Frontiers in Dentistry

The Effectiveness of Cognitive-Behavioral Intervention on Dental Anxiety During Pulpotomy in 7-10 Year-Old Children: A Clinical Trial

Marzieh Shokravi[1], Mohammadreza Maaboudi[2], Ali Amiri[3], Monirsadat Mirzadeh[4], Razieh Jabbarian[5*]

1. Department of Pediatric Dentistry, Faculty of Dentistry, Qazvin University of Medical Sciences, Qazvin, Iran
2. Student Research Committee, Qazvin University of Medical Sciences, Qazvin, Iran
3. Office of Counseling and Mental Health, Student and Cultural Deputy, Qazvin University of Medical Sciences, Qazvin, Iran
4. Community Medicine, Metabolic Diseases Research Center, Research Institute for Prevention of Non-Communicable Diseases, Qazvin University of Medical Sciences, Qazvin, Iran
5. Department of Pediatric Dentistry, Dental Caries Prevention Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

Article Info

Article type:
Original Article

Article History:
Received: 29 Jul 2022
Accepted: 17 Mar 2023
Published: 26 Aug 2023

**** Corresponding author:***

Department of Pediatric Dentistry, Dental Caries Prevention Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

Email: r_jabbarian@yahoo.com

ABSTRACT

Objectives: Dental anxiety is a common phenomenon experienced by children in the dental setting. However, there is limited research on the effectiveness of cognitive-behavioral interventions in managing this anxiety. Therefore, the aim of this study was to evaluate the impact of a cognitive-behavioral psychologic intervention on dental anxiety in children.

Materials and Methods: A total of thirty children, aged 7-10 years, underwent prophylaxis and fluoride therapy. The baseline anxiety levels of the children were determined using the Modified Child Dental Anxiety Scale (MCDAS). The intervention group (N=15) received two 30-minute sessions of cognitive-behavioral exercises. Additionally, a short film demonstrating a cooperative child undergoing pulpotomy was created and parents were instructed to show it to their children at home. During the treatment session, the exercises were reinforced at each step, and the MCDAS questionnaire was administered again. The children's behavior was also assessed using the Venham Clinical Cooperation Scale. Independent t-test, Mann-Whitney, chi-square, and Pearson's correlation coefficient were used for statistical analysis and $P<0.05$ was considered statistically significant.

Results: Postoperatively, the MCDAS score in the intervention group was significantly lower compared to the control group. Notably, the intervention group demonstrated a downward trend in anxiety scores, while the control group showed an increase ($P<0.001$).

Conclusion: Cognitive-behavioral interventions were found to be successful in decreasing dental anxiety in children undergoing pulpotomy. These interventions can be successfully implemented in clinical settings.

Keywords: Dental Anxiety; Psychology, Child; Pulpotomy

➢ **Cite this article as:** Shokravi M, Maaboudi M, Amiri A, Mirzadeh M, Jabbarian R. The Effectiveness of Cognitive-Behavioral Intervention on Dental Anxiety During Pulpotomy in 7-10 Year-Old Children: A Clinical Trial. *Front Dent*. 2023:20:32.

INTRODUCTION

Dental anxiety is a response to stressors in the dental setting, and refers to apprehension due to possible pain and discomfort that may be experienced during dental procedures; even without previous dental experience [1]. Factors associated with dental anxiety and non-cooperative behaviors of children in the dental environment include demographic status, mood, pain during treatment, parental anxiety, child awareness of dental problems, coping skills, and previous medical experiences [1,2].

Dental anxiety in children can impede regular dental visits for check-ups or completion of a treatment procedure, and can adversely affect their oral health and quality of life. It also leads to an increase in the duration and cost of treatments, and can make dental procedures a frustrating experience for both pediatric patients and dental clinicians, and adversely affect the outcome of treatment as well. Thus, the first step in treatment of pediatric dental patients with anxiety would be to identify and quantify their anxiety by precise screening tools [2].

There are two primary approaches to detect and measure dental anxiety in children [3]. The first method involves observing the behavior and reactions of children by dental professionals during dental procedures. This is typically done by using scales such as the Venham Clinical Cooperation Rating Scale (VCCS) to assess the child's behavior. The second method relies on self-reporting by children themselves, where they rate their level of dental anxiety using psychometric scales such as the Modified Child Dental Anxiety Scale (MCDAS). [3].

VCCS is a 6-choice scale and a type of behavioral questionnaire that is used to identify observable behaviors with a score of 0 (fully cooperative) to 5 (non-cooperative and need of restraint) [4]. MCDAS is a psychological questionnaire to measure the level of dental anxiety in children and has 8 questions quantifying child dental anxiety by a 5-point Likert scale (Maximum: 40 and minimum: 8). Scores above 8 indicate the presence of clinical anxiety and scores above 31 indicate phobia disorder and very severe dental anxiety. The reliability of the Persian translation of the MCDAS questionnaire and its validity have been previously confirmed [5].

Given that dental anxiety is an example of situational anxiety, and can be affected by trait anxiety, which is a personality trait, questionnaires are used to screen children with anxiety disorders. The Screen for Child Anxiety Related Disorders (SCARED) is another questionnaire employed to assess anxiety, which has 41 questions and distinguishes anxiety disorders, chaotic behavioral disorders and mood disorders. Children with a score of 25 and above have anxiety disorders. SCARED has also been validated for use in the Iranian population, and has optimal validity and reliability [6].

Several techniques are available to control dental anxiety including pharmaceutical and psychological approaches. The cognitive behavioral approach is among the psychological interventions used in this context [7]. Dental clinicians can help patients feel more at ease by utilizing techniques that target the physiological excitation caused by anxiety, unfamiliarity with the environment, negative expectations, and a sense of insecurity [8]. These techniques may include relaxation methods such as deep breathing or guided imagery that can help calm the patient's body and mind. Additionally, clinicians can provide reassurance and promote rational thinking to create positive expectations and a sense of familiarity and security with the dental environment [8].

Cognitive-behavioral interventions are a modern psychological approach that focus on retraining methods and changing behavior through cognitive processes. These methods aim to modify thought and behavioral patterns to influence a person's feelings and behavior. The underlying principle of this approach is that irrational thoughts and behavior contribute to psychological disturbances. [9]. Therefore, this study aimed to assess the effect of cognitive behavioral interventions on the dental anxiety level of 7-10-year-old dental patients undergoing pulpotomy. The null hypothesis was that cognitive behavioral interventions would have no significant effect on dental anxiety of 7-10-year-old dental patients during pulpotomy.

MATERIALS AND METHODS

This study was conducted at the School of Dentistry, Qazvin University of Medical Sciences between January and May 2019. The study was approved by the ethics committee of this university (IR.QUMS.REC.1397.161), and registered in the Iranian Registry of Clinical Trials (IRCT20181024041441N1).

Trial design:

A randomized clinical trial was designed in which the intervention group received cognitive behavioral intervention before pulpotomy while the control group underwent pulpotomy with no prior intervention. The results were reported in accordance with CONSORT guidelines (Figure 1). Interim analyses were

not performed and there were no stopping guidelines.

Participants, eligibility criteria, and settings:

The inclusion criteria were children aged 7-10 years old, presence of at least one mandibular primary molar requiring pulpotomy as well as an inferior alveolar nerve block injection, and presence of clinical dental anxiety according to the MCDAS. Exclusion criterion consisted of mental disorders, systemic conditions, genetic defects, history of previous dental treatment, anxiety disorders according to the SCARED questionnaire, and inability to learn and/or implement psychological relaxation techniques. The sample consisted of thirty eligible children presenting to the dental clinic of Qazvin University of Medical sciences for dental treatment.

Interventions:

After obtaining written informed consent from the parents/guardians, the Farsi version of SCARED questionnaire was filled out by the parents/guardians, which included 41 questions. Children acquiring a score of ≥25 were excluded since they constituted the diagnosis of an anxiety disorder [6].

In the first session, the children received dental prophylaxis along with fluoride therapy and

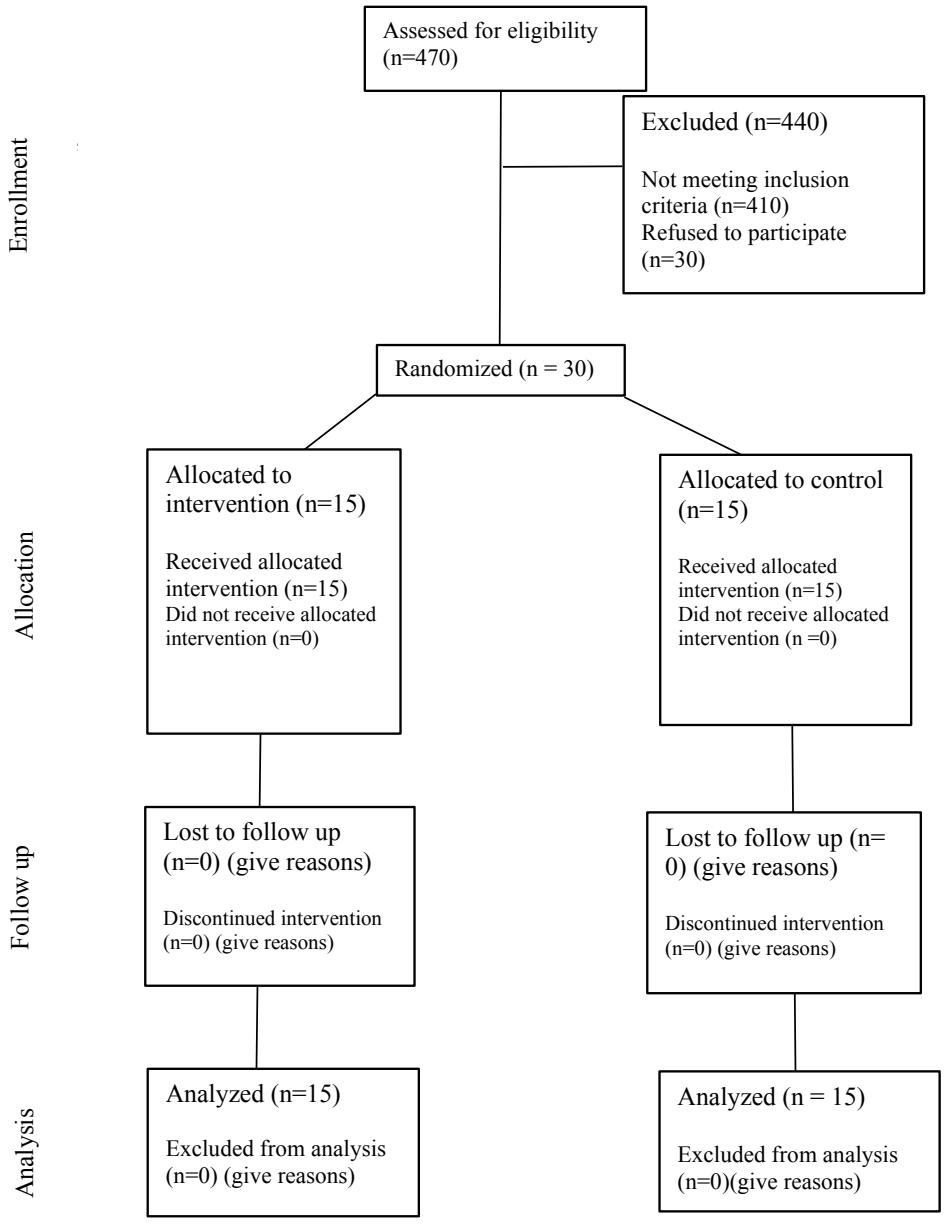

Figure 1. Consort flow diagram of the study

their baseline dental anxiety level was measured using the Persian version of MCDAS, which was filled out by the children. This questionnaire has 8 questions, and indicates the concerns of children regarding specific dental procedures such as visiting a dentist, dental examination, dental cleaning, polishing and prophylaxis, anesthetic injection, tooth restoration, tooth extraction, lying down on a dental chair, and inhalation sedation. Only children with clinical dental anxiety, and not dental phobia (scores 9 to 31), were enrolled in this study. The decayed, missing, filled tooth (dmft) score was also determined, and the children were randomized into intervention and control groups (N=15). The intervention group received cognitive behavioral intervention within 2 sessions of 30 minutes each by a dental student who had been trained by a psychologist within several sessions. The interventions were as follows:

Relaxation technique:

It included breathing according to the Benson's relaxation technique [10], progressive contraction and relaxation of muscles, a combination of both, and relaxation along with mental imagery.

Breathing technique:

The children were requested to sit down, close their eyes, breathe in slowly, let the air in, and blow the stomach like a balloon. Then gently press on the stomach with hands and let the air out.

Progressive muscle relaxation:

Spaghetti hands: The children were told: "Relax your body, breathe as I taught you. Contract your muscles as strong as you can, count to 10, and then take a deep breath, hold your breath, and then release it while telling yourself to calm down. At the same time, quickly relax your muscles until your arms fall down". The children were then requested to close their eyes, breathe slowly, and then imagine a pleasant scene.

Iron feet: The children were requested to focus on their feet: "Stretch your feet, bend the big toe towards the head to tighten the muscles in the front of the leg. While the foot is stretched, lift it a few inches off the ground".

Contracting stomach like a stone: "Loosen and relax your hands and feet, now contract your stomach as if you are going to be punched in the stomach. Count to 10, breathe in, and then breathe out while repeating the word CALM, and relax your stomach".

Inhibition of thoughts:

After instructing the children on how to relax their bodies, they were taught to remove negative thoughts from their mind.

Advanced muscle relaxation:

This technique includes contraction and relaxation of different muscles. The children were asked to close their eyes, and relax their body [10].

The dental student in charge of the exercises first practiced and rehearsed them with a child and the entire process was videotaped and given to the parents. Parents were requested to show the short film to their children at home on a daily basis for one week prior to the pulpotomy session. Also, a cooperative child undergoing pulpotomy was videotaped and after the approval of a psychologist, the parents were requested to show the short film to their children at home on a daily basis. The parents were encouraged to practice all the above-mentioned exercises with their children at home. Also, the children in the intervention group were reminded to repeat these exercises during the pulpotomy procedure whenever signs and symptoms of anxiety or disruptive behavior appeared.

The control group only received the conventional behavioral control techniques and did not receive any of the abovementioned interventions. All the steps of the pulpotomy procedure were performed by a pediatric dentist in both groups. After completion of the procedure, the MCDAS questionnaire was filled out again by the children. The treatment process was also videotaped. The films were evaluated by two pediatric dentists and they assessed and scored the clinical behavior and cooperation of children during anesthetic injection and pulpotomy procedures according to the VCCS.

Outcomes:

The objective of this study was to assess the effect of cognitive behavioral intervention on the dental anxiety and behavior and cooperation of 7-10-year-old dental patients during pulpotomy.

Sample size calculation:

The sample size was calculated as 15 in each

group assuming alpha=0.05, beta=0.2, and study power of 80% according to the below formula [29]:

$$n = \frac{\left(z_{1-\frac{\alpha}{2}} + z_{1-\beta}\right)^2 \left(\sigma_1^2 + \sigma_2^2\right)}{\left(\mu_1 - \mu_2\right)^2}$$

Randomization:

The children were randomly assigned into two groups using the simple randomization method and assignment sequences were recorded on the supplied form as either intervention or control, before research initiation. Randomization was performed using random allocation software.

Blinding:

Blinding of the examiner to the group allocation of children was not possible since the examiner had to remind the relaxation techniques to children during the procedure. The statistician who analyzed the data was blinded to the group allocation of children.

Statistical analysis:

Independent t-test was applied to compare SCARED scores, and Mann-Whitney was used to analyze the difference of MCDAS score between the two groups at baseline and after the intervention. Chi-square test, and Pearson's correlation coefficient were used to analyze and compare other variables such as gender and VCCS score between the two groups. P<0.05 was considered statistically significant.

RESULTS

Participant flow:

The sample consisted of 30 children in two groups of 15, including 8 males and 7 females in each group (P=1 for gender distribution). The mean age was 7.53 in the intervention and 7.46 in the control group with no significant difference (P=0.53). There was no significant difference in the level of education of the mother (P=0.13) or father (P=0.48) or dmft (P=0.85) between the two groups. Also, difference in the SCARED score was not significant between the two groups at baseline (P=0.8).

Harms:

No patients were harmed during the study.

Group analyses:

Primary outcome: MCDAS scores were not significantly different between the two groups at baseline (P=0.12). After the intervention, the mean dental anxiety score (MCDAS) was significantly lower in the intervention group compared with the control group (P<0.001). Also, in comparison with baseline, the trend of change in MCDAS score was descending in the intervention (-5 [median: -8, percentile: -3]) and ascending (4 [median: 0, percentile: 6]) in the control group, and the difference in the trend of change was significant between the two groups (P<0.001).

Before treatment, the mean MCDAS score in boys was higher than girls in the intervention group but the difference was not significant (P=0.2). However, after treatment this difference was significant (P=0.01). The control group demonstrated similar changes with insignificantly higher values in boys before treatment (P=0.16), which became significant after treatment (P=0.01).

Secondary outcome: Within-group comparison of the behavior of girls and boys using VCCS score showed no significant difference in any of the groups during pulpotomy (P=0.4 and P=0.3, respectively) or during anesthetic injection (P=0.3 and P=0.9, respectively). The majority of children in both groups had a VCCS score of 0 during anesthetic injection and pulpotomy, and were classified as having a relaxed behavior. In the intervention group, the mean VCCS score was significantly higher during injection, compared to that recorded during the procedure (P=0.04), while this difference was not significant in the control group (P=0.12). As shown in Table 1, comparison of the VCCS scores between the two groups showed no significant difference (P>0.05). No significant correlation was noted between the MCDAS score before and after treatment. Similarly, there was no correlation between the VCCS scores obtained during treatment (P>0.05) (Table 2).

Table 1. Comparison of the behavior of participants in the two groups according to the Venham clinical cooperation rating scale (VCCS)

VCCS score	Groups	
	Intervention N(%)	Control N(%)
0	8(53.3)	8(53.3)
1	7(46.7)	5(33.3)
2	0	2(13.3)

Table 2. Comparison of the anxiety score of the participants and the relationship with behavior in the two groups according to Venham clinical cooperation rating scale

Groups	MCDAS	VCCRS scores	N	Mean±Standard deviation	P
Intervention	Before treatment	0	8	17.7±5	0.7
		1	7	17± 4.5	
	After treatment	0	8	12.7± 2.8	0.5
		1	7	11.7± 3.7	
Control	Before treatment	0	8	15.3±4.2	0.2
		1	5	12.6±3.2	
		2	2	18.5±3.5	
	After treatment	0	8	18.1±4	0.08
		1	5	15.6±5.4	
		2	2	25±4.2	

MCDAS: Modified Child Dental Anxiety Scale; VCCRS : Venham Clinical Cooperation Rating Scale

DISCUSSION

Dental anxiety is a common problem in dental office settings which elicits emotional, cognitive, behavioral, and physical responses in patients, and can prevent seeking dental treatment [1,2]. This study assessed the effect of cognitive behavioral intervention on the dental anxiety of 7-10-year-old patients undergoing pulpotomy. The results revealed that the mean MCDAS score in the intervention group was significantly lower than that of the control group after treatment ($P<0.001$), which indicates the optimal efficacy of the implemented intervention for reduction of dental anxiety in pediatric dental patients.

In the present study, both dental anxiety and cooperation (behavior) of patients during anesthetic injection and pulpotomy were evaluated because assessment of the behavior of children alone is not sufficient to determine the level of dental anxiety. Behavioral problems in the dental environment are defined as external behavioral issues related to the dental situation. Children with this problem may or may not show behavioral management problems in other environments [3]. Differentiation between dental anxiety and behavioral problems is important. Behavioral problems are more easily identified by clinicians, while dental anxiety can include a wide range of behaviors from uncooperative to very cooperative during treatment, depending on the personal characteristics of the patients and the etiology of the dental anxiety [10]. Evidence shows that there is an overlap between dental anxiety and behavioral problems in the dental office and only 27% of children with behavioral problems simultaneously show signs and symptoms of dental anxiety. However, 61% of children with dental anxiety exhibit behavioral problems in dental office settings [11].

If dental clinicians only focus on the cooperation and behavior of children during dental procedures, dental anxiety may be overlooked. Moreover, although behavioral problems during dental procedures are a characteristic feature of dental anxiety, they may be related to other disorders such as dental phobia [12]. On the other hand, according to the 5-component model of anxiety, different aspects of dental anxiety include a person's undesirable thoughts, feelings, physical symptoms, behaviors, and situational factors (such as parental anxiety) [12,13]; that is why the questionnaires that only focus on one component of dental anxiety are not useful for this purpose [13].

In general, there are three ways to assess a child's behavior and anxiety, including direct observation of behavioral responses in the dental field by the therapist or researcher, completion of a questionnaire by parents, and personal reports completed by the child [13,14]. Clinical observation alone is not reliable because there is a moderate to weak agreement between dentist scoring compared to child scoring for anxiety [14]. While children with dental anxiety may show negative emotional and behavioral reactions to dentistry, some children do not show a clear manifestation of anxiety, and sometimes

behavioral reactions that are interpreted as manifestations of anxiety can be the result of factors such as behavioral management problems. On the other hand, anxiety measurement questionnaires completed by parents have limitations. Parents often have personal anxiety and the questionnaire would basically reflect their anxiety instead of the child's. Additionally, there is only a moderate agreement between the child's scoring and that of the parents' [15].

Therefore, to determine dental anxiety we applied the child's 'personal reporting technique' as the most valid method of assessment, using the MCDAS questionnaire. Since existing questionnaires cannot assess the behavioral and physical reactions that may be related to dental anxiety, we also videotaped the behavior of children during the procedure, which was later scored by two observers using the VCCS.

Selection of 7-10-year-old children for this study was due to the fact that children in this age range can reliably report all their health-related issues and understand the questions of the questionnaire [13,16]. In order for children to be able to complete the options of self-report questionnaires, the questionnaire must show developmental validity [17] in the sense that the child must understand and answer the questions [18].

In both intervention and control groups, the majority of children had a VCCS score of zero during treatment and injection which refers to relaxed behavior. Comparison of VCCS scores during treatment between the two groups did not show a significant difference and also when comparing scores of behavior during injection, no significant difference was observed between the groups. However, the mean dental anxiety after treatment in the intervention group showed a significant decrease compared to the control group. Boys showed significantly higher dental anxiety after treatment in both groups, which was different from the findings of Katanec et al. [19] and Kothari and Gurunathan [20] who reported higher level of anxiety in girls, and the findings of Ghasem Pour et al. [21] who found no correlation between stress score and gender.

In the present study, children had no previous experience of dental treatment. Anxiety is a vague feeling that does not require previous experience of the expected situation. In cases of dental anxiety, there is a sense of worry about possible pain, discomfort, or danger during treatment, even without a history of previous experience. Some studies have also shown a strong association between dental anxiety and negative dental experience [22]. Some studies reported the highest and lowest score of dental anxiety to be related to tooth extraction/anesthetic injection and visual examination of teeth by the dentist/inhalation sedation, respectively [23,24], which may be due to the traumatic nature of the former [25].

We used a combination of interventions including the breathing technique, Benson's relaxation method, mental imagery, and showing a short film of a cooperative child receiving dental treatment. Using this combination of interventions has advantages like easy learning and not requiring advanced equipment. Also, all of the selected interventions are part of the cognitive behavioral intervention and can greatly help resolve dental phobia and anxiety [24]. Cognitive-behavioral interventions are a general name for psychotherapy practices based on learning and cognitive psychology [26]. Cognitive psychology is used to help children identify negative thoughts through behavioral exercises. Learning psychology is one of the principles of classical conditioning which uses exposures and silence to reduce anxiety [27]. These interventions reinforce targeted behaviors such as 'opening the mouth while sitting on the unit' through verbal and physical practice. In addition, the principles of observational learning through participant modeling (the therapist demonstrates desirable behavior) or through modeling with film (showing a video of a child performing desirable behavior) are used. Also, the child learns coping strategies such as controlled breathing, relaxation, and self-awareness to reduce physical reactions to stress [27]. This combination of interventions empowers the children and gives them a sense of being in charge. The current results indicated optimal efficacy of the combined interventions for significant reduction of dental anxiety in children, which was in agreement with the results of previous studies that used cognitive behavioral intervention for this purpose. Abolghasemi et al. [28] used cognitive

behavioral intervention (distraction using number registration device/mental imagery/ positive incentives) and showed that it significantly decreased fear, anger, pain, and pulse rate of children during dental procedures. Kebriaee et al. [29] evaluated the effects of cognitive behavioral interventions (playing in a playroom for 4 minutes and showing a film of a happy child receiving dental prophylaxis, Benson's respiration technique for 4 minutes and use of positive sentences for 8 minutes prior to treatment) on dental anxiety of 3 to 6.5-year-old children. Despite some differences in methodology and using a different scale, they reported a reduction in anxiety of children, which was similar to the present findings. Also, due to the age range of children in the above study and the inability to diagnose and interpret cognitive and physiological manifestations of anxiety by the child, it is not possible for the questionnaire to be completed by the child and the researcher cannot directly obtain the child's point of view. Nocella and Kaplan [30] used cognitive behavioral intervention and reported a significant reduction in stress-related behaviors and body movements of the intervention group during dental procedures. However, unlike the present study, their study only involved children with previous dental experience, which can affect the type of behavior and the level of anxiety. Also, the trainings were given very briefly to the children in the waiting room in the same session as the treatment, which could not be expected to have long-term effects.

Our study had many strengths: two groups were matched in terms of age and gender, since evidence shows that anxiety is significantly correlated with age and gender [3]. Also, the two groups had no significant difference in the MCDAS score at baseline; thus, the reduction in dental anxiety in the intervention group after treatment can be reliably attributed to the implemented intervention. Furthermore, the SCARED questionnaire was used for screening purposes and exclusion of those with anxiety disorders, because evidence indicates that patients with anxiety disorders often experience higher levels of dental anxiety and pain [26].

This study had some limitations, since the children had to be reminded to repeat the exercises during the pulpotomy procedure, blinding of the operator was not possible. Also, cooperation of the parents was required for showing the short film to their children and practicing the exercises with them at home, which could have affected the results. Moreover, considering that delaying treatment was not an option and it was not possible to visit the parents regularly, samples were not collected in groups and training sessions were implemented individually for each child.

It is recommended to consider cooperation of a psychologist and psychotherapist with the dental team for psychologic interventions at the office. Also, considering the items present in the MCDAS, it would be ideal to first find the context of anxiety of the child, and then select the best type of intervention, accordingly. Additionally, to evaluate the child's cooperation ability in the dental environment, it is better not to rely only on the child's behavioral display and to evaluate anxiety. By addressing and controlling anxiety, the child's overall behavior can be positively influenced.

CONCLUSION

Cognitive-behavioral interventions showed considerable success in reducing dental anxiety among pediatric patients. This approach effectively targets multiple dimensions of anxiety responses, including cognitive, emotional, behavioral, and physical aspects. It can be employed for both management and treatment of cases with dental anxiety, making it a valuable tool in dental practice. By utilizing this approach, dental professionals can identify, analyze and target the specific factors that contribute to a child's dental anxiety. As a result, the need for early decisions, such as referring patients for dental procedures under sedation or general anesthesia solely based on their behavior, can be significantly reduced.

ACKNOWLEDGMENTS

The authors are thankful to the staff at the Department of Pediatric Dentistry for their assistance and the parents and children for participating in the study.

CONFLICT OF INTEREST STATEMENT

None declared.

REFERENCES

1. Asl AN, Shokravi M, Jamali Z, Shirazi S. Barriers and Drawbacks of the Assessment of Dental Fear, Dental Anxiety and Dental Phobia in Children: A Critical Literature Review. J Clin Pediatr Dent. 2017;41(6):399-423.
2. Dahlander A, Soares F, Grindefjord M, Dahllöf G. Factors Associated with Dental Fear and Anxiety in Children Aged 7 to 9 Years. Dent J (Basel). 2019 Jul 1;7(3):68.
3. Cianetti S, Lombardo G, Lupatelli E, Pagano S, Abraha I, Montedori A, et al. Dental fear/anxiety among children and adolescents. A systematic review. Eur J Paediatr Dent. 2017 Jun;18(2):121-130.
4. Venham LL, Gaulin-Kremer E, Munster E, Bengston-Audia D, Cohan J. Interval rating scales for children's dental anxiety and uncooperative behavior. Pediatr Dent. 1980 Sep;2(3):195-202.
5. Campbell C, Hosey MT, McHugh S. Facilitating coping behavior in children prior to dental general anesthesia: a randomized controlled trial. Paediatr Anaesth. 2005 Oct;15(10):831-8.
6. Birmaher B, Khetarpal S, Brent D, Cully M, Balach L, Kaufman J, et al. The Screen for Child Anxiety Related Emotional Disorders (SCARED): scale construction and psychometric characteristics. J Am Acad Child Adolesc Psychiatry. 1997 Apr;36(4):545-53.
7. Appukuttan DP. Strategies to manage patients with dental anxiety and dental phobia: literature review. Clin Cosmet Investig Dent. 2016 Mar 10;8:35-50.
8. Hajal NJ, Paley B. Parental emotion and emotion regulation: A critical target of study for research and intervention to promote child emotion socialization. Dev Psychol. 2020 Mar;56(3):403-417.
9. Gustafsson A, Arnrup K, Broberg AG, Bodin L, Berggren U. Child dental fear as measured with the Dental Subscale of the Children's Fear Survey Schedule: the impact of referral status and type of informant (child versus parent). Community Dent Oral Epidemiol. 2010 Jun;38(3):256-66.
10. Peretz B, Kharouba J. Dental anxiety among Israeli children and adolescents in a dental clinic waiting room. Pediatr Dent. 2013 May-Jun;35(3):252-6.
11. Klingberg G, Berggren U, Carlsson SG, Noren JG. Child dental fear: cause-related factors and clinical effects. Eur J Oral Sci. 1995 Dec;103(6):405-12.
12. Ramos-Jorge ML, Ramos-Jorge J, Vieira de Andrade RG, Marques LS. Impact of exposure to positive images on dental anxiety among children: a controlled trial. Eur Arch Paediatr Dent. 2011 Aug;12(4):195-9.
13. Williams C, Garland A. A cognitive–behavioural therapy assessment model for use in everyday clinical practice. Advances in Psychiatric Treatment. 2002 May;8(3):172-9.
14. Barros L, Buchanan H. Correspondence between dentist and child ratings of dental anxiety in Portugal: a preliminary study. Rev Port Estomatol Med Dent Cir Maxilofac. 2011 January–March;52(1):13–15.
15. Eiser C, Twamley S. Talking to children about health and illness. Qualitative health psychology: Theories and methods. 1999 Mar 19:133-45.
16. Ross DM, Ross SA. Childhood pain: the school-aged child's viewpoint. Pain. 1984 Oct;20(2):179-191.
17. Woolley ME, Bowen GL, Bowen NK. Cognitive Pretesting and the Developmental Validity of Child Self-Report Instruments: Theory and Applications. Res Soc Work Pract. 2004 May;14(3):191-200.
18. Rebok G, Riley A, Forrest C, Starfield B, Green B, Robertson J, et al. Elementary school-aged children's reports of their health: a cognitive interviewing study. Qual Life Res. 2001;10(1):59-70.
19. Katanec T, Singh S, Majstorovic M, Klaric I, Herman NG, Mourси AM. Gender Differences in Dental Anxiety and Medical Fear in Croatian Adolescents. J Clin Pediatr Dent. 2018;42(3):182-187.
20. Kothari S, Gurunathan D. Factors influencing anxiety levels in children undergoing dental treatment in an undergraduate clinic. J Family Med Prim Care. 2019 Jun;8(6):2036-2041.
21. Ghasem Pour M, Haji Ahmadi M, Pourya Vali M. Dental experiments induced anxiety in 6-12 year old children and relative factors. J Babol Univ Med Sci 2004; 6 (5) :12-16.
22. Brown DF, Wright FA, McMurray NE. Psychological and behavioral factors associated with dental anxiety in children. J Behav Med. 1986 Apr;9(2):213-8.
23. Versloot J, Veerkamp J, Hoogstraten J. Dental anxiety and psychological functioning in children: its relationship with behaviour during treatment. Eur Arch Paediatr Dent. 2008 Feb;9 Suppl 1:36-40.
24. van Maanen EJ, van Dinter N, Versloot J, Veerkamp JS. Angst voor een tandheelkundige behandeling bij kinderen. Invloed van ervaring en psychisch functioneren [Fear of dental treatment among children. Influence of experience and psychological functioning]. Ned Tijdschr Tandheelkd. 2009 Jan;116(1):3-8. Dutch.
25. Karjalainen S, Olak J, Söderling E, Pienihäkkinen K, Simell O. Frequent exposure to invasive medical care in early childhood and

operative dental treatment associated with dental apprehension of children at 9 years of age. Eur J Paediatr Dent. 2003 Dec;4(4):186-90.
26. Öst, L.; Clark, D.M. Cognitive Behavior Therapy: Principles, Procedures and Evidence Base; Öst, L., Skaret, E., Eds.; Cognitive Behaviour Therapy for Dental Phobia and AnxietyChichester (UK); John Wiley: Hoboken, NJ, USA, 2013.
27. Gallagher MW, Payne LA, White KS, Shear KM, Woods SW, Gorman JM, et al. Mechanisms of change in cognitive behavioral therapy for panic disorder: the unique effects of self-efficacy and anxiety sensitivity. Behav Res Ther. 2013 Nov;51(11):767-77.
28. Abolghasemi A, Hajjaran M, Kiamarsi A. The effectiveness of cognitive-behavioral interventions in reduction of distress resulting from dentistry procedures. jdm 2007; 20 (2) :150-155.
29. Kebriaee F, Sarraf Shirazi A, Fani K, Moharreri F, Soltanifar A, Khaksar Y, et al. Comparison of the effects of cognitive behavioural therapy and inhalation sedation on child dental anxiety. Eur Arch Paediatr Dent. 2015 Apr;16(2):173-9.
30. Nocella J, Kaplan RM. Training children to cope with dental treatment. J Pediatr Psychol. 1982 Jun;7(2):175-8.