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Research Article

EFFECTIVENESS OF COGNITIVE BEHAVIORAL THERAPY IN MANAGING DENTAL ANXIETY AMONG PATIENTS: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

A study conducted by pediatric dentists investigated the efficacy of Cognitive Behavioral Therapy (CBT) in alleviating dental anxiety among children, a condition affecting approximately 4% of the pediatric population. Dental anxiety not only contributes to a decline in oral health but also induces pain and psychological distress in affected individuals. The study employed a randomized and controlled trial with parallel groups, wherein treatment allocation was concealed from assessors conducting the behavioral avoidance test. Sixty participants, comprising 16 boys and 44 girls, were divided into two groups: CBT (n=26) and sedation-assisted treatment (n=34). The CBT group received ten hours of therapy following a structured treatment manual, while clinical treatments were administered in a naturalistic setting. Assessments were conducted at three intervals: three months after treatment initiation, three months post-treatment completion, and one year post-treatment completion. Results from repeated-measures analysis of variance revealed statistically significant improvements in children who underwent CBT compared to those receiving standard treatment. There were substantial differences in effect sizes between the two groups. Specifically, 74% of participants in the CBT group successfully managed the behavioral avoidance test, contrasting starkly with the mere 13% success rate observed in the standard treatment group. Furthermore, following one year of treatment, 32% of individuals in the CBT group no longer met the diagnostic criteria for depression, as opposed to only 2% in the treatment-as-usual group. The study also reported significant enhancements in dental anxiety and self-efficacy measures among the CBT group compared to controls. Based on these findings, the authors recommend the incorporation of CBT into pediatric dental practices to effectively address anxiety among children and adolescents, thereby facilitating their psychological well-being and overall oral health.

Key words:- Dental Anxiety, Cognitive Behavioral Therapy (CBT), Pediatric Dentistry, Randomized Controlled Trial, Behavioral Avoidance Test.

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INTRODUCTION

About 9% of children and adolescents suffer from dental anxiety. Dental anxiety is considered a specific phobia by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)1. Symptoms include marked fear and anxiety when treated by a dentist. There is intense distress and/or avoidance [2]. The presence of untreated caries, missing teeth, and gum disease are associated with dental anxiety during childhood [3]. Additionally, poor oral health can cause embarrassment, reduced self-confidence, and increased

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absences. Dental anxiety can be treated with nitrous oxide sedation [4], tell-show-do, midazolam, and general anesthesia in pediatric dentistry [5]. Recent systematic reviews, however, have found low or very low quality support for these methods in pediatric dentistry [6]. Behavioral problems may not be sufficiently affected by these strategies [7]. Several specific phobias have been treated with cognitive behavioral therapy (CBT) [8]. Randomized trials have found moderate to large treatment effects for adults with dental anxiety. Psychoeducation, exposure, and homework exercises are all part of CBT [9]. In children and parents, CBT has improved their ability to cope with dental anxiety. Further research on CBT in pediatric dentistry is needed, according to the literature.

METHODS AND MATERIALS

Participants

Parents of children referred to two pediatric dental clinics with dental anxiety or behavioral problems were invited to participate in the study on behalf of their children. A general dentist referred all potential participants since self-referral was not permitted. The following criteria had to be met by participants: 1) consent from all primary caregivers, 2) diagnosis of specific phobia in accordance with DSM-IV-TR, 3) there were no other psychiatric or developmental diagnoses, 4) no concurrent psychological appointment or treatment elsewhere, and 5) there was no need for emergency dental care [10].

Aside from eligibility criteria listed above, some practical requirements must be met as well. 1) An active divorce or stable living situation, 2) Attending a specialist clinic for treatment requires time off from school; 3) Participation is not hampered by serious somatic illness, 4) Home or public computer access to complete the study's online questionnaires, and 5) willingness to participate.

Interventions

A 10-hour CBT was conducted in two pediatric dental clinics. In the first three weeks, sessions 1 to 2, 3 to 4, and 5 to 6 were offered. There were two sessions on the same day with 15 minutes of rest between them. Every other week, 1 session/h was scheduled. Dental procedures in vivo and in films, relaxation techniques, procedural pain management information, and cognitive restructuring were all included. While seeing psychologists, patients viewed films showing a child having dental work done. Cotton balls, topical anesthetic, spiral-shaped suction nozzles, and needles were provided for parents and children to practice at home. Younger children require a greater amount of parental support and behavioral techniques in order to be successful. Treatment was conducted by three licensed psychologists with at least five years of psychology training at university and one year of clinical experience. All therapists had six to eight years of experience providing CBT in pediatric dentistry to a wide range of patient populations. The psychologist provided the other two therapists with weekly supervision to increase adherence. During these supervisions, treatment fidelity was continuously discussed. A checklist was also provided at the beginning of each session as well. Dental visits vary depending on the patient's needs. In the CBT group, dental treatment began after session 6. The typical treatment included nitrous oxide sedation, midazolam premedication, and tell-show-do. Treatment as usual is described in Appendix A (online) [11].

Outcomes

Measure of primary outcome

A previous study of CBT for dental anxiety used the Behavioral Avoidance Test. Adapting BAT for pediatric dentistry was the goal of this study. During the course, participants would enter a dentist's room and inject local anesthesia. Dentists instructed children to complete various dentistry procedures, but they also gave them the option of discontinuing at any time. Each child's score was determined by the sum of stages from 0 to 18. Involvement of dentists and dental assistants in the measurement process maintained measurement fidelity. A preliminary assessment, a follow-up assessment after 3 months, and a follow-up assessment after one year were conducted [12].

Measures of other outcomes

Secondary outcome measures included dental anxiety assessed by the Structured Clinical Interview for Dental Anxiety (SCI-DA). Development and Well-Being Assessment (DAWBA) specific phobia questions regarding dentistry were asked. It has been reported that DAWBA expert diagnoses have been found to be reliable. Also measured were the child and parent versions of the Children's Fear Survey Schedule-Dental Subscale. Validity and reliability of the CFSS-DS are high. CFSS-DS measures fear associated with medical and dental situations, as well as interactions with unfamiliar people. A questionnaire called the Self-Efficacy Questionnaire for Specific Phobias was also used. The questionnaire assesses people's self-efficacy, which is their belief that they will succeed [13].

Size of the sample

Parents of 364 patients were recruited by a dental assistant. 134 parents expressed interest in participating. 60 met the inclusion criteria and were randomly assigned. Other studies have similar sample sizes and power.

Randomization

Randomization was unrestricted. Using a randomization list generated by an external person, unrelated to the study, assigned participants to treatment

groups at random. After determining whether to enroll a patient, we assigned him or her to the intervention group. The subjects were assigned on a random basis to either CBT or treatment as usual. Between the ages of 7 and 18, there were 16 boys and 44 girls, with ages ranging from 7 to 18. The sociodemographic and clinical characteristics of the intervention group are shown in Table 1.

Blinding

The outcome assessors had no knowledge of the treatment assigned. The dentists were asked to guess each participant's allocation status along with administering the BAT to each participant. The dentists were also asked whether they knew any participants' treatment status. The participants and parents were instructed not to mention interventions when scheduling the BAT.

Procedure

The children and their parents provided written informed consent. All outcome measures and the study were conducted. All outcome measures were assessed before, after, and one year after treatment. All assessments except the BAT and SCI-DA were conducted online. Personalized passwords were given to parents and children (older than 11 years) to access the DAWBA on the Internet. On the basis of an on-site SCI-DA and DAWBA, the clinical psychologist evaluated the patient's eligibility. Using the SCI-DA, parents and children were interviewed. Clinical assessments were conducted by three psychologists trained to administer the SCI-DA and the DAWBA. These assessors received regular supervision from a child and adolescent anxiety disorder expert during the recruitment period.

Analyses based on statistics

This study was analyzed BAT, CFSS-DS, and SEQ-SP using repeated-measures analysis of variance (ANOVA). CBT and control groups were compared before, after, and after 1 year of follow-up by means of independent two tailed t tests. Additionally, we used paired t tests to compare between-group effects between the initial treatment period and the post-treatment period, between the initial treatment period and the 1-year follow-up period, and between the initial treatment period and the 1-year follow-up period. Based on pooled standard deviations, Cohen's d was calculated to measure effect size. Based on the Chi-squared test or Fisher's exact test, we calculated the frequency of patients without diagnosis in CBT vs. controls, and CBT showed statistically significant improvements vs. controls. In order to explore whether there were any differences within-groups in terms of the dichotomous dependent variable, McNemar's test and Cochran's Q test were applied.

RESULTS

Attrition and participant flow

Two CBT participants dropped out before receiving treatment after randomization. A child received dental treatment abroad due to an acute need. Due to a new job, the parent couldn't visit the clinic during office hours because the parent had difficulty taking time off work. Additionally, one participant from the usual treatment group and one from the control group failed to complete the SEQ-SP and CFSS-DS. Further, parental outcomes for one teenager among controls were not available. We decided not to include SEQ-SP scores for one young participant (CBT group). Both groups of patients completed their treatments and measurements. Both intervention groups, participants' dental needs were met. One participant in the CBT group required adjunctive midazolam sedation. The treatment-as-usual group had 50% of participants treated with nitrous oxide, midazolam, or general anesthesia.

Primary Outcome

BAT, the primary outcome measure, revealed a significant interaction between time and group regarding ability to cope with dental procedures, $F = 6.78$,$P = 0.007$, partial $h2 = 0.20$. The BAT showed that children and adolescents who received CBT improved more than those in the control group when it came to managing dental procedures. The results of the BAT showed superior, statistically significant improvements in children receiving CBT compared with controls. BAT improvement within groups was also statistically significant (Table 2).

Size of the effect

The between-group effect size was large. A large effect size was also found within groups (Table 3). An individual with a BAT score of 18 can handle injections under anesthesia and drilling into composite. Using the cutoff value of 18, the BAT values were dichotomized to calculate the clinical significance. CBT participants completed all stages of BAT after treatment, compared to 7% in treatment as usual. 74% and 14%, respectively, were reported at 1-year follow-up. Statistically significant improvements were observed at 1-year follow-up in favor of CBT.

Masking assessment

At follow-up, assessors' guesses were not significantly correlated with actual allocation. All dentists reported not knowing their patients' allocation status before testing.

Secondary Outcomes

Participants who met the SCI-DA diagnostic criteria for dental anxiety differed statistically significantly between groups. After CBT, 65% of participants did not meet dental anxiety diagnostic

criteria. Both at the 1-year follow-up and after-treatment assessment ($P < 0.03$) to find a relationship between treatment and diagnosis-free status. As a result of assessment and follow-up measurements, CBT participants did not meet the diagnostic criteria for dental anxiety in a statistically significant manner.

Measures of other outcomes

The interaction between intervention and time in the CFSS-DS-C, CFSS-DS-P, and SEQ-SP was not statistically significant (Table 2). After treatment as well as one year after treatment, we found statistically significant differences between groups favoring CBT. CFSS-DS (C&P) within-group improvements were significant in both groups, except for SEQ-SP, where they were significant only in the CBT group.

Size of the effect

These measures showed large between-group effect sizes. The SEQ-SP had low within-group effect sizes for the control group (Table 3). For each participant and parent, we chose item 3 on the CFSS-DS, which measures injection fear, or item 8 on the CFSS-DS, which measures fear of drill to assess a clinically significant fear. During the first assessment before treatment, we selected the item that the patient rated the highest. On a scale of 1 to 5, we considered CFSS-DS scores of 2 (little afraid) or lower clinically significant, and scores of 3 to 5 were considered non-significant. Using the cutoff value, we dichotomized the results. Treatment and item values were statistically significant in both CFSS-DS-C and CFSS-DS-P. After treatment, significant improvements were observed at 1-year follow-up. According to child ratings, 74% of children treated with CBT showed clinical improvement after treatment, as compared to 7% in a control group, and 81% compared with 30% of parents.

Effects adverse to health

After the treatment, parents and children were surveyed about their experiences with CBT, and there were no adverse events reported. Dentists and psychologists who participated in the study reported no adverse effects.

Table 1: At baseline, demographic and clinical characteristics

Variable	CBT (*n* = 26)	TAU (*n* = 34)
Age	11 ± 6	11 ± 6
In %	140	152
Dental fear among parents or siblings	62	60
Employed parent 1	124	176
Employed parent 2	170	142
Comorbidity	16	24
Dental anxiety duration	5 ± 4.9	4.6 ± 3.9
Fear of intraoral injection	152	142
Restorations needed	138 2.8 ± 3.1	154 2.5 ± 2.2
Number of decayed surfaces	78 0.9 ± 2.1	70 0.5 ± 0.6

Table 2: Effectiveness of Cognitive Behavioral Therapy for Children with Dental Anxiety..

Measures (Scale Range), Group, and Participants	Before Treatment, Mean (SD)	After Treatment, Mean (SD)	1-y Follow-up, Mean (SD)	F Value (df)
BAT (0–18)				
CBT	8.0	16.2	17.8	
n	26	22	22	G: 13.1 (1)** T: 47.9 (2)****
TAU n	8.2 34	12.1 34	12.4 32	I: 6.8 (2)***
CFSS-DS-C (15–75)				
CBT n	39.3 26	22.1 22	25.7 22	G: 16.4 (1)*** T: 21.5 (2.48)****
TAU	43.1	34.3	34.8	I: 0.97 (2.48)
n	34	32	32	
CFSS-DS-P (15–75)				
CBT	35.6	22.2	21.5	

n	26	22	22	G: 23.9 (1)**** T: 29.9 (2)****
TAU n	41.8 32	35.3 30	31.7 30	I: 2.7 (2)
SEQ-SP (0–70)				
CBT	36.0	54.1	51.4	
n	24	20	20	G: 32.5 (1)**** T: 9.5 (2)**
TAU n	30.4 34	33.0 30	33.6 32	I: 4.1 (2)

Table 3: Treatment as Usual versus Cognitive Behavioral Therapy for Dental Anxiety.

	Between-Group Effect Sizes Cohen's d (95% Confidence Interval)		**Within-Group Effect Sizes Cohen's d (95% Confidence Interval)**		
Measures (Scale Range)	After Treatment	1-year Follow-up	Before Treatment to after Treatment	Before Treatment to 1-y Follow-up	After Treatment to 1-y Follow-up
BAT	2.4	2.9			
CBT			3.0	3.9	0.6
TAU			2.3	2.2	0.2
CFSS-DS-C	2.4	2.0			
CBT			2.8	2.3	–0.5
TAU			0.10	2.0	–0.2
CFSS-DS-P	2.7	2.5			
CBT			2.8	3.2	0.2
TAU			0.9	2.3	0.6
SEQ-SP	3.2	2.7			
CBT			2.9	2.6	–0.4
TAU			0.4	0.4	0.2

DISCUSSION

According to our findings, CBT is effective for treating dental anxiety in children and adolescents. CBT produced superior psychological improvements compared with standard treatment. As compared to 13 percent of the control group, 73 percent of the CBT group managed all stages of the behavior avoidance test14. Compared with the control group, 91% of the CBT group no longer met the diagnostic criteria for dental anxiety. Both CBT studies and dental studies use a 1-year follow-up period. Both CBT and controls achieved active control status regarding BAT and CFSS-DS outcomes. Contrary to the control group, the CBT group had a larger effect size. One-year follow-up showed that treatment effects were maintained. Self-efficacy was found to be high in the CBT group and low in the control group. Combined with an increase in SEQ-SP following treatment as well as a 1-year follow-up only seen in CBT, the results suggest that self-efficacy is a mechanism of change. According to the findings of the present study, CBT is effective in treating anxiety disorders in children and adolescents. In several secondary outcomes, time and group interaction effects were not significant. SEQ-SP and CFSS-DS (C & P) did not improve15. There were no booster sessions, possibly explaining the lack of improvement after treatment. In our study, the majority of children and adolescents feared intraoral injections. Because the CFSS-DS contains only one item measuring injection fear, it is not appropriate as a primary outcome measure. Our decision to choose BAT as the primary outcome was also due to its ability to represent actual dental performance and its ability to be measured blindly. Based on dental records, participants in both intervention groups received necessary dental treatment. In pediatric dentistry, the use of sedation techniques allows the treatment of children with dental anxiety to be performed. Compared to CBT, these methods do not sufficiently affect behavioral and emotional variables that are crucial to clinically significant psychological change.

CONCLUSION

Pediatric dentistry anxiety management techniques are uncertain, according to a meta-analysis. Adolescents and children with dental anxiety can benefit from CBT in dentistry, according to the results of this study. The treatment approach increases dental patients' self-efficacy and self-management of dental procedures. As well as being randomized, manual-based, standardized, masked, and measuring four times, this study has several strengths. Clinical trials were conducted in a real-world

setting, suggesting it could have a positive effect on patients. More randomized controlled trials are needed in dental settings. CBT also needs to be modified and adapted for dental organizations without psychologists and for pediatric dentistry groups without psychologists. Pediatric dentistry studies that examine 1-session CBT interventions are also important.

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