

Comparing the Effectiveness of Muscle Relaxation Training and Mindfulness Training on Fear and Resilience in Patients With Dental Anxiety

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Abstract

Introduction: Patients with dental anxiety avoid receiving medical care. This anxiety poses a threat to oral health. The present study aimed to investigate the effectiveness of muscle relaxation training and mindfulness training on fear and resilience in patients with dental anxiety.

Methods: This was a clinical trial (pretest-posttest design and a control group). The statistical population comprised all patients with dental anxiety who went to dental clinics in the city of Ahvaz in 2018-2019. The research sample included 45 patients with dental anxiety selected through convenience sampling. The participants were randomly divided into two experimental (muscle relaxation training and mindfulness training) and one control group (n=15 each). The research tools included the Dental Fear Survey (DFS), the Connor-Davidson Resilience Scale (CD-RISC), and the Modified Dental Anxiety Scale (MDAS). Multivariate analysis of covariance was used to analyze the data.

Results: The mean ± standard deviation (SD) of the post-test scores of fear and resilience were 49.53 ± 9.67 and 84.80 ± 7.89 in the muscle relaxation training group and 58.26 ± 12.67 and 55.60 ± 8.83 in the mindfulness training group, which were significantly different from the control groups (83.80 ± 3.50 and 40.46 ± 5.65). Muscle relaxation training reduced fear and increased resilience in patients with dental anxiety in the experimental groups compared to the control group ($P < 0.001$). Furthermore, in terms of fear and resilience in patients with dental anxiety, muscle relaxation training and mindfulness training were significantly different ($P < 0.001$).

Conclusion: In addition to decreasing fear, muscle relaxation training and mindfulness can increase resilience in patients with dental anxiety. Also, muscle relaxation training was more effective than mindfulness training in reducing fear and increasing resilience in patients with dental anxiety.

Keywords: Muscle relaxation, Mindfulness, Fear, Resilience, Dental anxiety

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Introduction

Dental anxiety is an acute problem that threatens human health.¹ Patients who suffer from dental anxiety avoid receiving medical care. In fact, they become anxious when they sense a great deal of unease about dentists and dentistry procedures. This anxiety is hazardous to human health. Phobia is a significant factor in patients who suffer from dental anxiety.² These people have an irrational and severe phobia, which causes them to lose control and exhibit a wave of anxiety.³ Being exposed to terrifying situations can cause anxiety. These reactions can manifest as panic attacks related to the situation or as a result

of a pre-existing background. If a person has this type of phobia about dentistry, they will avoid having dental surgery. The degree of anxiety and phobia is proportional to the proximity of the phobic stimulus.⁴

A person suffering from dental anxiety lacks the necessary resilience. One of the most important aspects of adjustment is resilience. It can boost cognitive-emotional and affective efficiency.^{5,6} Identifying and improving resilience creates a diverse and promising insight and strengthens a person's adjustment and coping capabilities when confronted with a disaster or extreme pressure. Low resilience in people disrupts a person's internal capability, social skills,

and interaction with the environment, and it serves as a negative characteristic that causes anxiety. Resilience makes it easier to return and improves one's ability to overcome setbacks.^{7,8}

Muscle relaxation training is one method that can help patients with dental anxiety improve their cognitive problems.⁹ According to Zargarzadeh and Shirazi,¹⁰ practicing muscle relaxation techniques is an effective intervention in the treatment of anxiety disorders. It appears that using this technique can eliminate the negative physiological effects of tension and prevent the emergence of symptoms caused by these damaging factors. The muscle relaxation technique is based on preventing the progression and even the emergence of anxiety, tension, or stress, because anxiety and stress affect the nervous and endocrine systems, circulatory system (blood), and conscious system (thinking, memory). Fighting it at any point will cause it to advance and create a spiral movement. When these systems are subjected to prolonged stress and anxiety, it can result in psychological diseases.¹¹ This technique allows the individual to contract their muscles and identify and release any tension. Muscle relaxation is a technique in which a person feels relaxed by contracting their muscles and then gradually expanding a specific group of muscles.^{12,13}

Furthermore, mindfulness is an effective therapeutic technique for patients suffering from dental anxiety.¹⁴ Shabani et al¹⁵ demonstrated that mindfulness is an effective method for treating psychological issues. This treatment assists an individual in reducing cognitive and emotional sadness and creating a desirable situation for information processing. This therapeutic approach allows a person to express their feelings. Mindfulness is defined as a person's undivided attention to the present moment and experience. It is a method of directing one's attention through meditation, resulting in mindful self-regulation and moment-to-moment awareness.¹⁶ Mindfulness was developed to relieve and treat human pain, particularly emotional pains that lead to depression and anxiety. Furthermore, it entails paying particular and deliberate attention in the present moment, without judgment.^{17,18} Mindfulness entails being present in the moment and with whatever is present at the time, without judgment or commentary on what is happening. The origins of mindfulness can be traced back to Buddhist meditation exercises, which improve the capacity for sustained and wise awareness that goes beyond thinking.¹⁹

Patients with dental anxiety experience high levels of stress as a result of their severe phobia and anxiety, and their resilience diminishes accordingly. Cognitive issues can have a negative impact on the overall mental health of people who require dental treatment.²⁰ Investigating which method provides the most critical and efficient treatment can aid in providing proper and reliable feedback regarding the treatment for these individuals.²¹

Conducting research on the psychological variables of patients with dental anxiety can result in appropriate feedback about visiting a dentist without fear and anxiety, thereby improving these people's quality of life. Given this, two approaches to muscle relaxation training and mindfulness were compared to examine the impact of muscle relaxation training and mindfulness on fear and resilience in patients with dental anxiety in order to provide feedback on the best training approach for these people's problems. Regarding the above statements the present research aimed to investigate the effectiveness of muscle relaxation training and mindfulness training on fear and resilience in patients with dental anxiety.

Materials and Methods

This was a clinical trial with a pretest-posttest design and a control group. The statistical population consisted of all patients with dental anxiety who visited dental clinics in Ahvaz in 2018-2019. The convenience sampling method was used to select 45 patients with dental anxiety for the study. The participants were randomly divided into two experimental (muscle relaxation training and mindfulness training) and a control group (n = 15 each). In this study, the sample size for the groups was selected 45 patients with dental anxiety based on G*Power with effect size (1.75) and alpha (0.05) and power of a test (0.90). Furthermore, a random number table was used to randomly allocated the participants into experimental and control groups. The first experimental group received six 90-minute sessions of muscle relaxation training, and the second experimental group received eight 120-min sessions of mindfulness training. A summary of the training sessions in the experimental groups is presented in Tables 1 and 2. The Modified Dental Anxiety Scale (MDAS) was first distributed to the participants. Participants with a score of 15 or higher were identified as having dental anxiety. The inclusion criteria included a MDAS score of 15 or higher and the absence of cognitive and personality disorders. The exclusion criteria were the absence of more than two treatment sessions and reluctance to continue the treatment process. The participants were informed of the research goals and its procedures. Also, the researchers received a written consent for participation in the research from the participants.

Research Instruments

Dental Fear Survey (DFS): Kleinknecht developed this scale in 1973 in response to dental phobia. This scale consisted of 27 questions, 2 of which were concerned with dental treatment avoidance, 6 with the feeling of physiological arousal, 14 with identifying obvious fear-provoking stimuli, one with dentists' dental scrubs, and 4 with the reaction of family and friends to dentistry. However, the scale was reduced to 20 questions by Kleinknecht in 1980 as a result of a factor analysis, and divided into

Table 1. A Summary of Muscle Relaxation Training Sessions

Session	Content
1	A brief history of muscle relaxation techniques, the impact of tension on mental health, and the role of muscle relaxation in reducing anxiety and fear.
2	Dividing muscles into 16 groups, explaining the manner of contracting muscles, stress relief, performing contraction exercise, relieving stress in several groups of muscles, and performing contraction exercise, gradually relieving stress in 16 groups of muscles in a specific order, using desirable relaxation techniques through examining muscles one-by-one, proposing relaxing suggestions, ending exercise by counting backward, moving muscles and counting at the same time.
3	Training, contracting exercise, relieving stress in seven muscles, evaluating experiences, discussion, inspection after exercise, speaking about feelings, resolving problems and ambiguities related to exercise.
4	Training and exercising recalling stage, evaluating experiences, relieving stress in four muscles (neck, abdominal, thigh, and forearm).
5	Training the recalling stage together with counting, gradually relieving stress in muscles, executing relaxing mental imaging, evaluating experiences.
6	Performing summary of muscle relaxing exercise, conclusion, and executing post-test.

Table 2. A Summary of Mindfulness Training Sessions

Session	Content
1	Introducing the participants and providing a summary of sessions, introducing the treatment, body scan meditation and taking the pre-test, meditating and discussing this experience and using in the daily activities, discussing the assignments and exercise obstacles and solutions of mindfulness program in that regard.
2	Discussing the manner of confronting tension obstacles, discussing the difference between feelings and thoughts, giving assignments for the subsequent session.
3	Seeing and listening exercises, sitting meditation and breathing and paying attention to senses, 3-minute breathing space exercise.
4	Revising and evaluating assignments of the previous session, sitting meditation plus paying attention to breathing, discussing stress responses and person's reaction to severe situations and alternative behavior for them.
5	Performing awareness of thoughts meditation, performing sitting meditation, 3-minute breathing space exercise.
6	Awareness of thoughts and the role of thoughts in life, giving assignments for the subsequent session, four-dimensional meditation, the exercise of replacing unpleasant events with pleasant events.
7	Three-minute breathing exercise, assignments such as sitting meditation.
8	Practicing everything learned thus far, asking questions about all sessions, concluding sessions, and taking post-test.

three sections: A. Dental treatment avoidance, B. physical symptoms of anxiety, and C. anxiety provoked by a dental stimulus. These questions are graded on a 5-point Likert scale ranging from 1 (never) to 5 (always) (very much). Scores ranged from 20 to 100. People who scored 20 to 44 were considered fearless, people who scored 45 to 75 were considered to have mild fear, and people who scored $DFS \geq 75$ were considered to have phobia.²² Oliveira et al²³ reported the Cronbach's alpha of 0.95 for the scale. In the present study, Cronbach's alpha was 0.87 for the inventory.

Connor-Davidson Resilience Scale (CD-RISC): Connor and Davidson (developed the resilience scale that has 25 items scored based on a 5-point Likert scale anchored by 0 "completely wrong" to 4 "always true." This scale is scored between 0 and 100 with a cutoff point of 50. Scores lower and higher than 50 indicate high and low resilience, respectively.²⁴ The reliability of the resilience scale was obtained using Cronbach's alpha (0.89). The validity of each item and total scale was between 0.41 and 0.64 using the correlation coefficient. The reliability coefficient obtained from the re-test method in a four-week interval was 0.78.²⁵ In the present study, Cronbach's alpha coefficient was 0.81 for the questionnaire.

MDAS: Corah in 1969 developed this tool, which was revised Clarke in 1993. This questionnaire consists of 4 five-choice questions about various dental status and situations. Each question was graded on a scale of 1 (no anxiety) to 5 (extreme anxiety). The scores ranged from 4 to 20. Humphris et al²⁶ added a question about local

anesthesia. As a result, the questionnaire was renamed the MDAS. This questionnaire's scores ranged from 5 to 25, with a score of 15 or higher indicating high anxiety in dental patients.²⁷ Saatchi et al⁶ reported an alpha Cronbach coefficient of 0.79 for the questionnaire. In the present study, Cronbach's alpha coefficient was 0.82 for the questionnaire.

Statistical Analyses

Data were analyzed by descriptive and inferential statistics, such as mean, standard deviation, and multivariate analysis of covariance. Levene's test was utilized to investigate the equality of variances and Kolmogorov-Smirnov test was used to examine the normality of distribution of pre-test and post-test. The effectiveness of muscle relaxation training and mindfulness training on fear and resilience in patients with dental anxiety was studied by multivariate analysis of covariance (MANCOVA) and one-way analysis of variance (one-way ANOVA). SPSS version 21.0 was further used for analyzing the data.

Results

According to the descriptive statistics, the mean and standard deviation (SD) of the age of participants in muscle relaxation training, mindfulness training, and control groups were 37.42 ± 4.35 , 35.80 ± 4.12 , and 36.68 ± 3.70 , respectively. In terms of education level, in the muscle relaxation training group, 10 (66.67%) people had a high school education, and 5 (33.33%) had a college

education. In the mindfulness training group, 8 (53.33%) people had a high school education, and 7 (46.66%) had a college education. Moreover, in the control group, 9 (60.00%) people had a high school education, and 6 (40.00%) had a college education. Table 3 presents the mean ±SD of the pre-test and post-test scores of fear and resilience in the experimental and control groups.

According to the results, the zero assumption for normality of distribution of scores on fear and resilience variables for two groups, experimental and control, was approved. It means that the assumption of normality of distribution of scores in the pre-test was confirmed in both the experimental and control groups. Based on Levene’s test results, the F-value of interaction for fear and resilience variables was not significant. Therefore, the assumption of regression homogeneity was confirmed. In terms of fear and resilience, Levene’s test was not significant. Thus, the variance of the two experimental and control groups was not significant in terms of the research variables. Consequently, the assumption of variance convergence was confirmed and the zero assumption for equality of variances of the scores of two groups was confirmed regarding all research variables in the post-test phase.

According to Table 4, the level of significance of all tests after controlling for pre-test indicates that there was a significant difference between patients with dental anxiety in experimental and control groups in terms of fear and resilience variables ($F=132.24, P<0.001$). The difference or effect was 0.98%. In other words, 98% of the

personal differences on fear and resilience post-test scores in patients with dental anxiety were related to the efficacy of muscle relaxation training and mindfulness training.

A one-way analysis of covariance (ANOVA) test was used to determine the variable that differed between the two experimental and control groups, and the results are shown in Table 5. There was a significant difference in muscle relaxation training between the experimental and control groups after controlling for the pre-test in patients with dental anxiety. In other words, muscle relaxation training can reduce fear ($F=227.53, P<0.001$) and increase resilience ($F=132.79, P<0.001$) in patients who suffer from dental anxiety. The effects were 0.91% and 0.86%, respectively. Given this, 91% and 86% of personal differences on fear and resilience post-test scores in patients with dental anxiety were related to the effect of muscle relaxation training, respectively (Table 5). Moreover, there was a significant difference in mindfulness training between the experimental and control groups after controlling for the pre-test in patients with dental anxiety. Mindfulness training reduced fear ($F=54.94, P<0.001$) and increased resilience ($F=43.96, P<0.001$) in in patients with dental anxiety. The effects were 0.73% and 0.68%, respectively (Table 5).

The Bonferroni post-hoc test was used to compare the efficacy of two training methods, and the results are shown in Table 6. In patients with dental anxiety, the mean difference in fear and resilience between the two groups, i.e., muscle relaxation training and mindfulness training, was 9.22% and 22.16%, respectively ($P<0.001$). Thus,

Table 3. Mean ±SD of Research Variables in the Experimental and Control Groups in the Pre-test and Post-test Phases

Variables	Phases	Muscle Relaxation Training	Mindfulness Training	Control	P Value
		Mean ±SD	Mean ±SD	Mean ±SD	
Fear	Pre-test	85.33 ±5.92	81.46 ±7.52	81.40 ±5.44	0.419
	Post-test	49.53 ±9.67	58.26 ±12.67	83.80 ±3.50	<0.001
Resilience	Pre-test	40.46 ±5.66	37.26 ±7.04	38.26 ±6.02	0.170
	Post-test	84.80 ±7.89	55.60 ±8.83	40.46 ±5.65	<0.001

Abbreviation: SD, standard deviation.

Table 4. Results of Multivariate Analysis of Covariance on the Scores of Research Variables in the Experimental and Control Groups

Variables	Value	df	Error df	F	P	Effect Size
Pillai’s trace	0.98	4	21	132.24	<0.001	0.98
Wilks’ lambda	0.01	4	21	132.24	<0.001	0.98
Hotelling’s trace	81.38	4	21	132.24	<0.001	0.98
Roy’s largest root	81.38	4	21	132.24	<0.001	0.98

Table 5. Results of One-way ANOVA on Research Variables in the Experimental and Control Groups

Groups	Variables	SS	df	MS	F	P	η²
Muscle relaxation training	Fear	6467.46	1	6467.46	227.53	<0.001	0.91
	Resilience	7109.52	1	7109.52	132.79	<0.001	0.86
Mindfulness training	Fear	3834.86	1	3834.86	54.94	<0.001	0.73
	Resilience	1589.63	1	1589.63	43.96	<0.001	0.68

Abbreviations: SS, sum of squares; MS, mean squares.

Table 6. Bonferroni post-hoc Test for Paired Comparison of the Fear and Resilience Between the Two Experimental Groups

Groups	Variable	Mean Difference	Standard Error	P
Muscle relaxation training - mindfulness training	Fear	9.22	1.29	<0.001
	Resilience	22.16	2.32	<0.001

there was a significant difference between the effectiveness of muscle relaxation training and mindfulness training on fear and resilience in patients with dental anxiety. Given the mean values, muscle relaxations training was more effective than mindfulness training in reducing fear and increasing resilience in patients with dental anxiety. In patients with dental anxiety, muscle relaxation training is a more effective way of reducing fear and increasing resilience.

Discussion

this study aimed to investigate the effectiveness of muscle relaxation training and mindfulness training on fear and resilience in patients with dental anxiety. According to the findings, there was a significant difference in fear and resilience between patients suffering from dental anxiety in the experimental and control groups. In other words, in the experimental group, muscle relaxation training and mindfulness reduced fear and increased resilience in patients with dental anxiety. Furthermore, the results revealed a significant difference on fear and resilience between muscle relaxation training and mindfulness training in patients with dental anxiety. Muscle relaxation training was more effective than mindfulness training in reducing fear and enhancing resilience in patients with dental anxiety, based on mean values. Muscle relaxation training is a more effective approach for reducing fear and increasing resilience in patients with dental anxiety. This finding is consistent with the research results of Nasiri et al²⁸ and Toussaint et al.²⁹

Muscle relaxation training increased participants' ability to concentrate and pay attention to the reduction of tension, and increased muscle relaxation enabled these people to perceive less tension, and muscle relaxation training helped to control the level of fear and anxiety in the participants by developing participants' ability to consciously and intentionally control their muscles.⁹ Nasiri et al²⁸ reported that progressive muscle relaxation could reduce stress and anxiety in pregnant women during six sessions. It is worth noting that muscle relaxation training prevented negative emotions and thoughts such as anxiety and fear because this technique allowed participants to control their feelings and muscle stretching, and the exercises of this method increased blood flow and improved blood supply to limbs, reduced tension and fear in patients, and increased their resilience.¹³ Muscle relaxation leads to peace of mind because there is no emotional situation in the case of full relaxation of body members, which elevates resilient behavior. Manzoomeh and Akbari³⁰ showed that relaxation techniques training

had a positive effect on increasing resilience in mothers of children with leukemia.

It should be noted that mindfulness training through cognitive flexibility in people who perceived anxiety strengthens cognitive processing and improves the ability to pay assiduous attention in these people.¹⁴ These people were able to control their fear of dental problems and the pain caused by procedures due to increased cognitive processing and attention to the moment-to-moment experience. Since intervention in patients with dental anxiety increased cognitive processing and organizing, mindfulness is an effective technique for reducing fear and increasing resilience.¹⁷ Furthermore, this training intervention through experiencing, being in the present moment on purpose, and without judgment helped people show more resilience and toughness in the face of tension and anxiety, as well as improved their flexibility. People who practiced mindfulness by replacing unpleasant events with pleasant events were less likely to succumb to stressful situations, increasing their resilience and potential for adjustment.

Based on the results of the present study, there was a significant difference in the efficacy of muscle relaxation training versus mindfulness training on fear and resilience in patients with dental anxiety. Muscle relaxation training was found to be more effective than mindfulness training in reducing fear and increasing resilience in patients with dental anxiety. Accordingly, it can be argued that muscle relaxation was easier to practice than mindfulness, and that the ease with which muscle relaxation was performed in people resulted in its greater effectiveness. Muscle relaxation training was more effective in reducing fear and increasing resilience in patients with dental anxiety due to its higher biological feedback, the passiveness of participants in mindfulness, achieving socially adjusted interactions in the process of training, and the advantage of gradual changes.¹¹ Despite the fact that both methods resulted in a decrease on fear and an increase in resilience, muscle relaxation training was more effective. Participants' higher consciousness and the ease of practice of the muscle method resulted in rapid improvement in a shorter period of time. When patients with dental anxiety had more control over the situation, they perceived a reduction in fear and an increase in resilience more easily and quickly by performing the exercises. Therefore, it can be argued that muscle relaxation training was more effective than mindfulness because of its advantages, such as ease of practice and the enjoyment of active participants during the intervention period, as well as its effectiveness in reducing fear and increasing resilience.

The study's limitations included a failure to control for important economic and family-social variables influencing research variables, as well as nonconvergent research samples in terms of general characteristics in two experimental and control groups. Since the present study was performed on patients with dental anxiety in Ahvaz, caution should be observed in generalizing the results to other people.

Conclusion

According to the findings, there was a difference in the effectiveness of muscle relaxation and mindfulness training on fear and resilience in patients with dental anxiety. In patients with dental anxiety, muscle relaxation training was more effective than mindfulness training at reducing fear and increasing resilience. Muscle relaxation methods are recommended by dental centers due to their higher effectiveness in reducing fear and enhancing resilience in patients with dental anxiety in order to reduce dental anxiety for the purpose of providing better treatment. Specialists train dentists and their assistants in muscle relaxation training workshops so that they can take measures to reduce dental anxiety. To provide clients with the necessary information about dental anxiety reduction, dental clinics and hospitals should display the results of the muscle relaxation training method on the improvement of fear and resilience, as well as the results of carrying out muscle relaxation training on the reduction of dental anxiety.

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Authors' Contribution

The authors contributed equally to this research.

Competing Interests

The authors have no competing interests.

Ethical Approval

The Ethics Review Board of Islamic Azad University, Ahvaz branch, approved the present study (code: 162266452).

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