

# Effectiveness of Cognitive Behavioral Play Therapy and Audiovisual Distraction for Management of Preoperative Anxiety in Children

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## ABSTRACT

**Background:** Children with high level of preoperative anxiety during their visit to dental office are more likely to develop maladaptive behavior postoperatively. First dental experience is always critical in molding child's attitude toward dentistry. Various behavior management methods are being employed during dental treatment to complete anticipated treatment in children.

**Aim:** The aim of the study was to evaluate the effectiveness of cognitive behavioral play therapy and audiovisual distraction for management of preoperative anxiety in children.

**Materials and methods:** A total of 45 children of age 6–10 years with moderate-to-severe anxiety were allocated into three groups: group I—cognitive behavioral play therapy (CBT), group II—audiovisual (AV) distraction, and group III—tell-show-do technique (control group). Children in the CBT group were allowed to play with building blocks, asked to draw a picture and then showed a modeling video of co-operative child undergoing dental treatment. Children in group II were subjected to passive distraction with audiovisual aids, whereas group III (control) children were managed with the conventional TSD technique. Baseline and postintervention objective and subjective anxiety scores were measured with a pulse oximeter and facial image scale (FIS), respectively.

**Results:** A statistically significant reduction in the subjective and objective anxiety scores is observed in all the three groups ( $p = 0.001$ ) in both intragroup and intergroup comparisons. On intergroup comparison, the reduction in subjective and objective anxiety scores was higher in CBT ( $p = 0.0$ ) than in AV distraction and TSD groups ( $p = 0.05$ ).

**Conclusion:** Active distraction with cognitive behavioral play therapy is found to be more effective in reducing the preoperative anxiety in children compared to audiovisual distraction and tell-show-do technique.

**Clinical significance:** Identification and management of preoperative anxiety in children is most critical for successful dental treatment. Active distraction is an effective psychological approach for behavior management in anxious children.

**Keywords:** Audiovisual distraction, Cognitive behavioral therapy, Dental anxiety, Pediatric patients.

*International Journal of Clinical Pediatric Dentistry* (2019): 10.5005/jp-journals-10005-1661

## INTRODUCTION

Anxiety and fear are normal adaptive psychological responses to threat but are unpleasant. Anxiety is a variant of fear. Children during their first-dental visit are frequently found to be anxious and frightened owing to exposure to dental equipments and new persons. Sometimes this causes a negative impact on child's psychology, making unpleasant the dental appointment. Children with a high level of preoperative anxiety are more likely to develop maladaptive behavior postoperatively.<sup>1</sup> First dental experience of children is always critical in sculpting positive attitude toward dentistry and also in completion of anticipated treatment.

Several behavioral management approaches have been practiced to reduce distress during dental treatment, such as tell-show-do, distraction, modeling, hypnotism, and pharmacological means. Tell-show-do (TSD) is an elementary method used in behavior management of children. It dictates that before any procedure is done, the child is explained what is going to be done using euphemisms and then showing simulation of what exactly happens with the intended procedure. But this may not completely allay the anxiety when exposed to a real clinical environment.<sup>2</sup>

Distraction of children provides effective relaxed experience during painful dental procedures. Cognitive behavioral therapy (CBT) is an active form of distraction, wherein children are

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**How to cite this article:** Rajeswari SR, Chandrasekhar R, Vinay C, *et al.* Effectiveness of Cognitive Behavioral Play Therapy and Audiovisual Distraction for Management of Preoperative Anxiety in Children. *Int J Clin Pediatr Dent* 2019;12(5):419–422.

**Source of support:** Nil

**Conflict of interest:** None

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encouraged to involve in activities that calm them from dental anxiety. Passive distraction includes audiovisual (AV) distraction, wherein children remains quiet and get involved in visual and auditory scenes.<sup>3</sup>

Available literature is sparse to demonstrate the effectiveness of distraction methods in managing preoperative anxiety in children. Hence, a clinical study was carried out with an aim to test the effectiveness of cognitive behavioral play therapy, audiovisual

distraction, and tell-show-do technique in allaying preoperative anxiety in children in dental office.

## MATERIALS AND METHODS

This randomized clinical study design included 45 children (aged 6–10 years) from the outpatient Department of Pediatric dentistry. Ethical clearance was obtained from institutional ethical review committee (VDC/IEC/2016/31) and the trial is registered with Clinical Trials Registry of India (CTRI/2018/03/019171). The purpose of the study was explained and the informed consent was obtained from parents or guardians.

Children with moderate to severe anxiety during their first dental visit requiring dental treatment were included. Their preoperative anxiety level was evaluated using modified dental anxiety scale (MDAS). Selected children were divided into three groups consisting 15 in each by simple random sampling by computer generated numbers.

Children in group I were subjected to active distraction with CBT. They were allowed to play with building blocks, asked to draw a picture, and color it. Then, in the modeling phase, a video of cooperative child undergoing dental prophylaxis and topical fluoride therapy was shown. Children in group II were subjected to passive distraction with audiovisual aids. They were allowed to watch a cartoon film of their choice for a period of 10 minutes, whereas children in group III were managed with conventional TSD.

To understand the effectiveness of interventions, we measured objective anxiety signs with a pulse oximeter and subjective anxiety with Facial Image Scale at baseline and postintervention.

The obtained data was statistically analyzed using parametric tests such as paired “*t*” test and one-way ANOVA for objective measure of anxiety since pulse rate is a continuous data. Nonparametric tests such as Wilcoxon sign rank test and Mann–Whitney *U* test were used for subjective measure since the data is ordinal.

## RESULTS

After intervention with CBT (group I), a significant reduction ( $p = 0.001$ ) in objective anxiety scores is observed (Table 1), whereas a subjective anxiety score of 1 (very happy) was marked by 80% of children and score 2 (happy) was marked by 20% of children. When these scores are compared with baseline scores, the difference is found to be statistically significant ( $p = 0.001$ ) (Table 2).

In the AV distraction group, postintervention objective anxiety scores showed a significant reduction ( $p = 0.001$ ) (Table 1), whereas a subjective anxiety score of 1 (very happy) was marked by 26.7% of children, score 2 (happy) was marked by 46.7% of children, and score 3 (normal) by 26.7% of children. On comparing these scores with baseline scores, the difference is found to be statistically significant ( $p = 0.001$ ) (Table 2).

After intervention with TSD (group III), a significant reduction ( $p = 0.001$ ) in objective anxiety scores is observed (Table 1), whereas a subjective anxiety score of 2 (happy) was given by 53.3% of children and score 3 (normal) was marked by 46.7% of children. When these scores are compared with baseline scores, the difference is found to be statistically significant ( $p = 0.001$ ) (Table 2).

On intergroup comparison of postintervention scores with CBT and AV distraction, a greater reduction of objective and subjective anxiety scores in CBT is observed than in the AV distraction group ( $p = 0.002$ ) (Tables 3 and 4). A subjective score of 1 (very happy) was given by 80% of children in the CBT group and 26.7% of children in the AV distraction group.

On comparison of postintervention scores between CBT and TSD, a significant difference in objective anxiety and subjective scores is observed in CBT than in the TSD group ( $p = 0.001$ ) (Tables 3 and 4). A subjective score of 1 (very happy) was given by 80% of children in the CBT group and none in the TSD group.

On intergroup comparison of postintervention scores with AV distraction and TSD, a greater reduction in objective and subjective anxiety scores is observed in the AV distraction group than TSD ( $p = 0.05$ ) (Tables 3 and 4). A subjective score of 1 (very happy) was given by 26.7% of children in the AV distraction group and none in the TSD group.

## DISCUSSION

Anxiety is a human reaction to any unknown situation. It is an emotional state that occurs following frightening stimuli, which sometimes is not even recognizable. The level of anxiety is influenced by many factors such as temperament, age, gender, socioeconomic status, and the role of parents.<sup>4</sup>

Exposure to dental procedures is reported as the fifth-most common reason for anxiety.<sup>5</sup> Shim et al. reported that in US population more than 80% children had fear for dental treatment and 20% children avoid the dentist due to fear.<sup>6</sup> The prevalence of anxiety to dental treatment is reported to be 24.5% among 5–10-year-old Indian children.<sup>7</sup> It was noticed that 57.2% of children exhibit anxiety before the start of dental procedures and 46.2% of children were anxious during the procedures.<sup>8</sup> The increase in preoperative anxiety makes the child uncooperative and poses a difficulty in performing dental treatment. Usually children are more anxious during waiting period prior to treatment and this time can be utilized for behavioral management to minimize anxiety.

Several behavior management techniques such as communication, modeling, TSD, voice control, and positive reinforcement are being practiced. Distraction is an effective technique where children are distracted away from the stimuli that evokes anxiety.<sup>9</sup> Audiovisual distraction is a passive form with involvement of hearing and seeing sensations, whereas playing game is an active distraction method involving kinesthetic

**Table 1:** Intragroup comparison of mean values of objective anxiety levels in three different groups

Groups	Time of interval	Mean	SD	Mean difference	<i>t</i> value	<i>p</i> value
Group I (CBT)	Baseline	93.33	4.482	20.333	12.32	0.001*HS
	Postintervention	73.00	4.765			
Group II (AV distraction)	Baseline	94.80	5.101	13.966	7.721	0.001*HS
	Postintervention	80.93	5.023			
Group III (TSD)	Baseline	94.13	4.223	10.200	9.459	0.001*HS
	Postintervention	83.93	3.888			

Paired *t* test, \*HS, highly significant

**Table 2:** Intragroup comparison of proportions of subjective anxiety scores in three different groups

Groups	FIS scores	Baseline scores %	Postintervention scores %	Wilcoxon signed rank test value	p value
Group I (CBT)	Score 1	0 (0)	80 (12)	-3.460	0.001*HS
	Score 2	0 (0)	20 (3)		
	Score 3	26.7 (4)	0 (0)		
	Score 4	46.7 (7)	0 (0)		
	Score 5	26.7 (4)	0 (0)		
Group II (AV distraction)	Score 1	0 (0)	26.7 (4)	-3.571	0.001*HS
	Score 2	0 (0)	46.7 (7)		
	Score 3	26.7 (4)	26.7 (4)		
	Score 4	46.7 (7)	0 (0)		
	Score 5	26.7 (4)	0 (0)		
Group III (TSD)	Score 1	0 (0)	0 (0)	-3.272	0.001*HS
	Score 2	0 (0)	53.3 (8)		
	Score 3	40 (6)	46.7 (7)		
	Score 4	46.7 (7)	0 (0)		
	Score 5	13.3 (2)	0 (0)		

Wilcoxon signed rank test, \* HS, highly significant

**Table 3:** Intergroup comparison of mean difference in postintervention objective anxiety levels

Pair-wise comparison		Mean values	Mean difference	Std. error	p value
Group I (CBT) vs group II (AV distraction)	CBT	73.00	7.933	1.674	0.002 **HS
	AV	80.93			
Group I (CBT) vs group III (TSD)	CBT	73.00	10.933	1.674	0.001 **HS
	TSD	83.93			
Group II (AV distraction) vs group III (TSD)	AV	80.93	3.00	1.674	0.05 *S
	TSD	83.93			

One way ANOVA, \*\*HS, highly significant; \*S, significant

**Table 4:** Intergroup comparisons of postintervention subjective anxiety scores

Pair-wise comparison	FIS scores	Postintervention scores		Mann-Whitney U test value	p value
		CBT %	AV distraction %		
Group I (CBT) vs group II (AV distraction)	Score 1	80 (12)	26.7 (4)	46.500	0.002 **HS
	Score 2	20 (3)	46.7 (7)		
	Score 3	0 (0)	26.7 (4)		
	Score 4	0 (0)	0 (0)		
	Score 5	0 (0)	0 (0)		
Group I (CBT) vs group III (TSD)	Score 1	80 (12)	0 (0)	12.000	0.001 **HS
	Score 2	20 (3)	53.3 (8)		
	Score 3	0 (0)	46.7 (7)		
	Score 4	0 (0)	0 (0)		
	Score 5	0 (0)	0 (0)		
Group II (AV distraction) vs group III (TSD)	Score 1	26.7 (4)	0 (0)	74.000	0.05 *S
	Score 2	46.7 (7)	53.3 (8)		
	Score 3	26.7 (4)	46.7 (7)		
	Score 4	0 (0)	0 (0)		
	Score 5	0 (0)	0 (0)		

Mann-Whitney U test, \*\*HS, highly significant; \*S, significant

sensation (physical movements) in addition to hearing and seeing.<sup>10</sup>

The study population is children of age 6–10 years visiting a dentist for the first time with higher dental anxiety due to social

fear, fear of injury, or exposure to a new environment. Anxiety is a multi-dimensional phenomenon consisting of behavioral, psychological, and physiological components.<sup>11</sup> Identifying the factors responsible for anxiety and measuring it is quite tricky. We

considered an objective assessment of pulse rate, a physiological sign of anxiety. When children are subjected to anxious situations, there will be increased corticoid release, causing increase in heart rate and systolic blood pressure.<sup>11</sup> Behavioral and psychological components were measured with FIS, which is a self-report scale that provides an immediate state of emotional response toward dental treatment. It has high reliability and validity, and is suitable for young children.<sup>12</sup>

Observations of the study revealed that CBT, AV, and TSD are effective in reducing preoperative anxiety in children; however, distraction methods are found to be more effective. Distraction methods completely divert child's attention away from clinical setting, whereas in TSD the child is exposed directly to clinical environment, which might make the child more anxious. Similar findings are reported by Navit et al. and Khandelwal et al., wherein they found that AV distraction was more effective than TSD.<sup>3,13</sup>

We found that active distraction CBT is more effective compared to passive AV distraction. Children with anxiety most often have negative thoughts and views about dental treatment. Cognitive treatment strategies enhance control over such negative emotions by diverting child's focus from his or her concerns about feared condition resulting in lower anxiety. Similar observations were made by Allani et al., where they reported that an active distraction with mobile phone video gaming is more effective compared to passive distraction with audiovisual aids.<sup>10</sup>

Identification and management of preoperative anxiety in children is the most critical aspect in delivering successful dental treatment. Usually children are more anxious during waiting period prior to treatment and this time can be utilized for behavioral management to minimize anxiety. Our observations suggest that distraction methods work better for managing anxious children compared to conventional tell-show-do technique alone.

## CONCLUSION

Active distraction with cognitive behavioral play therapy is found to be more effective in reducing the preoperative anxiety in children compared to audiovisual distraction and tell-show-do technique. Recognizing children with preoperative anxiety is critical, since it causes behavior disruption during dental treatment. Administering active and passive distraction methods could be more useful in allaying preoperative anxiety in dental office.

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