Comparing the Effect of Acceptance and Commitment Therapy and Cognitive Behavioral Therapy on Dental Anxiety

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Quantitative Study

Abstract

Background: This study was aimed at the comparison of the effect of acceptance and commitment therapy (ACT) and cognitive behavioral therapy (CBT) on dental anxiety.
Methods: The present clinical trial was performed with a pretest-posttest design, a control group, and a 3-month follow-up period on patients with dental anxiety. The study participants were 48 patients who were selected through convenience sampling and randomly assigned to 2 experimental groups and one control group. The first experimental group received 10 weekly 90-minute sessions of ACT and the second group received 10 weekly 90-minute sessions of CBT. The control group received no intervention. The Dental Anxiety Inventory (DAI) was used to assess the dependent variable and Symptom Checklist-90-R (SCL-90-R) and a pulse oximeter were used as screening tools. Data were analyzed using repeated measures ANOVA in SPSS software.
Results: The results showed a significant difference between the experimental groups and the control group in terms of dental anxiety ($P < 0.01$). Furthermore, there was a significant difference in dental anxiety between the pretest, and follow-up and posttest ($P < 0.01$), but there was no significant difference between the posttest and follow-up ($P > 0.05$). Moreover, there was no significant difference between the ACT and CBT groups ($P > 0.05$), but there was a significant difference between the 2 treatment groups and the control group ($P < 0.05$).
Conclusion: ACT and CBT can be used to reduce dental anxiety, and thus, prevent treatment avoidance.
Keywords: Dental anxiety; Acceptance and commitment therapy; Cognitive behavioral therapy

Introduction

In recent years, preventive medicine experts have seriously considered non-communicable diseases in addition to communicable diseases; it is believed that the prevention of major non-communicable diseases constitutes a major part of national programs in developed and developing countries (Murray & Lopez, 1990). Primary, secondary, and tertiary prevention are considered for most diseases. The practices related to primary prevention inhibit the occurrence of diseases in healthy people and decrease exposure to diseases before their incidence. In the secondary phase of prevention, the progression of the chronic or hidden disease to a severe state and increasing of deficiencies is prevented. Tertiary prevention is also used to prevent the incidence of severe complications and risks (Azizi, 2014).

Prevention is highly important in that it prevents the direct (diagnosis and treatment) and indirect (loss of efficiency and productivity due to disease) costs. Prevention in the oral health domain is much more important owing to the high costs of dental materials and services and it has priority over dental rehabilitation. Therefore, regular referrals to dentists and primary preventive dental visits have been extensively supported by professional beneficiaries (Baltaci, Baygin, Tuzuner, & Korkmaz, 2019; Bhaskar, McGraw, & Divaris, 2014). However, there are barriers in this regard including dental anxiety which is believed to be the most important one (Seligman, Hovey, Chacon, & Ollendick, 2017; Beaton, Freeman, & Humphris, 2014). Dental anxiety is described as anxiety or concern about the incidence of a threatening stimulus in dental treatments (Soares, Lima, de Barros, Dahllof, & Colares, 2017), which can be attributed to individuals' assumptions of the dangers and impairments caused by these treatments (Walsh, 2009). Researchers have described a cycle of avoidance of dental treatment by which people with dental anxiety avoid dental care, thereby leaving their oral health problems untreated and exacerbating their conditions (Vermaire, van Houtem, Ross, & Schuller, 2016). Poor oral health also causes embarrassment and dental treatment avoidance until the pain or symptoms become intolerable (Seligman et al., 2017). This anxiety is ranked fifth among the most common stressful situations (Rezwana et al., 2014), and its prevalence is higher in women than men (Saatchi, Abtahi, Mohammadi, Mirdamadi, & Binandeh, 2015). Hence, it is essential to mitigate dental anxiety in patients to prevent the risks of dental traumas and severe dental anxiety due to disrupted dental procedures.

There are various techniques for this purpose, including the use of sedatives and sleeping pills (Leitch & Macpherson, 2007), general anesthesia (Bennett, Kramer, & Bosack, 2015), behavior control techniques (Wang et al., 2012), and a combination of drug therapy and behavior control (Hmud & Walsh, 2008). Furthermore, the use of aromatherapy techniques has been reported to be effective in controlling anxiety in some cases (Kritsidima Newton, & Asimakopoulou, 2010). All methods mentioned above, although helpful in most cases, have disadvantages. For instance, behavior control methods and aromatherapy cannot be responsive to high levels of anxiety. Moreover, drug management of dental anxiety undoubtedly increases the success rate of treatments and improves their quality. However, drugs that cause respiration deficiency and vomiting reflex also have potential risks. Thus, the use of psychiatric medications seems to be helpful in such cases (Roberts, Curzon, Koch, & Martens, 2010).

A psychological therapy proposed for special phobias such as dental anxiety is cognitive behavioral therapy (CBT). CBT is one of the highly accepted forms of psychological therapies owing to strong empirical evidence for the improvement of anxiety disorders through exposure to situations, regular desensitization, inducing relaxation, and cognitive restructuring (Wide, Carlsson, Westin, & Hakeberg, 2013).

This treatment assists the patients in the diagnosis of their distorted models of thought and inefficient behaviors to prepare them for dealing with stressful situations such as dental situations. To change patients' distorted and inefficient thoughts, organized discussions and behavioral assignments are used, which can have positive effects on inefficient assumptions and beliefs about dental anxiety (Gumport, Williams, & Harvey,, 2015; Gavita, David, Bujoreanu, Tiba, & Ionutiu, 2012) and can help the patients to opt for regular dental referral and treatment follow-up (Manski, Hoffmann, & Rowthorn, 2015). Studies have shown that CBT can positively affect dental anxiety and fear (Shahnavaz, Hedman, Grindefjord, Reuterskiold, & Dahllof, 2016; Wide et al., 2013).

Another approach that may be effective on dental anxiety and fear is acceptance and commitment therapy (ACT). A modern CBT tries to boost functioning by increasing an individual's ability to remain active and act based on personal values (Hayes, Strosahl, & Wilson, 1999). Enhancing mindfulness and cognitive distancing (observation of thoughts), committing to active engagement in the external world, and making efforts to achieve a meaningful and original life in order to increase psychological flexibility can help people cope with stressful situations. ACT leads to psychological flexibility through 6 central processes, including acceptance, diffusion, self-as-context (SAC), present moment, values, and committed action (Hayes, 2016). Studies have indicated that ACT can lead to improved oral health behaviors (Wide, Hagman, Werner, & Hakeberg, 2018). Yet, the effect of this therapy on dental anxiety has not been investigated until now.

Hence, given the significance of prevention in the oral health domain, high costs of dental treatments, role of dental anxiety in irregular dental referral and adherence to treatment, empirical evidence in favor of the positive efficacy of CBT and ACT in improving dental anxiety, lack of studies on this subject in Iran, and absence of research on the comparison of the effect of these two treatments on dental anxiety, the present study was conducted to compare the effect of ACT and CBT on the symptoms of patients with dental anxiety with the aim to prevent avoidance of treatment.

Methods

This pretest-posttest, clinical trial, with a control group and 3-month follow-up, was conducted on patients with dental anxiety. This study (code: 84520709981007) was approved by the International Branch, Islamic Azad University, Khorramshahr, Persian Gulf, Iran, with ethical code IR.IAU.AHVAZ.REC.1398.005 from Ahvaz Branch, Islamic Azad University, Iran, and registered in the Iranian Registry Center of Clinical Trials (registration code: IRCT20190505043473N1).

The study population comprised all patients with dental anxiety in Isfahan, Iran, in 2019. Individuals with fear of dental interventions were invited to participate in the study via an announcement on the boards of psychiatric clinics. From among 84 volunteers, 48 participants were selected based on the inclusion criteria (16 participants in each group).

The inclusion criteria of the study consisted of willingness to participate in the intervention sessions, completion of an informed written consent, presence of dental anxiety according to Steward's Dental Anxiety Inventory (DAI) (Stouthard, Mellenbergh, & Hoogstraten, 1993), and reconfirmation of dental anxiety using a pulse oximeter (NOAMETRIX, U.S.A). For reconfirmation of dental anxiety, the patients took a rest for 5 minutes and their heart rate was measured by a dentist twice on a dental unit; those with an average increase of 5 pulses per minutes were included in the study. The other study inclusion criteria consisted of an age range of

19-50 years, minimum reading and writing ability, lack of any systemic diseases and congenital syndromes, lack of acute or chronic psychological disorders or anxiety disorders measured using the Symptom Checklist-90-R (SCL-90-R) (Prunas, Sarno, Preti, Madeddu, & Perugini, 2012), minimum physical and cognitive ability for participation in psychological interventions determined by a clinical psychologist in the primary psychological interview, minimum of 20 natural teeth and 1 treated tooth, lack of urgent dental treatment determined via a dentist's examination, and lack of any parallel psychological therapies and pharmaceutical treatments in the past 6 months. The exclusion criteria of the study were unwillingness to participate in the study and failure to attend more than 2 treatment sessions.

The participants were asked to attend a briefing session at the Dental Research Center of Isfahan University of Medical Sciences, Isfahan, following which the researcher randomly assigned them to 2 experimental groups and 1 control group through a draw. Then, the DAI was coded and distributed among the participants to complete as a pretest. The first experimental group underwent ACT in 10 weekly 90-minute sessions over 2 months and a half (Table 1).

Table 1. Acceptance and commitment therapy for dental anxiety

Session	Brief description
One	Greeting, introduction, instructions for group work and explanation of the type of therapy, overall assessment and explanation of the negative thoughts and feelings and concerns of treatment seekers, the nature and features of normal dental fear and anxiety, and therapeutic objective and commitment of therapists, and practicing concentration and introducing mindfulness, and practicing conscious breathing
Two	references in the past week, reviewing Practicing concentration, performance assessment of dental therapy avoidance models, efficacy and costs of this avoidance, observing dental anxiety instead of reaction to it through practicing acceptance of thoughts and emotions
Three	Practicing concentration, performance assessment, reviewing the reactions of the treatment seekers to former sessions, repracticing the acceptance of thoughts and emotions, introducing control as a problem and explaining whether the main problem is control or abandoning control is an alternative solution, presenting the metaphor of "challenging the dental anxiety monster", and assigning homework
Four	Practicing concentration, reviewing the acceptance of thoughts and emotions, practicing anxiety acceptance based on the knowledge through expression of the nature of acceptance and awareness, accepting anxiety and that acceptance is not a quick solution to anxiety, talking about controlling external events vs. controlling internal issues, assigning life promotion tasks as homework
Five	Practicing concentration, performance assessment, reviewing reactions to former vs. oneself as content, presenting the metaphor sessions, introducing oneself as context of "playing volleyball with thoughts and stressful emotions", presenting the metaphor of the "chess board" and the metaphor of the "radio of anxiety news", life compass as the final cause for exposure, analyzing the valuable paths sheet, assigning homework
Six	Practicing concentration, performance assessment, reviewing the reactions to former sessions, discussing emotional desires through attempts or actions along with pencil practice, presenting the parable of thermostat of desire and exposure to thoughts and intense emotions along with the metaphor of the "bus driver", assigning homework
Seven, eight, nine	Practicing concentration, performance assessment, reviewing the reactions to former sessions, normal value-oriented behavioral activation via behavioral activation, defusion and mindfulness techniques, knowledge of mental and verbal traps, empirical practice of life promotion, including practicing anxiety acceptance, life sensing exercises (internal and/or visualization exercises) or activities related to valuable life objectives, monitoring the experiences related to anxiety and fear, assigning homework
Ten	Practicing concentration, performance assessment, reviewing the reactions to former sessions, continuing the introduction of values, enhancing concentration on behavioral commitment, preparing the treatment seekers for the end of treatment, presenting a summary of treatment procedures, preparing for the recurrence of the problem and possible failures, identifying high-risk situations, asking the treatment seekers to implement these principles in their life, giving a summary of metaphors presented to the treatment seekers in a brochure and end of treatment

The second experimental group underwent CBT provided by an experienced therapist in 10 weekly 90-minute sessions over 2 months and a half (Table 2). The control group received no training. After the treatment sessions were completed, the experimental and control groups completed the DAI. Follow-up was performed and participants were invited and evaluated at the Dental Research Center of Isfahan University of Medical Sciences 3 months after the posttest.

Data analysis was carried out using descriptive statistics, including central and dispersion indices such as mean and standard deviation, and inferential statistics, including repeated-measures ANOVA, in SPSS software (version 22; IBM Corporation, Armonk, NY, USA).

In this study, a pulse oximeter and the SCL-90-R were used as screening tools and the DAI was used to evaluate the dependent variables (Eilenberg, Fink, Jensen, Rief, & Frostholm, 2016).

Table 2. Cognitive behavioral therapy for dental anxiety

Session	Brief description
One	Introducing the therapist and group members, creating a secure and reliable environment for the members and providing the grounds for group coherence and relationship (techniques: establishing rapport or therapeutic relationship, familiarity with the general rules of treatment, pretest components, familiarity with dental anxiety, assessment of therapeutic expectations, and assigning homework)
Two	Reviewing the homework of the former session, explaining the vicious cycle of dental anxiety, extensive analysis of the negative psychological, cognitive, and physiologic effects associated with dental anxiety, assessment of dental anxiety in the members, assigning homework
Three	Reviewing the homework of the former session, explaining the importance of thoughts and their role in inducing emotions, identifying the thoughts, identifying patients' negative spontaneous thoughts, analyzing common cognitive distortions during the occurrence of dental anxiety and distinguishing between thoughts and reality, explaining the importance of thoughts and their role in inducing emotions, presenting the three-component model of dentistry, presenting the therapy rational, assigning homework
Four	Reviewing the homework of the former session, finding the implications of thoughts, validating the negative thoughts and beliefs related to dental anxiety, presenting strategies for coping with negative thoughts related to dental anxiety, assigning homework
Five	Reviewing the homework of the former session, evaluating the quality of evidence, creating adaptable thoughts and beliefs, evaluating the adaptable thoughts, introducing exposure, investigating the instructions of exposure and its practice, assigning homework
Six	Reviewing the homework of the former session, teaching tensionless relaxation, practicing confrontation and imaginal exposure, assigning homework
Seven	Reviewing the homework of the former session, expressing anxiety changes in imaginal exposure, testing the indicators and analyzing the progress of patients, reviewing the negative memories related to dental situations, focusing on behavior rather than on emotions, assigning homework
Eight	Reviewing the homework of the former session, presenting the experiences of group members regarding their imaginal exposure, testing the remaining indicators, practicing imaginal exposure in group meetings, assigning homework
Nine	Reviewing the homework of the former session, sharing achievements and failures in imaginal exposure, emphasizing common topics and issues, in vivo exposure, assigning homework
Ten	Reviewing the homework of the former session, reviewing the progress of group members through a ranking from, expressing thoughts and emotions about the end of sessions, determining probable future barriers and problems in order to prevent the recurrence of dental anxiety

The Symptom Checklist-90-R: The SCL-90-R was first developed by Derogatis et al. (1973) and was then revised. The SCL-90-R is a psychometric self-measurement checklist. Respondents respond to 90 items based on a 5-point Likert scale. This scale consists of 9 dimensions, including somatization (12 items), obsessive-compulsive disorder (OCD) (10 items), interpersonal sensitivity (9 items), depression (13 items), anxiety (10 items), hostility (6 items), phobic anxiety (7 items), paranoid ideation (6 items), and psychoticism (10 items), and 7 extra items, some of which measure sleep disorders and sexual desire. The score of each subscale is the sum of the scores of the subscale items divided by the number of the subscale items. A mean score ≥ 1 and > 3 is interpreted as phobic states and psychotic states, respectively. It should be noted that in the depression subscale, a score > 3 shows severe depression and psychoticism. The internal consistency of this scale has been reported to be 0.78-0.90 (Prunas et al., 2012).

Dental Anxiety Inventory: The DAI was designed by Stouthard et al. (1993). It is a self-report questionnaire with 36 items about dental fear. The items are scored based on a 5-point Likert scale ranging from completely false (score: 1) to completely true (score: 5). The internal consistency of this scale was determined to be 0.96-0.96 using Cronbach's alpha. The test-retest reliability index of this scale was found to be between 0.84 and 0.87 in different groups. The DAI was translated into Persian and psychometrized by Yousefi and Piri (2017). In this study, the internal consistency of the DAI was determined as α = 0.94 using Cronbach's alpha and r = 0.94 using the split-half method, indicating a high reliability index. In the study by Stouthard et al. (1993), 130.5 respondents with a score of 23.6 were considered to have dental anxiety. Cronbach's alpha level for this questionnaire was calculated to be 0.71.

Results

The findings showed that most participants in the ACT, CBT, and control groups were within the age range of 20-30 years. Furthermore, most participants in the ACT group had a high school diploma, in the CBT group had primary education, high school diploma, bachelor's degree, and master's degree, and in the control group had a bachelor's degree. The descriptive indices of dental anxiety in the 3 study groups in the pretest, posttest, and follow-up stages are presented in table 3.

Table 3. Distribution and frequency percentage of age groups and education based on group membership

Variables		Acceptance and commitment therapy No (%)	Cognitive behavioral therapy No (%)	Control No (%)
Age groups (year)	20-30	6 (37.5)	6 (37.5)	6 (37.5)
	31-40	4 (25.0)	5 (31.25)	5 (31.25)
	41-50	6 (37.5)	5 (31.25)	5 (31.25)
	Total	16 (100.0)	16 (100.0)	16 (100.0)
Education	Primary education	3 (18.8)	4 (25.0)	2 (12.5)
	High school diploma	8 (50.0)	4 (25.0)	4 (25.0)
	Bachelor's degree	5 (31.3)	4 (25.0)	6 (37.5)
	Master's degree	0 (0.0)	4 (25.0)	4 (25.0)
	Total	16 (100.0)	16 (100.0)	16 (100.0)

Table 4. Descriptive statistics of dental anxiety for the experimental groups in the pretest, posttest, and follow-up

Variable	Source	Acceptance and commitment therapy	Cognitive behavioral therapy	Control
		Mean ± SD	Mean ± SD	Mean ± SD
Dental anxiety	Pretest	121.31 ± 10	126.12 ± 6.85	124.00 ± 13.10
	Posttest	89.18 ± 7.81	91.56 ± 4.88	125.56 ± 12.72
	Follow-up	87.93 ± 8.14	90.68 ± 5.16	125.93 ± 12.88

As shown, the mean scores of dental anxiety in the posttest and follow-up indicate greater improvement in the intervention groups than in the control group.

It is noteworthy that the results of Shapiro-Wilk, Levin, and Mauchly's tests were analyzed before running repeated measures ANOVA to consider the presumptions. The insignificant dental anxiety scores in the Shapiro-Wilk test ($P > 0.05$) showed that the data was normally distributed. Moreover, a lack of statistical significance in the dental anxiety scores in Levin's test showed that the between-group variances and dental anxiety error variance were equal in all groups. Finally, the results of Mauchly's test showed a significant difference in dental anxiety, so the assumption of the equality of variances within respondents was rejected.

The descriptive indices of dental anxiety for the 3 experimental groups in the pretest, posttest, and follow-up stages are presented in table 4. As indicated, the mean scores of dental anxiety were significantly higher in the posttest and follow-up in the experimental groups compared to the control group.

Table 5 shows the results of Wilkes' Lambda test in multivariate analysis of variance (MANOVA) for dental anxiety. As shown, the test factor was significant in terms of dental anxiety. Furthermore, there was a significant difference in dental anxiety between the pretest, posttest, and follow-up stages. Moreover, there was a significant difference between test interaction and group membership. In addition, dental anxiety showed a significant difference in group membership (ACT, CBT, and control groups) in the pretest, posttest, and follow-up stages.

The results of the Greenhouse-Geisser correction indicated a significant difference in dental anxiety between the pretest, posttest, and follow-up stages ($P < 0.01$), and 78% of this difference was due to the treatment method (either ACT or CBT), which was confirmed with 100% power (Table 6). Moreover, the results of the Greenhouse-Geisser correction showed that test and group (control and 2 experimental groups) have a significant interaction with dental anxiety ($P < 0.01$; df = 105.2; F = 048.50). Furthermore, there was a significant difference between the 2 experimental groups (ACT and CBT) and control group in the pretest, posttest, and follow-up, and 69% of this difference was due to the application of the treatment (either ACT or CBT), which was confirmed with 100% power.

Table 5. Results of multivariate analysis of variance for dental anxiety

Effect	Value	F	df	df	P-value
Test	0.215	306.80	2	44	0.001
Group-test interaction	0.305	868.17	4	88	0.001

Table 6. Results of repeated measures analysis of variance for intragroup factor and intragroup-intergroup interaction for dental anxiety

Source of effect	Test	Sum of squares	df	Mean square	F	P-value	Eta-squared	Test power
Test	Greenhouse-Geisser	389.11158	052.1	998.10603	528.159	0.0001	0.780	1.00
Test-group interaction	Greenhouse-Geisser	7001361.	105.2	753.3326	048.50	0.0001	0.690	1.00

Table 7 illustrates the results of one-way ANOVA for comparison of dental anxiety between the 2 experimental groups (ACT and CBT) and control group (P < 0.01). As indicated, there was a significant difference between the 2 experimental groups (ACT and CBT) and control group. The eta-squared value of the group factor was 0.692, and the test power was equal to 1. Moreover, the one-way ANOVA showed 69.2% significant difference between the experimental groups and control group, with 100% power.

The results of the Bonferroni test for dental anxiety in pair comparison of experimental groups (ACT and CBT) and control group in pretest, posttest, and follow-up are presented in table 8. As indicated, there was a significant difference in dental anxiety between the pretest, posttest, and follow-up (P < 0.01), but there was no significant difference between the posttest and follow-up (P > 0.05). Therefore, there was no significant difference between the ACT and CBT groups (P > 0.05), but there was a significant difference between the control group and the 2 treatment groups.

Discussion

This study compared the effect of ACT and CBT on the symptoms of patients with dental anxiety with the aim to prevent avoidance of treatment. The findings showed that ACT and CBT were able to decrease the symptoms of patients with dental anxiety, which was in line with the results of Wide et al. (2013) and Shahnavaz et al. (2016) concerning the effects of CBT on dental anxiety as well as the findings of Wide et al. (2018) regarding the impact of ACT on oral health behaviors.

As for the mechanism of effect of ACT on the symptoms of patients with dental anxiety based on the theoretical foundations, it can be argued that a basic principle in this treatment is achieving psychological flexibility (Tarkhan, 2017). During the ACT sessions, the patients were taught the concept of acceptance through metaphors, parables, and practices. Acceptance helped them to deal with the situations related to their problems (dental anxiety) more effectively, to increase their cognitive flexibility,

Table 7. Results of one-way analysis of variance for dental anxiety between the control group and the experimental groups

Source of effect	Test	Sum of squares	df	Mean square	F	P-value	Eta-squared
Group	264.21132	2	174.1680696	834.8044	0.0001	0.692	1.00
Error	229.9401	45	916.208				

Table 8. Results of the Bonferroni test for pair comparison of study groups in terms of dental anxiety

	Baseline	Time of comparison	Mean differences	Standard error	P-value
		Test factor			
	Pretest	Post-test	375.18	435.1	0.0001
	Posttest	Follow-up	958.18	495.1	0.0001
Psychological capital	Posttest	Follow-up	583.00	279.0	0.053
		Group membership			
	ACT	CBT	0.021	950.2	0.994
	ACT	Control	688.25	950.2	0.0001
	CBT	Control	708.25	950.2	0.0001

ACT: Acceptance and commitment therapy; CBT: Cognitive behavioral therapy

and to moderate their dental anxiety. They were also asked to identify the life values the achievement of which dental anxiety inhibited. Then, they were asked to set goals to achieve those values and make a promise to do their best to accomplish their goals (Hayes, 2016). In fact, this part of the treatment was effective due to its increasing of the individual's motivation to deal with the fear of dental interventions. Moreover, mindfulness enhanced the patients' relationship with the present moment, which was followed by reduced involvement in dysfunctional thoughts related to dental anxiety. Furthermore, performing cognitive diffusion activities distracted the patients from dental anxiety-related thoughts. Given the significant role of inefficient thoughts in the intensification of the symptoms of patients with dental anxiety, this therapy helped the patients to feel free from the anxiety caused by dental interventions and to reduce the thoughts and emotions resulting from it (Yousefi & Piri, 2017). This was facilitated through the "observer" task that helped the patient to be merely an external observer of thoughts and feelings. Therefore, it could be argued that ACT training, by helping the patients to distinguish their feelings, internal emotions, and experiences and to use them appropriately, helped them to understand their situations and interactions and experience them with a new perspective rather than to ignore internal emotions and experiences (Stouthard et al., 1993), thereby improving their dental anxiety.

As for the mechanism of effect of CBT on the symptoms of patients with dental anxiety, it can be said that CBT, via teaching dental anxiety management, can decrease dental anxiety through reducing avoidance, inducing the ability to detect the fear of dental interventions, and increasing group self-efficacy. During the treatment, the patients understood dental anxiety and its vicious cycle thoroughly (Wang et al., 2012).

Expressing the importance of thoughts about dental anxiety and their role in inducing excitements, identifying negative spontaneous thoughts, analyzing common cognitive distortions during the occurrence of dental anxiety, and detecting the difference between thoughts and reality helped the patients to change their negative emotional and behavioral outcomes, i.e., dental anxiety and dental treatment avoidance, by modifying their thoughts about dental interventions, getting familiar with the preparatory events, and changing cognitive deficiencies and distortions (Gumport et al., 2015). During the CBT, feelings and their relationship with the

patients' previous thoughts were investigated and other realities were recalled to decrease the negative thoughts associated with dental anxiety. Analyzing the quality of evidence and replacing the compatible, realistic, positive, and flexible beliefs can help the patients to change their old and inefficient rules and assumptions into new and efficient ones and can induce motivation for replacing thoughts in themselves through evaluation of compatible thoughts. Performing the visual and realistic exposure technique, practicing it, and generalizing it to real situations individually made the patients gradually deal with irritating stressors, including dental office, dental tools, dental unit, and dental interventions, and helped them make an effort to cope with these stressors for a longer time, giving them a chance to analyze the stressors mentally. This diminished the patients' tendency to use avoidance strategies to cope with stressors, thereby reducing dental anxiety because of regular exposure (Shahnavaz et al., 2016).

This study had some limitations that need to be considered while making conclusions and generalizing the findings. One limitation was the multidisciplinary nature of the study, with no possibility of medical treatment control. Moreover, there was no long-term follow-up after the psychological training as the follow-up period lasted only 3 months. In addition, like other human studies, the family environment and socioeconomic conditions of the individuals in this study affected the results. Therefore, generalizing the findings to the whole society should be done with caution and adequate knowledge.

Conclusion

Finally, given the efficacy of ACT and CBT in reducing the symptoms of patients with dental anxiety, and consequently, decreasing dental treatment avoidance, these two therapies can be used to promote preventive oral health measures.

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