

Original Research Article

Rubix cube and kaleidoscope-an interesting tool for anxiety management in children

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ABSTRACT

Background: Dental anxiety is a common fear for children undergoing dental treatments. Distraction involves diverting children's attention away from painful stimuli during invasive dental procedures and is the most effective when tailored to child's developmental level. Parents prefer non-invasive techniques over general anaesthesia, sedation, restraint, and hand over mouth. Introducing distraction aids using Rubix cube or kaleidoscope can help in the reduction of dental anxiety during the dental visits. The objective of this study was to compare Rubix cube and kaleidoscope as tools for reducing dental anxiety during the treatment.

Methods: Randomized clinical trial was conducted among 60 children (5-12 years old). They were randomly divided into three groups (20 each): Group A (control group-did not receive anything), group B (received Rubix cube during treatment) and group C (received kaleidoscope during treatment). Chotta Bheem-Chutki scale was recorded prior to the appointment and after the dental treatment. This study demonstrated that patients subjected to Rubix cube and kaleidoscope therapy had a statistically significant reduction in anxiety compared to the control group after the dental treatment.

Results: This study demonstrated that patients subjected to Rubix cube and kaleidoscope therapy had a statistically significant reduction in anxiety compared to the control group after the dental treatment.

Conclusions: Distraction aids like Rubix cube and kaleidoscope during the dental procedure plays an important role in managing dental anxiety in children and can be effectively incorporated into routine clinical practice.

Keywords: Dental anxiety, Rubix cube, Kaleidoscope, Chotta Bheem-Chutki scale

INTRODUCTION

Dental anxiety is fear, anxiety or stress associated with children undergoing dental treatments. Things like needles, drills or the dental setting in general can trigger dental anxiety. Being scared to visit the dentist can result in delaying or avoiding dental treatment. Avoiding the dentist can result in dental disease getting worse, a greater need for emergency care or more complex treatment. It can also feed the underlying problem of dental anxiety. This is known as the 'vicious cycle of dental anxiety'. When dental anxiety is severe and causes irrational fear and avoiding going to the dentist, it can be classified as a dental phobia.¹

Determining dental anxiety in children is of prime importance in the first dental visit as it leaves an impact and influences future behaviour towards dental treatment.² For a pediatric dentist, apart from recognizing dental anxiety in children, adopting techniques to manage the child in a way which incorporates positive attitude in the child for future dental visit plays an important role.² If dental anxiety in pediatric patients is assessed during the first visit, it will not only aid in management but also help to identify patients who are in need of special care to deal with their fear.³

Anxiety exhibited by children during restoration treatment is created by the unusual and sometimes

unpleasant sights, sounds, and sensations of the dental operatory.⁴ Distraction involves diverting children's attention away from painful stimuli during invasive dental procedures and is the most effective when tailored to child's developmental level. Parents prefer non-invasive techniques over general anaesthesia, sedation, restraint, and hand over mouth. Introducing distraction aids using Rubix cube or kaleidoscope can help in the reduction of dental anxiety during the dental visits. This is a research protocol for a study aimed to evaluate and compare the effectiveness of Rubix cube and kaleidoscope to reduce dental anxiety in children aged 5-12 years.

METHODS

All the procedures performed in this study was in accordance with the ethical standards of the institutional research ethical committee.

An informed consent was obtained from the parents or the guardians and an assent form was obtained from the patients before the commencement of the study.

This was a randomised control trial conducted in the department of paediatric and preventive dentistry, M. R. Ambedkar Dental College and Hospital, Bangalore by a single operator during the time period from July 2023 to September 2023. Before beginning with the study, the study design had been approved by the ethical committee of M. R. Ambedkar Dental College and Hospital, Bengaluru, Karnataka, India and a written consent was obtained from patient's parents, with brief dental and medical history along with assent from patient. In this study anxiety was assessed using Chotta Bheem-Chutki scale in children requiring various dental treatments such as restorations, pulpectomy, extractions, etc.

Inclusion criteria

Children aged 5-12 years from both sexes, Frankl behavior rating scale 1 and 2, children without any systemic illness and children whose parents give consent were included in study.

Exclusion criteria

Children aged below 5 and above 12 years, Frankl behavior rating scale 3 and 4, children with allergies and any oral conditions, patients whose parents give a history of systemic illness, physical or intellectual disabilities and children whose parents do not give consent were excluded.

The 60 children included in the study were randomly divided into three groups (20 each): Group A (control group-did not receive anything), group B (received Rubix cube during treatment) and group C (received kaleidoscope during treatment). Chotta Bheem-Chutki

Scale were recorded prior to the appointment and post dental treatment.

Statistical data

The level of significance (p value) was set at $p < 0.05$

Descriptive statistics

Descriptive analysis includes extent of anxiety using mean and standard deviation for each group.

Inferential statistics

Kruskal Wallis test followed by Dunn's post hoc test was used to compare the mean age and values of different Indices b/w 3 groups at different time intervals.

Wilcoxon signed rank post hoc test will be used to compare the mean values of indices b/w different time intervals in each group. Chi square test will be used to compare the gender distribution between 3 groups.



Figure 1: Materials required-Rubix cube and kaleidoscope.



Figure 2: Distraction method using Rubix cube during treatment.



Figure 3: Distraction method using Kaleidoscope during treatment.



Figure 4: Self-assessment by the patient using Chotta Bheem-Chutki scale.



Figure 5: Chotta Bheem-Chutki scale for boys and girls.

Sample size estimation

The sample size for the present study was estimated using GPower software (latest ver. 3.1.9.7; Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany). The sample size estimation was performed at 5% alpha error ($\alpha=0.05$), with an effect size of 0.58 (Based on the findings from the previous literature by Rohlin et al for the mean difference in the anxiety levels depth b/w groups) and the power of the study at 80%, demonstrated that a minimum of 60 samples will be needed for the present study. So, each study group will consist of 20 samples (20 samples $\times$ 3 groups=60 samples).

RESULTS

Group A: control group; group b: Rubix cube group and group c: kaleidoscope group

The mean anxiety scores during pre-treatment period for group a was 2.45 ± 1.57 , group B was 2.55 ± 1.50 and group C was 2.80 ± 1.40 . There was no significant

difference in the mean anxiety scores during the pre-treatment period between 3 groups (Table 1).

The mean anxiety scores during post-treatment period for group A was 1.80 ± 0.89 , group B was 1.10 ± 0.31 and Group C was 1.30 ± 0.47 . There was a significant difference in the mean anxiety scores during the pre-treatment period between 3 groups at $p=0.009$, (Table 2).

Multiple comparison of mean difference between groups revealed that group A showed significantly higher anxiety scores as compared to group B and C and the mean differences were statistically significant at $p=0.002$ and $p=0.03$. However, the mean difference in the anxiety scores between group B and C did not show any significant differences ($p=0.58$). This infers that the mean anxiety scores were significant lesser in group B and C as compared to group A, (Table 3).

In group A, mean anxiety scores demonstrated significantly lesser scores in post treatment period (1.80 ± 0.89) as compared to pre-treatment period

(2.45±1.57) and the mean difference was statistically significant at p=0.02.

In group B, mean anxiety scores demonstrated significantly lesser scores in post treatment period

(1.10±0.31) as compared to pre-treatment period (2.55±1.50) and the mean difference was statistically significant at p=0.001, (Table 4).

Table 1: Comparison of mean anxiety scores using CBC scale during pre-treatment period between 3 groups using Kruskal Wallis test.

Groups	N	Mean	SD	Min	Max	P value
Group A	20	2.45	1.57	1	6	0.60
Group B	20	2.55	1.50	1	6	
Group C	20	2.80	1.40	1	6	

Table 2: Comparison of mean anxiety scores using CBC scale during post-treatment period between 3 groups using Kruskal Wallis test.

Groups	N	Mean	SD	Min	Max	P value
Group A	20	1.80	0.89	1	3	0.009
Group B	20	1.10	0.31	1	2	
Group C	20	1.30	0.47	1	2	

Table 3: Multiple comparison of mean anxiety scores using CBC scale during post-Rx period b/w groups using Dunn's post hoc test.

(I) Groups	(J) Groups	Mean diff. (I-J)	95% CI for the Diff.		P value
			Lower	Upper	
Group A	Group B	0.70	0.24	1.16	0.002
	Group C	0.50	0.04	0.96	0.03
Group B	Group C	-0.20	-0.66	0.26	0.58

Table 4: Comparison of mean anxiety scores using CBC scale between pre and post treatment period in each group using Wilcoxon Signed rank test.

Groups	Time	N	Mean	SD	Mean diff.	P value
Group A	Pre Rx	20	2.45	1.57	0.65	0.02
	Post Rx	20	1.80	0.89		
Group B	Pre Rx	20	2.55	1.50	1.45	0.001
	Post Rx	20	1.10	0.31		
Group C	Pre Rx	20	2.80	1.40	1.50	<0.001
	Post Rx	20	1.30	0.47		

DISCUSSION

Anxiety is usually the most likely response to dental stimuli and is most commonly seen in children during their first dental visit. An anxious child in a dental clinic poses a problem not only for the child, but also for the family and the dentist.⁴ Psychosocial problems caused by deterioration of the dentition may adversely affect people's general well-being and quality of life (QoL).⁶ Determining dental anxiety in children is of prime importance in the first dental visit as it leaves an impact and influences future behavior towards dental treatment.⁷

Distraction is divided into two main categories: passive distraction, which requires the child to remain silent while the dental health care professional is actively

distracting him. Watching movies, listening to music through headphones, reading a book to the child, or telling him a tale are all different forms of passive distraction. On the other hand, active distraction encourages the child to participate in the activities during the procedures. Active techniques include singing songs, compress balls, relaxation, breathing, and playing with electronic devices.⁸

Objective was to clinically evaluate and compare effect of Rubix cube and kaleidoscope on level of anxiety in patients undergoing various dental treatments.

Chotta Bheem-Chutki scale consists of two separate cards, one for boys and the other for girls. Chotta Bheem

cartoon character was chosen to for boys and Chutki cartoon character was selected for girls to depict various emotions. Each card comprises a series of six figures depicting from happy to unhappy and running emotion. The child was asked to choose the face they could relate to at that moment. A score of one was given to a happy face and six to running.⁷

In general, behavioral treatments have proven better than placebo or no treatment controls in reducing dental anxiety and returning patients to dental treatment.⁹

Distraction as a preoperative anxiety management technique can benefit pediatric patients undergoing elective surgery, and healthcare personnel can apply preoperatively to alleviate preoperative anxiety in pediatric patients.¹⁰

A study conducted Sadana et al suggested that CBC scale can be used as a new tool for dental anxiety assessment in children.² However in the study that we performed there showed a significant change in the behaviour post-treatment when subjected to either Rubix Cube or Kaleidoscope during the treatment.

Limitations

The children in our study group were randomly assigned into the different groups. We did not take into consideration or classify the children based on their appeal or ability. Further studies can be conducted based on evaluation of each child.

CONCLUSION

The present study demonstrated that Rubix cube and Kaleidoscope plays a significant role in anxiety reduction before and during the dental treatment procedure and a positive approach towards managing dental anxiety in children as indicated by Chotta Bheem-Chutki scale. It can be effectively incorporated during the routine clinical practice.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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