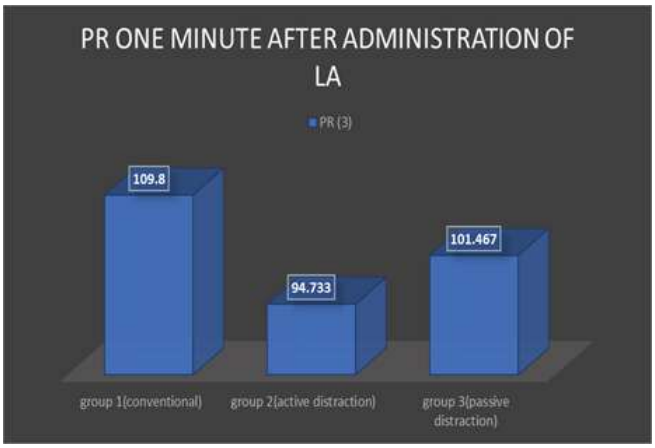

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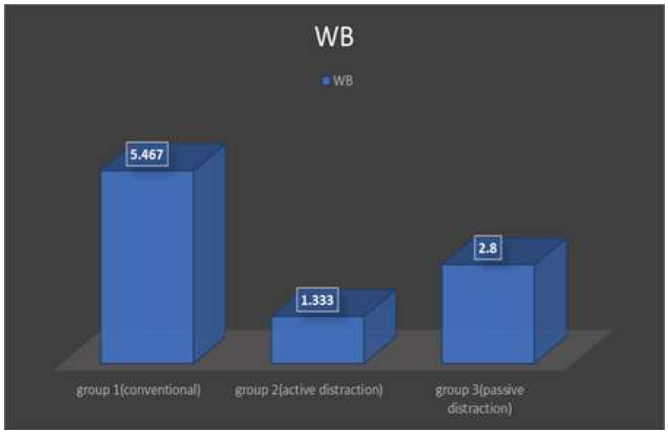

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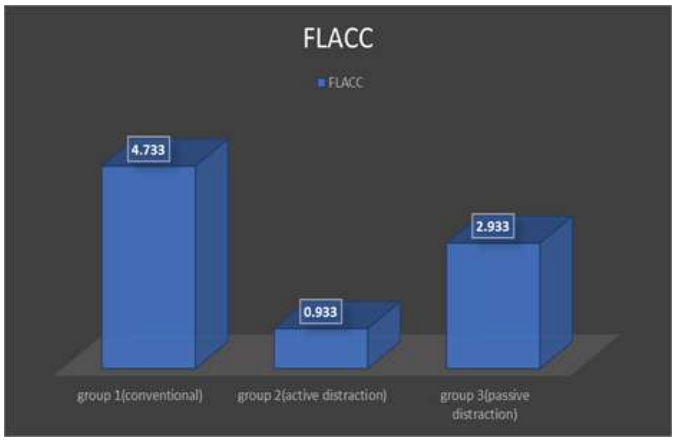

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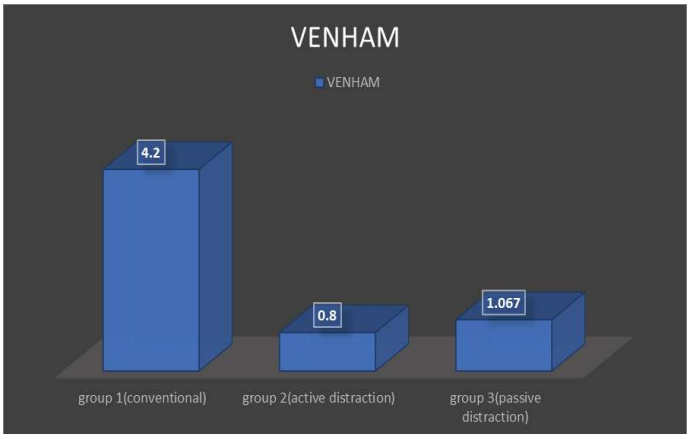

Figure 7.

Table 1. For intergroup comparison

	GROUP	N	mean	SD	P value
MCDAS	1	15	18.73	6.22	0.232
	2	15	15.6	5.21	
	3	15	16.00	6.09	
PR before LA	1	15	100.46	8.26	0.009
	2	15	92.2	4.61	
	3	15	95	7.31	
PR during LA	1	15	120	18.39	0.007
	2	15	102.2	7.30	
	3	15	103.8	9.25	
PR after1 min of LA admins	1	15	109.8	11.49	<0.001
	2	15	94.73	5.91	
	3	15	101.46	7.48	
WB	1	15	5.67	2.97	<0.001
	2	15	1.33	1.23	
	3	15	2.80	1.97	
FLACC	1	15	4.73	2.89	<0.001
	2	15	0.93	1.22	
	3	15	2.93	1.94	
Venham	1	15	4.20	3.50	0.006
	2	15	0.80	0.941	
	3	15	1.067	0.96	

Table 2. For Intragroup Comparison

	Grp	n	Mean	SD	P VALUE
GRP 1 PR	Before	15	100.5	8.26	0.002
	During	15	120	18.40	
	After	15	109.8	11.50	
Grp 2 PR	Before	15	92.2	4.62	<0.001
	During	15	102.3	7.30	
	After	15	94.7	5.91	
GRP 3 PR	Before	15	95.	7.30	0.015
	During	15	103.9	9.26	
	After	15	101.5	7.48	

- A significant difference (<0.05) was observed for PR before, during and 1min after the LA administration. Similar results were found for Wong Bsaker's scale, FLACC and Venham,s scale. However, MCDAS gave insignificant results (>0.05).(Table1)
- On intragroup comparison, group 2 and group 3 showed significant difference (<0.05) as compared to group 1. (Table 2)

DISCUSSION

This study was conducted to determine the efficacy of the use of distraction cards and kaleidoscope for reducing pain during administration of local anaesthesia in children aged between 6 to 12 years. Results from this study support the finding that the use of distraction cards and/or kaleidoscope is effective in reducing the pain during inferior alveolar nerve block procedures in 6-year-old to 12 year-old children. Procedural interventions, especially with needles, tend to be a fearful and painful process for children. One of the effective methods for reducing a child's fear and pain during administration of local anaesthesia is the use of distraction. Distraction methods may prevent any possible long-standing psychological and physical outcomes caused by pain to children (Canbulat *et al*., 2014; He *et al*., 2005; Inal and Kelleci, 2012; Tu¨fekci *et al*., 2009).Recently, Inal and Kelleci (2012) and Canbulat*et al*. (2014) demonstrated that distraction cards (Flippits) were very effective in reducing proce-dural pain and anxiety in children during phlebotomy. Through a well-placed distraction method, the child's pain experience, along with his or her attitude toward other medical interventions, will thus be affected positively.[11] The most typical anxiety-inducing stimuli, particularly in little children who are likely having their first visit to a dental clinic seems to be the anticipation of needle injury. Therefore, it is very essential to use selective interventions for distraction.[4] Hence, this study was carried out to compare the effects of different distraction techniques (distraction cards, kaleidoscope, and without any distraction aids) on

children's anxiety levels. Also, blocking the inferior alveolar nerve in children was affirmed to be one of the most painful and stressful procedures in pediatric dentistry, hence IANB was chosen to compare distraction approaches.[12] A numeric rating scale is usually understood by children who are capable of good cognitive functioning; however, under the potentially anxiety-provoking environment of the dental situation the child may regress and experience a lowering of their cognitive ability. With a reduction in cognitive functioning the MCDAS may be more difficult for the regressed child to understand.Therefore, there is a need to modify the MCDAS with the addition of a faces analogue scale anchored above the original numeric form to allow for any decrease in age adequate functioning and cognitive functioning as a consequence of the anxiety provoking environment of the dental situation.[13] Venham Picture Test (VPT) has been considered to be the most reliable method of self-reported anxiety in children and hence was used to measure the self-reported anxiety levels of children[14]. The results of the present study showed that Groups (Groups2 and 3) that implied distraction had lower mean VPT scores compared to the non-distraction group and the results were statistically significant indicating that all the distraction methods used were able to reduce the anxiety levels throughout IANB procedure.

Kaleidoscope has been used in the medical field as an effective distraction aid during procedures. Canbulat *et al* investigated the effect of colored cards and kaleidoscopes as visual distraction tools, compared their impact on the pain levels, and found that the pain level of the kaleidoscope group was lower than the control group. In a multicentre study conducted by Carlson *et al*, observed that using kaleidoscope distraction method during venipuncture affected pain levels; however, it did not reduce pain levels statistically significantly. To date, kaleidoscope has not been evaluated as a distraction aid in Pediatric Dentistry. Bulut *et al* discovered a significant difference in postoperative pain, fear, and anxiety levels between intervention and control groups in favour of the kaleidoscope group. Similarly, Aditya *et al* observed that kaleidoscope distraction was beneficial in decreasing anxiety among children when compared to the control group and the results were statistically significant ($p < 0.05$). [4] Pulse rate has been proven to be a direct measure of physiologic arousal in dentally apprehensive children and hence it was included as one of the measures of dental anxiety in the current investigation. Instead of a traditional bedside pulse oximeter, a small cost-effective fingertip device was used, which was extremely beneficial clinically, less threatening for children, and has the advantages of high portability, ease of use, and battery operation.[15] Two measures were used for the assessment of pain: the FLACC behavioral pain assessment scale and Wong–Baker FACES pain rating scale. Many studies support the use of the Wong–Baker FACES pain rating scale as an appropriate self-reported pain assessment tool among children. It shows high sensitivity and validity, is simple to use, and is preferred by pediatric patients in comparison with other pain scales.[16] Existing data also support the use of the FLACC behavioral pain assessment scale across different populations and settings; further, it is reliable and sensitive to procedural pain in young children.[17]Canbulat *et al* also found that distraction cards were efficacious in reducing pain and anxiety during IM injections in children aged between 6 and 11 years. This suggests that distraction cards might be effective in a variety of procedures that induce pain or anxiety, which should be tested in further studies using different age groups.[10]

The present study results showed that during the procedure, children in the distraction cards and kaleidoscope groups experienced less pain than the children in the control group. In previous studies in which distraction cards were used, Inal and Kelleci found that distraction cards helped to reduce pain during blood draw in 6 year olds to 12 year olds.[18] Güdücü Tüfekci *et al* found that kaleidoscope is an effective method to reduce pain related to venipuncture in school-aged children.[19] In a study comparing the effects of distraction cards and kaleidoscope by Canbulat *et al*, distraction cards were more effective than kaleidoscope for reducing pain during phlebotomy.[10] Tork showed that distraction cards effectively decreased children's pain levels during venipunctures. [20]Kunjumon and Upendrababu found that the use of a kaleidoscope was effective in managing pain in children aged 4 to 6 years during intravenous cannulations.[21] Consequently, the results of this study and the other studies show that distraction methods, both face-to-face interaction methods and visual methods, are effective in reducing pain and anxiety levels of children during procedural interventions. The use of distraction methods in procedural interventions contributes to the development of positive attitudes in children as it reduces procedural pain and improves children's adaptation. For this reason, in the scope of atraumatic care practices, pediatric dentists can choose to use distraction methods suitable to each child's age and growth level before and during all painful interventions.

Limitations: However, the study has a few limitations. Blinding of assessor or the participant was not possible due to the nature of the intervention and the number of sample size was less. Hence there are scopes for further designed studies.

CONCLUSION

Active distraction techniques generally result in lower anxiety, pain, and physiological responses (as indicated by lower scores and pulse rates) compared to conventional techniques. However, passive distraction shows intermediate results.

Conflict of Interest: There were no conflict of interest in the study.

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