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Comparison of the effect of cognitive-behavioral therapy and dialectical behavioral therapy on perceived stress and coping skills in patients after myocardial infarction

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Original Article

Abstract

BACKGROUND: Among the cardiovascular diseases (CVDs), myocardial infraction (MI) is one of the main causes of mortality around the world. A diagnosis of MI may be followed by psychological problems, such as depression, anxiety, and stress. Therefore, psychological interventions can be beneficial in routine treatment. The purpose of this study was to compare the effect of cognitive-behavioral therapy (CBT) and dialectical behavioral therapy (DBT) on perceived stress and coping skills in patients after MI.

METHODS: This study was a randomized clinical trial with a pretest-posttest design and control group. The statistical population consisted of 45 patients after MI who referred to Noor Heart Clinic in Rasht, Iran, between 2018 and 2019. They were randomly divided into 3 groups of 15 individuals (2 interventions including CBT and DBT, and 1 control group). In the intervention groups, participants underwent 8 weekly 90-minute sessions. Data were collected using a 3 part self-report questionnaire including a demographic information form, the Ways of Coping Questionnaire (WCQ), and the Perceived Stress Scale-14 (PSS-14). The statistical methods used for data analysis included chi-square test, one-way ANOVA, repeated-measures ANOVA, and post hoc Bonferroni test.

RESULTS: We found significant main effects of group ($F_{(2,42)}$=6.11; P=0.005) and time ($F_{(2,84)}$=28.48; P<0.001), and a significant group-by-time interaction ($F_{(4,84)}$=8.97; P<0.001) on perceived stress scores. For problem-focused coping scores, findings indicated significant main effects of group ($F_{(2,42)}$=7.33; P=0.002) and time ($F_{(2,84)}$=30.71; P<0.001), and a significant group-by-time interaction ($F_{(4,84)}$=12.86; P<0.001). For emotion-focused coping scores, the results also indicated significant main effects of group ($F_{(2,42)}$ = 17.41; P < 0.001) and time ($F_{(2,84)}$=31.74; P<0.001), and a significant group-by-time interaction ($F_{(4,84)}$=14.90; P<0.001).

CONCLUSION: The current study revealed that DBT was more effective in improving emotion-focused coping than CBT.

Keywords: Myocardial Infarction; Stress; Cognitive-Behavioral Therapy; Dialectical Behavioral Therapy

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Introduction

Myocardial infraction (MI) is one of the main causes of mortality around the world.[1,2] As a life-threatening and unpredictable condition, acute myocardial infarction (AMI)[3] can produce substantial distress for patients during and after the event.[4] The resulting psychological stress not only effects patient's emotional well-being, but also has a negative effect on cardiovascular health and post-AMI recovery.[5-7] In the process of stressful situations, the type of psychosomatic reactions and coping strategies used are important. In the face of stressful situations, people have different personalities and various situation characteristics, and they may be able to show different coping

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responses.[8] However, different effective and ineffective coping methods have different consequences on a person's physical and mental health.[9] Considering the high prevalence of MI and the emphasis of health researchers on the relationship of social psychological factors with cardiovascular disease (CVD), it is important to determine patients' stress levels, how to use coping strategies, and appropriate psychological treatment.

Perceived stress is the feelings or thoughts about the uncontrollability and unpredictability of one's life that is associated with the amount of stress of an individual at given point in time or over a given perio.[10,11]

Therefore, understanding how perceived stress changes over time as patients recover from the event can help guide clinical care to better meet patients' needs (e.g., when patients need the most help with stress management, and whether acute or longer term stress programs are more beneficial).[4] However, little research has been conducted on patients' perceived stress after AMI.[4,12]

Coping strategies as a collection of behavioral and cognitive responses are aimed at minimizing the pressure of stressful life situations. Stress coping strategies may be helpful in cardiovascular patients. In a research conducted by Afrasiabi et al., coping strategies training was associated with a decrease in stress in cardiovascular patients.[13]

Cognitive-behavioral therapy (CBT) in stress management familiarizes the individual to stress and how to deal with it, and can help improve a person's psychological and physiological performance by neutralizing some of the effects of stress and stress responses. Therefore, this intervention can be used as a complementary method of medical treatment to improve the general health of these patients.[12] Moreover, dialectical behavior therapy (DBT) is a behavioral methodology the main basis of which is emotion regulation. The most important difference between it and the main CBTs is its emphasis on emotion regulation and its resulting correction of emotional regulation. Therefore, the reason for using this treatment for heart patients is the relationship between negative emotions and the incidence of the disease. Furthermore, DBT was developed to integrate cognitive behavioral approaches and mindfulness/acceptance techniques compliantly, thus leading to a natural synthesis of two broad lines of therapy research for people with MI.[10]

Awareness of the complications of perceived stress in patients after MI can help with the course of heart disease and the patient's recovery process after MI. Moreover, improving perceived stress and coping skills is one of the most significant needs of patients. Furthermore, due to the controversial results of researches regarding effective and safe non-pharmaceutical methods and the importance of improving the perceived stress and coping skills of heart patients in order to improve the course of disease and reduce the cost of treatment, this study was conducted with the aim to determine and compare the effect of CBT and DBT on perceived stress and coping skills in patients after MI. If there are positive results, these non-pharmaceutical methods can be used as alternative or complementary therapies for the promotion of perceived stress and coping skills in this group of patients.

Materials and Methods

The present study was a randomized clinical trial designed to compare the effect of CBT and DBT on perceived stress and coping skills in patients after MI in Noor Heart Clinic in Rasht, Iran, during May 2018 and June 2019. The sample size was calculated as 15 individuals in each group based on the data of similar studies[13] and the following formula using MedCalc statistical software (MedCalc Software Ltd; Ostend, Belgium) with a power of 80%, α of 0.05, mean perceived anxiety of 26.6 in group one, and 20.0 in group two, with standard deviation of 6, Z_{α} of 1.96, and Z_{β} of 0.84.

$$k = \frac{n_2}{n_1} = 1$$

$$n_1 = \frac{(\sigma_1^2 + \frac{\sigma_2^2}{k})(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2}{\Delta^2} = 15$$

A random number table was used to randomly divide 45 participants, who had the inclusion criteria, into the 3 groups of DBT (n = 15), CBT (n = 15), and control (n = 15). The inclusion criteria included patients with MI during the previous 3 months, both genders, ability to read and write, and age range of 30 to 60 years (because of a higher prevalence of the disease in this age range). Patients with factitious disorder, acute pain, and psychological disorders that require neuropsychiatric drugs or other psychological therapies were excluded from the study.

We asked the individuals to pick a number from 1 to 45, and then, used the random number table. We selected 15 numbers from 1 to 45, then, by throwing a coin, we assigned the individuals corresponding to the numbers selected from the random numbers table to the control or intervention groups. Moreover, 15 participants (from 1 to 45) were selected in the other group (Figure 1).

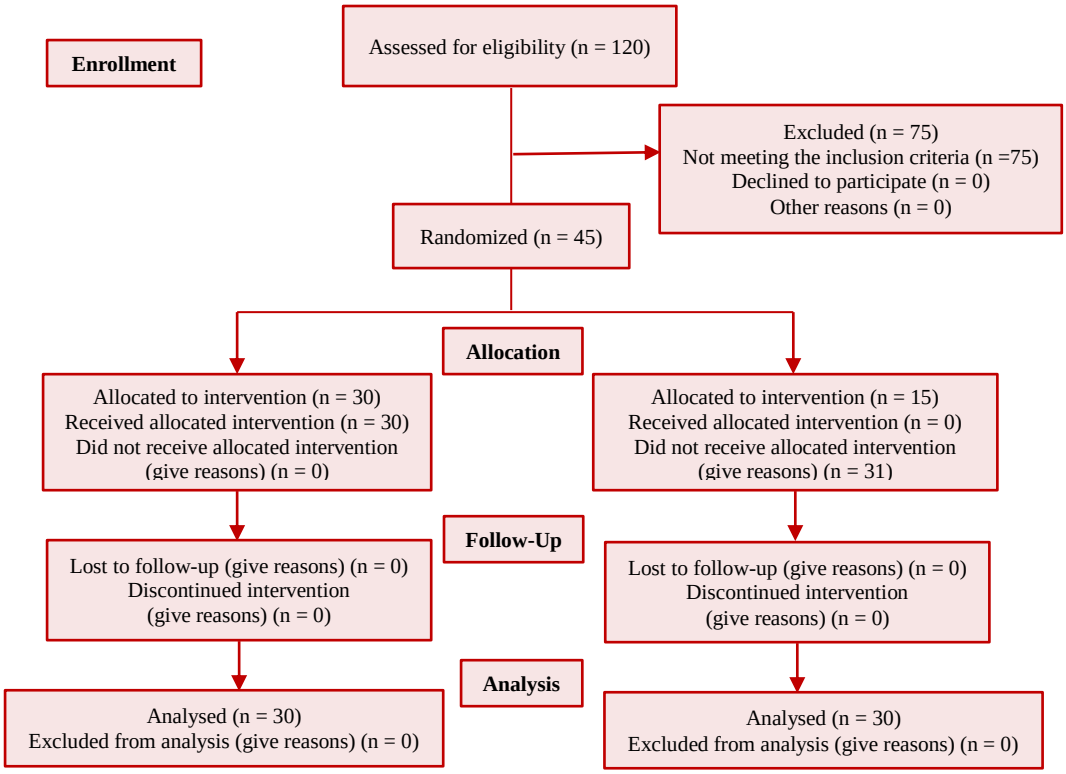

Figure 1. Consort flow diagram

The intervention included 8 weekly 90-minute sessions of group therapy, and the participants were evaluated at the end of the 8 sessions. Prior to the start of the study, enough information about the intervention was provided to the participants and a written informed consent was obtained from each of them for participation in the study. In addition, the suitability of the treatment for the participants was ensured. In order to maintain the principle of confidentiality, the information obtained from the evaluation sessions and questionnaires were encoded in such a way so as not to reveal the subjects' identities and were only available to the researcher.

The perceived stress and coping skills of these individuals were assessed before (pre-test) and after the end of the sessions (post-test), and again in the follow-up (3 months later) using two questionnaires. Pre-experimental and post-experimental controls were also obtained from the control group. The control group participants only received common drugs and talked about their feelings and experiences.

Data were collected using a 3 part self-report questionnaire consisting of a demographic and health related characteristics form, the Persian version of the Perceived Stress Scale-14 (PSS-14), and the Ways of Coping Questionnaire (WCQ).[14] The demographic and health related characteristics form included questions on age, sex, marriage status, and education level. The PSS-14 is a measure of perceived stress that assesses the stress levels associated with life situations. This scale is used to assess the unpredictable, uncontrollable, or overloaded response to life situations.[15] It is one of the most frequently used tools for the measurement of stress in patients with chronic conditions and can be administered in a few minutes,[16] making it appropriate and easy to use among CVD patients. The PSS-14 is scored on a 5-point Likert scale ranging from 0 to 4 [never (= 0), almost never (= 1), sometimes (= 2), often (= 3), and very often (= 4)]. It includes 2 subscales, the negative perceived stress subscale which includes items 1, 2, 3, 8, 11, 12, and 14, and the positive perceived stress subscale which includes items 4, 5, 6, 7, 9, 10, and 13. Items 4, 5, 6, 7, 9, 10, and 13 are scored inversely from 4 (never) to 0 (very often). The minimum and maximum total score of the PSS-14 is 0 and 56 points, respectively. The cut-off score is 21.8 and a higher score indicates negative perceived stress.[14] The Cronbach's alpha reliability coefficient of the PSS-14 has been reported as 0.89,[17] and the internal consistency of the Persian version was found to be 0.89.[18]

To evaluate the 2 coping scales of problem-

focused strategy and emotion-focused coping strategy, Folkman and Lazarus created the WCQ, a 66-item self-report measure. Each scale contains a set of questions, and the individual's score on each scale is derived from the sum of his/her scores from the questions in that scale. The problem-solving strategy has the 4 components of seeking social support, accountability, deliberate problem solving, and positive reassessment. The emotion-oriented strategy includes the 4 components of confrontation, avoidance, restraint, and flight. People respond to each item on a 4-point Likert scale ranging from 0 to 3 that shows the scope of each strategy (0 = "I have not used", 1 "I have used very little", 2 "I have used to some extent", and 3 "I have used a lot". Folkman and Lazarus reported the internal stability of the coping strategies as 0.66-0.79.[19] In Iran, the validity of the WCQ was obtained using Cronbach's alpha coefficient; the overall reliability coefficient was 0.86, and the problem-focused and emotion-focused coping strategy were, respectively, 0.82 and 0.88.[20]

Intervention component

Dialectical Behavior Therapy: In this study, DBT training included 8 weekly 90-minute sessions of group therapy. The intervention included the presentation of the goals and topics of discussions of each session, discussion, and exercises during and after the session. Additionally, from the second session onward, each session started with a 5-minute practice of comprehensive mindfulness through breathing and a review of the exercises of the previous session. Skills modules focused on mindfulness exercises, emotional regulation, distress tolerance, and interpersonal effectiveness. The subject and the content of the meetings are presented in table 1.

Cognitive-behavioral treatment: In this study, the trained CBT skills were taken from the standard CBT.[20] The CBT training included an 8-week group therapy of 90-minute sessions; the subject and the content of the meetings are presented in table 2.

Statistical Analysis: In this study, continuous variables were expressed as mean [standard deviation (SD)] and categorical variables as frequency (percentage). Demographic and clinical characteristics were compared among control, CBT, and DBT groups using one-way ANOVA (for continuous variables) and chi-square test (for categorical variables). Repeated-measures ANOVA was used to examine the effects of group, time, and group-by-time interactions on study variables. Data analysis was performed using SPSS for Windows (version 16.0; SPSS Inc., Chicago, IL, USA) and a $P < 0.050$ was considered statistically significant.

The Kolmogorov-Smirnov test diagnostic was used to assess the equality of distributions of the variables. These tests were performed separately for each group. According to the results of this test, the distribution of perceived stress scores, emotion-oriented coping style and problem-solving coping style in DBT, CBT, and control groups was normal ($P > 0.050$).

Table 1. Dialectical Behavior Therapy program overview

Session	Intervention component
1	Welcoming and, articulating the goals of the group's main meetings and rules, and expressing expectations from the participants in the therapy sessions
2	Fundamental skills for enduring confusion and distraction (imaging a safe place, discovering values, recognizing superior power, living in the present, using self-encouraging coping ideas, affirmative self-talk, and coping strategies)
3	Fundamental and Advanced Self-Awareness Skills
4	Fundamental and Advanced Self-Awareness Skills (deciding based on a wise mind, basic acceptance and beginner's mind, judgment, labeling and conscious communication with others, identifying resistances, barriers, meditation, etc.)
5	Fundamental and Advanced Emotional Regulation Skills (identifying emotions, how emotions act, overcoming barriers to healthy emotions, and reducing vulnerability
6	Basic and Advanced Emotional Regulation Skills (observing oneself, reducing cognitive vulnerability, increasing positive emotions, paying attention to and dealing with emotions, acting against extreme emotional desires, and problem solving)
7	Effective Basic and Advanced Communication Skills (such as passive behavior, maintaining balance between my own and others' requirements, relation of requirements and needs, key interpersonal skills, barriers to using interpersonal skills)
8	Effective Basic and Advanced Communication Skills (identifying requests, modifying requirements, requesting requests, bold suggestions, listening, saying no, and dealing with resistance and conflict, how to negotiate, and interpersonal problems)

Table 2. Cognitive-behavioral treatment program overview

Session	Intervention component
1	Familiarity of group members with each other, familiarity with cognitive-behavioral therapy, explanation of the impact of psychological factors on cardiovascular disease by a cardiologist, and setting treatment goals
2	Informing the patient of the symptoms of depression, anxiety, and stress, and identifying thoughts related to these symptoms
3	Distinguishing between thoughts and feelings, determining the relationship between thoughts and feelings, emotions, and behaviors, and paying attention to your feelings
4	Effective breathing training and muscle relaxation
5	Techniques to stop negative thoughts and challenge negative thoughts
6	Techniques to replace negative thoughts with positive ones
7	Problem solving skills
8	Reviewing exercises

Ethical consideration: This paper was extracted from the PhD thesis of Azam Nourisaeed in the Department of Psychology, Rasht Branch, Islamic Azad University, Rasht, Iran. The study was approved by the ethics committee of Rasht Branch, Islamic Azad University (#IR. IAU.RASHT.REC.1399.006). The trial protocol was approved by and registered in the Iranian Registry of Clinical Trials (IRCT20180205038626N5; https://irct.ir/ trial/47730).

Results

As shown in table 3, the total sample included 45 individuals (22 women and 23 men). The mean age of the participants in the DBT, CBT, and control groups was 36.7 ± 8.30, 37.8 ± 6.14, and 38.3 ± 7 years, respectability. No statistically significant difference was observed between the groups of participants in terms of age, gender, and educational level ($P > 0.050$). These findings provide support for the homogeneity of the groups.

Repeated measures ANOVA revealed the significant main effects of group ($F_{(2,42)} = 6.11$; $P = 0.005$) and time ($F_{(2,84)} = 28.48$; $P < 0.001$), and a significant group-by-time interaction ($F_{(4,84)} = 8.97$; $P < 0.001$) on perceived stress scores. As seen in figure 2 and table 4, perceived stress scores decreased in the posttest in the CBT and DBT groups, but not in the control group. The post hoc Bonferroni test showed a significantly lower perceived stress score in the CBT and DBT groups compared to the control group in both posttest and follow-up assessments (all $P < 0.050$).

For problem-focused coping scores, repeated measures ANOVA illustrated the significant main effects of group ($F_{(2,42)} = 7.33$; $P = 0.002$) and time ($F_{(2,84)} = 30.71$; $P < 0.001$), and a significant group-by-time interaction ($F_{(4,84)} = 12.86$; $P < 0.001$). As seen in figure 2 and table 4, problem-focused coping scores increased at posttest in both CBT and DBT groups, but not in the control group. The Bonferroni test showed that the mean of problem-focused coping scores in both posttest and follow-up assessments in the CBT and DBT groups was higher than that in the control group (all $P < 0.050$).

For emotion-focused coping scores, repeated measures ANOVA also indicated the significant main effects of group ($F_{(2,42)} = 17.41$; $P < 0.001$) and time ($F_{(2,84)} = 31.74$; $P < 0.001$), and a significant group-by-time interaction ($F_{(4,84)} = 14.90$; $P < 0.001$). As seen in figure 2 and table 4, emotion-focused coping scores decreased at post-test in CBT and DBT groups, but not in the control group. The Bonferroni test showed that the mean of problem-focused coping scores in the posttest and follow-up assessments in CBT and DBT groups was lower than that in the control group (all $P < 0.050$). In addition, the mean of emotion-focused coping scores in the DBT group was significantly lower than the CBT group in the posttest and follow-up assessment ($P = 0.012$ and $P < 0.001$, respectively).

Table 3. Patients' demographic characteristics in each group

Variable	Groups			P*
	DBT	CBT	Control	
Age (year)	36.70 ± 8.30	37.80 ± 6.14	38.3 ± 7.0	0.681
Gender (Male)	10 (66.7)	6 (40.0)	7 (46.7)	0.315
Educational level				0.330
Pre-diploma	2 (13.3)	3 (20.0)	1 (6.7)	
Diploma	3 (20.0)	7 (46.7)	7 (46.7)	
College education	10 (66.7)	5 (33.3)	7 (46.7)	

Values are presented as [n (%)] or mean ± SD. For categorical variables, chi-squared test was used. * $P < 0.050$ significance level

SD: Standard deviation CBT: Cognitive-behavioral therapy; DBT: Dialectical behavioral therapy; SD: Standard deviation

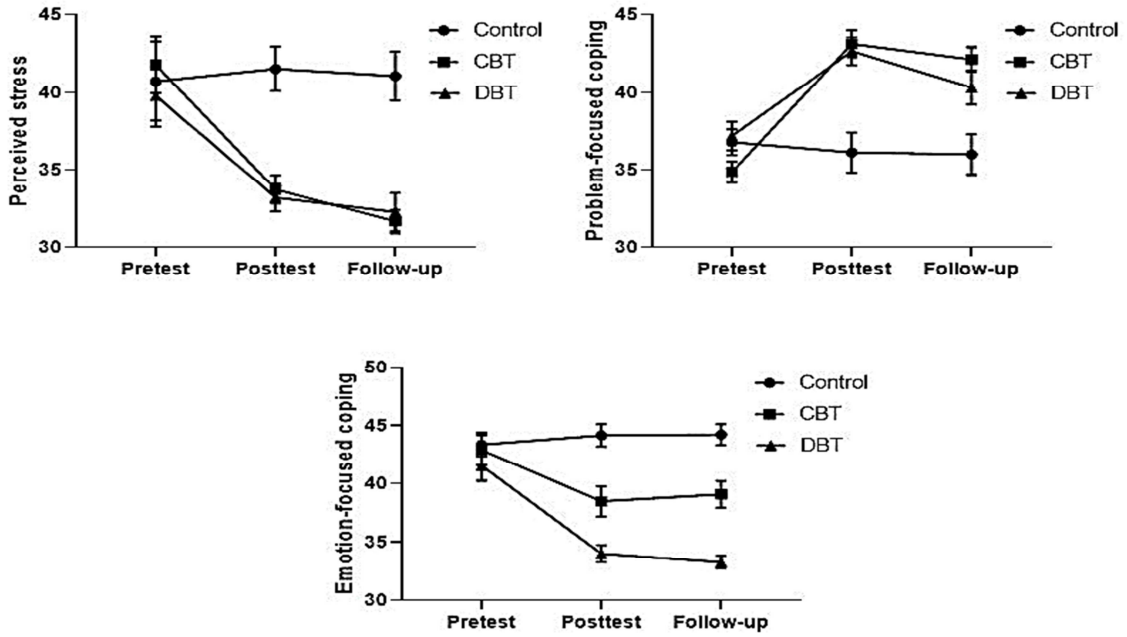

Figure 2. Perceived stress, problem-focused coping, and emotion-focused coping scores at pretest, posttest, and follow-up by study groups
Values are presented as mean ± SD.
CBT: Cognitive-behavioral therapy; DBT: Dialectical behavioral therapy; SD: Standard deviation

Discussion

In this study, we compared the effects of CBT and DBT on perceived stress and coping skills in patients after MI and found that DBT was more effective in improving emotion-focused coping than CBT. In recent years, different studies have indicated that MI patients experience more stressful situations compared to other patients.[13,21-23]

Norlund et al. indicated that CBT program was effective on symptoms of stress and depression in patients after MI.[24] Another research revealed statistically significant changes in stress levels, emotional pressure, the left side of the heart, and cardiovascular health. In fact, the study provides important implications in the field of stress, energy medicine, CBT, and the inter-relationship between the mind and the body.[25]

Furthermore, mindfulness-based interventions have been shown to promote depression and anxiety scores in patients with heart diseases undergoing cognitive-behavioral intervention compared with the control group.[10,26]

Table 4. Results of repeated measures analysis of variance examining the group and time effect on the study variables

Variable and Groups	Time			Effect		
	Pretest	Posttest	Follow-up	Group	Time	Group-by-Time
	Mean ± SD	Mean ± SD	Mean ± SD	P	P	P
Perceived stress				0.005	< 0.001	< 0.001
Control	40.7 ± 9.9$^{*,£}$	41.5 ± 5.5$^{*,£}$	41.1 ± 6.1$^{*,£}$			
CBT	41.8 ± 7.0$^{*,£}$	33.7 ± 3.5**,‡	31.7 ± 2.9$^{**,€}$			
DBT	39.8 ± 7.7$^{*,£}$	33.2 ± 3.5**,‡	32.3 ± 4.8**,‡			
Problem-focused coping				0.002	< 0.001	< 0.001
Control	36.8 ± 3.2$^{*,£}$	36.1 ± 5.0$^{**,£}$	36.0 ± 5.1$^{**,£}$			
CBT	34.9 ± 2.6*,‡	43.1 ± 3.3$^{*,£}$	42.1 ± 3.0$^{*,£}$			
DBT	37.2 ± 3.6$^{*,€}$	42.7 ±3.4$^{*,£}$	40.3 ± 4.3*,‡			
Emotion-focused coping				< 0.001	< 0.001	< 0.001
Control	43.3 ± 3.9$^{*,£}$	44.1 ± 3.8$^{*,£}$	44.2 ± 3.5$^{*,£}$			
CBT	42.9 ± 5.1$^{*,£}$	38.5 ± 5.1**,‡	39.1 ± 4.5**,‡			
DBT	41.5 ± 5.0$^{*,£}$	34.0 ± 2.9***,‡	33.3 ± 2.1***,‡			

SD: Standard deviation; CBT: Cognitive-behavioral therapy; DBT: Dialectical behavioral therapy
(*,**,***) In group comparisons, means followed by the same letter are not significantly different at the 0.05 level.
(£,‡, €) In time comparisons, means followed by the same letter are not significantly different at the 0.05 level.

Moreover, Hosseini et al. compared the efficacy of religious cognitive-behavioral therapy (RCBT), CBT, and sertraline on depression and anxiety in patients after coronary artery bypass graft surgery (CABG).[27] The results of their study did not confirm our findings. The lack of effect of the intervention found in this study may have several explanations, the sample size, different target group, or kind of treatment.[27]

Moreover, Mohamadi et al. demonstrated that DBT training had a greater impact on perceived stress; these findings were not in line with the results of our study.[10] This difference might be due to the sample size, type of disease, or target group.

In the present research, DBT training was more effective on emotion-focused coping than CBT and control group improvements among the subjects. The results of our study were similar to another study and their findings showed that the use of DBT techniques can improve the emotional regulation and perceived social support of heart patients, which plays an important role in preventing relapse.[28]

Overall, the main results obtained in our research were the significant effects of the problem-focused coping through CBT and DBT compared to the control group. The results of our study were in line with the results of Oladi et al.[29] However, Tavakoli et al. investigated the impact of DBT on interpersonal conflict resolution in patients with coronary heart disease (CHD).[30] They found that DBT can positively affect interpersonal conflict resolution in patients with CHD. Their findings were not in accordance with that of our study. This difference in results could be related to the sample size and type of tools used.

Researcher bias is always likely to be an effective factor in the collection and interpretation of data. In the present research, the researcher was an observer and in some ways a "complete participant" as a therapist sharing suitable experiences to aid in "building greater rapport with the people being observed". To counteract researcher bias, the statistical analysis was carried out separately after the study was over by others who are very proficient in statistical analysis. This enabled a separation between the research and the statistical analysis.

Another limitation was related to the participants' adherence to practice. Participants had agreed to do the homework, and many complied. A few who had not complied to the breathing practice and thought records were not as successful in positive changes as those who had done so. However, weekly home practice was not monitored or controlled in the present study. The participants were assessed weekly on their home practice at the start of each session, but they were not monitored after the session.

Another limitation was the inability to assess what went on in the therapy room with the participants; the researcher was the therapist for all the participants and no audio recordings were made of the sessions for the privacy of the participants. In CBT and DBT sessions, however, recordings can be made to assess the quality of the session and the therapist.

A suggestion for future researches is to increase the sample size in order assess the male/female groups separately. Ideally, a larger number of men and women participants would include individuals from other areas and geographic locations to yield more representative results of a broader population.

The use of a larger sample would also allow for the calculation of inferential statistics to determine whether any pretest and posttest changes noted were significant. The research design in future studies should also be adjusted to include a control group to allow for statistical comparisons to determine whether the pre- and post-changes noted differed significantly from the control. The gold standard of research, a randomized control group, would be ideal if cost and time were not an issue.

Home practice is an important part of self-improvement in CBT and DBT. Future researches could implement a more consistent control for home practice by asking participants to report on their practice at the beginning of each visit as email reminders might not be enough and can easily be avoided. In subsequent studies, patients should be categorized and evaluated based on the time elapsed since AMI and it is suggested that researchers increase the follow-up time interval.

Conclusion

In this study, we compared the effects of CBT and DBT on perceived stress and coping skills in patients after MI and found that DBT was more effective in improving emotion-focused coping than CBT. In this study, we tried to identify irrational and dysfunctional thoughts in patients with AMI and help patients become aware of the role of these factors in the disease, and then, replace these thoughts with more correct thoughts. In these sessions, negative self-reported thoughts were reviewed and these thoughts led to negative emotions (such as anxiety and stress). A list of cognitive errors that lead to negative thoughts about

the disease were reviewed and patients were instructed to identify these thoughts and the related emotions. Patients were then taught cognitive reconstruction techniques so as to reconstruct these thoughts and replace them with more compatible ones.

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This paper was extracted from the PhD thesis of Azam Nourisaeed in the Department of Psychology, Rasht Branch, Islamic Azad University, Rasht, Iran. The study was approved by the ethics committee of Rasht Branch, Islamic Azad University (#IR.IAU.RASHT.REC.1399.006). The trial protocol has been approved by and registered in the Iranian Registry of Clinical Trials (IRCT20180205038626N5; https://irct.ir/ trial/47730).

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Conflict of Interests

Authors have no conflict of interests.

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