



Original Article

Comparing the efficacy of mindfulness-based stress reduction training and compassion-focused training on stress coping styles in patients with coronary heart disease

Samaneh Elahi Mehr¹; *Hamid Nejat²; Hossein Akbari³; Ehsan Ormoz⁴

¹Ph.D. student in counseling, Mashhad Branch, Islamic Azad University, Mashhad, Iran.

²Department of Education Sciences, Mashhad Branch, Islamic Azad University, Mashhad, Iran.

³Department of Education Sciences, Qouchan Branch, Islamic Azad University, Qouchan, Iran.

⁴Department of Mathematics and Statistics, Mashhad Branch, Islamic Azad University, Mashhad, Iran.

Abstract

Introduction: This research aimed to compare the efficacy of Mindfulness-Based Stress Reduction (MBSR) training and Compassion-Focused Training (CFT) on stress coping styles in patients with coronary artery disease.

Materials and Methods: The statistical population of this clinical study consisted of all patients with coronary heart disease who referred to Saman Cardiology Clinic in Mashhad in July-August 2021. Forty-five patients were selected by voluntary method. They were randomly assigned into two experimental groups and one control group. The experimental groups received MBSR based on the Kabat-Zinn (2005) training plan, or CFT based on the Gilbert (2009) training plan in 8 sessions. The participants fulfilled the stress coping styles questionnaire of Lazarus and Folkman (1988). Data were analyzed using the mixed variance analysis test with repeated measures and SPSS-23 software.

Results: The results showed that training based on compassion increases the direct coping style and self-restraint and reduces the avoidance coping style and escape-avoidance coping style. The MBSR increases the responsibility coping style, planned problem-solving, positive reappraisal, and reduces escape-avoidance coping style, significantly ($P < 0.01$). Also, the efficacy of MBSR on responsibility was significantly higher than CFT ($P < 0.05$).

Conclusion: It seems that, mindfulness-based stress reduction training and compassion-focused training can improve the psychological condition of patients with coronary artery disease.

Keywords: Compassion, Coping styles, Coronary artery disease, Mindfulness, Stress

Please cite this paper as:

Elahi Mehr S, Nejat H, Akbari H, Ormoz E. Comparing the efficacy of mindfulness-based stress reduction training and compassion-focused training on stress coping styles in patients with coronary heart disease. *Journal of Fundamentals of Mental Health* 2023 May-Jun; 25(3): 169-178.

Introduction

Many studies have investigated the role of psychological factors in mortality and morbidity in patients suffering from heart diseases (1). Coronary heart disease is one of the most common types of cardiovascular

diseases and an important cause of death in the world (2). The amount of stress in cardiac patients is not only higher than others, but it can also be considered as a factor for the worsening of the previous disease. Therefore, it is necessary to control tension as a correctable risk factor

*Corresponding Author:

Department of Education Sciences, Mashhad branch, Islamic Azad University, Mashhad, Iran.

hnejat54@yahoo.com

Received: Dec. 23, 2022

Accepted: Mar. 15, 2023

through the use of coping strategies or coping behaviors in heart patients, which are different in each person depending on their efforts and cognitive ability (3). Stress coping styles are defined as a multidimensional concept that consists of cognitive and behavioral processes to manage internal and external needs in a specific stressful situation (4). In general, a person determines whether the situation can be controlled or not and evaluates his/her skills for effective responses. A healthy coping style is characterized by an effort to resolve personal, situational and interpersonal problems and an effort to overcome or minimize tension (5). The effect of a specific coping strategy may be different in the person who uses it, the person who sees it, or the person who evaluates it (6). Lazarus and Folkman (7) introduce two strategies to deal with tension as follows: problem-oriented style and emotion-oriented style. In problem-oriented style, people consider strategies that aim to reduce or eliminate the source of tension or action to solve the problem or change the situation if the problem is not solved. In emotion-oriented style, people take self-centered strategies and include all kinds of behaviors to reduce the distress caused by stressful factors. These behaviors also include showing negative emotions or seeking emotional support (8). Each of the strategies, if used correctly, can be useful for cardiovascular patients (9).

Mindfulness-based stress reduction method is an eight-week program based on psychological and medical scientific evidence to help people suffering from stress, anxiety, depression, and pain (10). In the sessions of mindfulness-based stress reduction training, a combination of cognitive training, meditation and strengthening non-judgmental attitude will be taught, which will help people to better understand and manage their thoughts and feelings to eliminate annoying feelings (11).

Based on the evidences, compassion-focused training can also lead to good outcomes in patients (12). Compassion-focused training helps people to be in a relationship with their suffering and pain instead of refraining or cutting off the relationship with it, creating a desire to remove the pain and be kind to them. It also includes the management of unnecessary judgments about incompetence, pain and failures (13). In other words, compassion-focused training encourages a person to focus on feeling self-compassion and understanding during

negative thought processes, or a strong focus on developing self-compassion. There are evidences that compassion-based training improve mental health in cardiac patients. This treatment is also considered as a suitable structure to support self-regulation in the cognitive, emotional and behavioral domains, especially in the context of chronic diseases (14). Some studies showed that the amount of perceived stress in cardiac patients is higher than others and they showed a relationship between coping styles with stress and improvement of cardiovascular outcomes (9,15,16). Regarding the impact of the stress reducing methods on mental health and quality of life in patients with cardiovascular diseases, this study aimed to compare the efficacy of stress reduction training based on mindfulness and compassion on stress coping styles in cardiac patients.

Materials and Methods

The statistical population of this clinical study consisted of all patients with coronary artery disease who referred to Saman Cardiology Clinic in Mashhad in July-August 2021. About 1000 patients were referred. The number of samples was considered to be 15 cases for each group (two experimental groups and one control group) (17).

So, 45 cases were selected through voluntary method and assigned into three groups randomly. The inclusion criteria included having at least a third middle school education, being over 18 years old and under 60 years old, willingness to participation, physical ability and the possibility of attending treatment sessions, and living in Mashhad.

The exclusion criteria included having psychiatric disorders or having family history of psychiatric disorders in first-degree relatives, failure to complete the questionnaire, substance abuse or alcohol use, and the history of receiving any psychological or psychiatric treatment. Ethical considerations were also observed. The process and goals of the research were fully explained. The written consent was obtained from the participations. The participants' names were not recorded in the questionnaires and reports.

The cases participated voluntarily. The participants were notified that the results will be interpreted for them if they wish and they were informed that participation in the research does not cause any financial, moral, social or other burden for them.

Research instrument

A) *Lazarus and Folkman Stress Coping Styles Questionnaire*: This questionnaire has 66 questions and 8 subscales of direct confrontation, avoiding or distancing, restraint, seeking social support, responsibility, escape-avoidance, planned problem-solving, and positive reappraisal. Also, these 8 subscales are summarized in the form of two general subscales of emotion-oriented strategy and problem-oriented strategy. The questions are scored on a 5-point Likert scale. Sixteen questions of this questionnaire are deviant and the other 50 questions evaluate the person's coping style. This questionnaire has been used in many studies and in different groups to measure coping strategies, so it is considered a standard and valid tool (18). The reliability of this questionnaire was assessed in Iran and Cronbach's alpha for the subscale of confrontation was 0.70, avoidance 0.61, restraint 0.71, social support 0.76, responsibility 0.66, escape-avoidance 0.72, planned problem solving 0.76, and positive reappraisal as 0.79 (19). Toosi et al. reported the reliability of this test equal to 0.85 (20). Mindfulness-based stress reduction training was implemented based on Kabat-Zinn's (21) training plan in a group method in eight 2-hour sessions per week. The content of mindfulness-based stress reduction training is followed:

First: The introduction of the automatic guidance system/ how to use awareness in the present moment of physical feelings, thoughts and emotions in reducing stress/ the exercise of eating raisins and giving feedback and discussing the exercise/ three-minute breathing space/ determining the next week's assignment

Second: Re-exercise of body inspection/ giving feedback and discussion about body inspection exercise/ breathing mindfulness meditation exercise/ yoga stretching exercise.

Third: Sitting mindfully with awareness of breathing (sitting meditation)/ doing yoga exercises/ three-minute breathing space exercise

Fourth: Re-doing the body check exercise/ doing conscious yoga exercises/ five-minute "seeing or hearing" exercise/ re-practicing conscious sitting with awareness of breathing and body.

Fifth: Breathing exercise/ retraining of conscious sitting (awareness of breathing, body, sounds, thoughts)/ explanations about stress and identification of participants' reactions to stress/ examination of awareness of pleasant and

unpleasant events on feelings, thoughts and bodily sensations/ performing mindful yoga exercises/ three-minute breathing space exercise

Sixth: Doing mindful yoga/sitting meditation

Seventh: Performing mountain meditation/ sleep health/ repetition of exercises from previous sessions/ preparation of a list of enjoyable activities.

Eighth: Body inspection exercise/ review of the whole program/ inspection and discussion about the programs/ stone, bead and marble meditation

Compassion-focused training based on Gilbert's (22) training plan was implemented in a group method in eight 1-hour sessions per week. The content of compassion-based training is followed:

First: The explanatory session, an overview of the structure of the meetings and the main rules of the group, the number and duration of the meetings, expressing expectations from the meetings, taking action to get to know each other, talking about coronary heart disease with the cooperation of the group members, examining the problems of the members, and conducting the pre-test

Second: Examining the positive and negative thoughts and feelings of the group members about coronary heart disease and the psychological problems caused by it, practicing physical examination and breathing, getting to know the brain systems focused on compassion, teaching empathy, explaining about compassion and presenting assignments, and homework

Third: Knowing the characteristics of compassionate people, compassion towards others, cultivating a warm and kind feeling towards oneself, cultivating and understanding that others also have defects and problems, in contrast to self-destructive feelings, and providing homework.

Fourth: Reviewing the homework, encouraging the subjects to self-identify and examine their personality as a person with compassion or without compassion according to the educational topics, identifying and applying exercises to cultivate a compassionate mind (empathy and sympathy towards oneself and others), teaching forgiveness, and providing homework.

Fifth: Reviewing the practice of the previous session, reconciling and applying the exercises of developing a compassionate mind (forgiveness, acceptance without judgment, and teaching tolerance), and presenting homework.

Sixth: Review of the exercise of the previous session, practical exercise of creating images

with compassion, teaching the styles and methods of expressing compassion (verbal, practical, partial and continuous compassion), applying these methods in daily life, and providing homework.

Seventh: Reviewing the practice of the previous session, teaching how to write letters with compassion for yourself and others, teaching how to record and keep a diary of real situations based on compassion and the person's performance in that situation

Eighth: The conclusion, reviewing the contents of the previous sessions, questions and answers to solve the questions, providing solutions to

maintain and apply this treatment method in daily life, and post-test implementation. Data were analyzed using the mixed variance analysis test with repeated measures and SPSS-23 software.

Results

In term of demographic variables, the mean age of the control group was 54.00 years, mindfulness group 52.80 years, and the compassion group 49.86 years. Also, most of the cases in the three groups were married and educated higher than diploma. Table 1 presents the descriptive findings of the variables.

Table 1. The scores of stress coping styles in different stages and groups

Source of change	Stage	Control (Mean ± SD)	MBSR (Mean ± SD)	CFT (Mean ± SD)
Direct confrontation	Pre-test	16.20 ± 1.37	15.60 ± 2.97	15.00 ± 2.67
	Post-test	16.00 ± 1.60	18.60 ± 2.47	20.47 ± 2.67
	Follow-up	16.27 ± 1.49	18.33 ± 1.91	19.73 ± 0.96
Avoidance	Pre-test	14.27 ± 0.88	14.40 ± 1.80	13.60 ± 2.06
	Post-test	14.33 ± 1.45	12.87 ± 1.73	11.60 ± 1.80
	Follow-up	14.20 ± 1.32	13.20 ± 1.66	11.67 ± 2.09
Restraint	Pre-test	18.80 ± 1.70	18.67 ± 1.99	18.93 ± 1.67
	Post-test	18.73 ± 1.39	22.07 ± 3.83	23.33 ± 2.89
	Follow-up	18.87 ± 1.46	20.67 ± 2.82	20.93 ± 2.19
Seeking social support	Pre-test	13.73 ± 2.31	14.93 ± 4.03	13.13 ± 2.75
	Post-test	13.33 ± 2.32	15.87 ± 4.07	14.07 ± 2.94
	Follow-up	13.80 ± 2.08	15.53 ± 3.91	15.27 ± 3.59
Responsibility	Pre-test	12.27 ± 0.88	12.00 ± 1.85	11.60 ± 1.12
	Post-test	12.67 ± 1.29	14.53 ± 0.92	14.60 ± 1.06
	Follow-up	12.80 ± 1.21	16.67 ± 2.50	13.60 ± 1.12
Escape-avoidance	Pre-test	26.20 ± 2.43	28.87 ± 2.45	28.47 ± 2.07
	Post-test	27.07 ± 1.83	22.60 ± 2.35	23.73 ± 3.69
	Follow-up	26.47 ± 2.00	19.67 ± 2.55	18.53 ± 2.03
Planned problem-solving	Pre-test	15.13 ± 1.30	15.27 ± 2.02	14.13 ± 1.81
	Post-test	15.20 ± 1.21	17.93 ± 2.69	17.87 ± 2.23
	Follow-up	15.07 ± 1.22	17.00 ± 2.90	16.13 ± 2.47
Positive reappraisal	Pre-test	18.00 ± 1.69	18.40 ± 2.61	17.60 ± 3.18
	Post-test	17.60 ± 1.92	22.47 ± 3.23	20.47 ± 4.26
	Follow-up	18.13 ± 1.46	24.40 ± 3.36	20.20 ± 3.23

The normality of the data distribution to perform the mixed analysis of variance test with repeated measurements was tested. Based on this, identifying using the Kolmogorov-Smirnov test, the multivariate normality of the data using the Mahalanobis distance (1971), assuming the absence of a significant difference in the pre-test of the two groups with using one-

way analysis of variance, checking the linearity of the relationship between variables using a scatter diagram, the assumption of homogeneity of the covariance matrix using the M-box test, and the homogeneity of variances using the Levene test were performed and confirmed.

Table 2. Results of repeated measurement variance analysis for stress coping styles according to time, intervention and the interaction of time and intervention

Effect		Test	Amount	F	df assumption	df error	P	η^2
Intergroup	Group	Pillai	1.099*	5.478	16	72	0.000	0.549
		Wilks lambda	0.191*	5.623	16	70	0.000	0.562
		Hoteling	2.706*	5.750	16	68	0.000	0.575
		Roy's greatest root	1.914**	8.613	8	36	0.000	0.657
Intragroup	Time	Pillai	0.958**	38.823	16	27	0.000	0.958
		Wilks lambda	0.042**	38.823	16	27	0.000	0.958
		Hoteling	23.007**	38.823	16	27	0.000	0.958
		Roy's greatest root	23.007**	38.823	16	27	0.000	0.958
	Time \times Group	Pillai	1.627**	7.640	32	56	0.000	0.814
		Wilks lambda	0.023**	9.514	32	54	0.000	0.849
		Hoteling	14.422**	11.718	32	52	0.000	0.878
		Roy's greatest root	12.044**	21.077	16	28	0.000	0.923

**Significance level 0.99

The results of the test showed that the main effect of measurement time is significant. That is, there is a significant difference between at least one of the components of stress coping styles in the pre-test, post-test and follow-up regardless of the group factor. Also, the results showed that the main effect of the group is also significant. That is, there is a significant difference between at least one of the components of coping styles in the three groups of MBSR, CFT, and the control group regardless of the measurement time factor. Also, the results of time interaction in the group indicated that the trend of changes in scores of at least one of the components of stress coping styles from pre-test to post-test and follow-up in the three groups was different significantly. To check the homogeneity of the error covariance matrix

related to the normal transformed dependent variables, Mauchelli's sphericity test was used, and the results of this test were significant for the components of avoidance, restraint, seeking social support, and positive reappraisal. It means that the assumption of sphericity is not established for this variable and therefore, the modified Greenhouse-Geisser degrees of freedom were used as the basis for reporting the F value (Table 3).

But for direct confrontation, responsibility, evasion and planned problem-solving were not significant and this means that the assumption of sphericity is established for this variable. In addition, in the case of significant intra-group and inter-group differences due to rejection of the assumption of sphericity, the Bonferroni post hoc test is used.

Table 3. Results of repeated measurement variance analysis of stress coping styles with Greenhouse correction

Source	Variable source	Test	SS	df	MS	F	P	Eta
Effect of time	Direct confrontation	Sphericity	209.378	2	104.689	49.80	0.000	0.542
	Avoidance	Greenhouse	37.215	2	23.083	17.44	0.000	0.293
	Restraint	Greenhouse	149.644	2	99.082	31.53	0.000	0.429
	Seeking social support	Greenhouse	19.615	1	13.790	5.34	0.015	0.113
	Responsibility	Sphericity	147.748	2	73.874	48.50	0.000	0.536
	Escape-avoidance	Sphericity	891.511	2	445.756	112.92	0.000	0.729
	Planned problem-solving	Sphericity	105.170	2	52.585	18.24	0.000	0.303
	Positive reappraisal	Greenhouse	206.326	2	118.649	37.72	0.000	0.473
Effect of time × group	Direct confrontation	Sphericity	138.044	4	34.511	16.42	0.000	0.439
	Avoidance	Greenhouse	21.141	3	6.556	4.95	0.003	0.191
	Restraint	Greenhouse	83.689	3	27.706	8.82	0.000	0.296
	Seeking social support	Greenhouse	23.319	3	8.197	3.17	0.033	0.131
	Responsibility	Sphericity	88.296	4	22.074	14.49	0.000	0.408
	Escape-avoidance	Sphericity	517.556	4	129.389	32.78	0.000	0.609
	Planned problem-solving	Sphericity	54.607	4	13.652	4.73	0.002	0.184
	Positive reappraisal	Greenhouse	152.607	3	43.879	13.95	0.000	0.399

The results of the mixed variance analysis test based on the sphericity statistic for the variables of direct confrontation, responsibility, escape-avoidance, planned problem-solving, and also based on Greenhouse's correction for avoidance, restraint, seeking social support, positive reappraisal, showed that in all eight components, the time factor had a significant effect on each of these variables. This shows that the scores of all the components of stress coping styles had a significant difference in at least one of the pre-test, post-test and follow-up stages. The results of the mixed variance analysis test based on the sphericity statistic for the variables of direct confrontation, responsibility, escape-avoidance,

planned problem-solving, and also based on Greenhouse's correction for avoidance variables, restraint, seeking social support, and positive reappraisal showed that the interaction of the time factor in the group had a significant effect on each variables, which shows that the scores of stress coping styles have a significant difference in at least one of the pre-test, post-test and follow-up stages.

To investigate the interaction of the intra-group variable, i.e. the measurement time and the inter-group variable, i.e. the type of intervention, on the styles of coping with stress are presented interactively with Bonferroni's post hoc test (Table 4).

Table 4. Intergroup effect test to compare the variables of stress coping styles

Variable source		SS	df	MS	F	P	Eta
Direct confrontation	Group	38.326	2	19.163	6.19	0.004	0.228
	Error	129.985	42	3.095			
Avoidance	Group	29.783	2	14.891	7.02	0.002	0.251
	Error	89.096	42	2.121			
Restraint	Group	41.378	2	20.689	5.29	0.009	0.201
	Error	164.178	42	3.909			
Seeking social support	Group	26.331	2	13.165	1.46	0.244	0.065
	Error	378.756	42	9.018			
Responsibility	Group	25.398	2	12.699	12.84	0.000	0.380
	Error	41.526	42	0.989			
Escape-avoidance	Group	86.178	2	43.089	11.20	0.000	0.348
	Error	161.511	42	3.846			
Planned problem-solving	Group	19.323	2	9.662	4.05	0.024	0.162
	Error	99.970	42	2.380			
Positive reappraisal	Group	112.538	2	56.269	8.51	0.001	0.289
	Error	277.422	42	6.605			

The results of the intergroup effect test showed that the intergroup effect in direct confrontation, avoidance, restraint, responsibility, escape-avoidance, planned problem-solving, and positive reappraisal at least in one of the stages (pre-test, post-test, and follow-up) is significant. With the significance of the inter-group effect, it can be said that there is a significant difference

between the experimental and control groups at least in one of the measurement stages for the components of stress coping styles.

To investigate the difference in the stress coping styles between the three groups, Bonferroni's post hoc test was used as a pair, and the results of this test can be seen in Table 5.

Table 5. Bonferroni's post hoc test between groups to compare significant differences in coping styles

Variable source	Group	Mean	SD	P	Significance 0.95		
					Low level	High level	
Direct confrontation	Control	MBSR	-1.356	0.642	0.123	-2.957	0.246
		CFT	-2.244	0.642	0.003	-3.846	-0.643
Avoidance	MBSR	CFT	0.889	0.642	0.521	-0.713	2.491
	Control	MBSR	0.778	0.532	0.453	-0.548	2.104
Restraint		CFT	1.978	0.532	0.002	0.652	3.304
	MBSR	CFT	-1.200	0.532	0.088	-2.526	0.126
Responsibility	Control	MBSR	-1.667	0.722	0.078	-3.467	0.134
	MBSR	CFT	-2.267	0.722	0.009	-4.067	-0.466
Escape-avoidance		CFT	0.600	0.722	1.000	-1.200	2.400
	Control	MBSR	-1.822	0.363	0.000	-2.728	-0.917
Planned problem-solving		CFT	-0.689	0.363	0.194	-1.594	0.217
	MBSR	CFT	-1.133	0.363	0.010	-2.039	-0.228
Positive reappraisal	Control	MBSR	2.867	0.716	0.001	1.081	4.652
		CFT	3.000	0.716	0.000	1.214	4.786
	MBSR	CFT	-0.133	0.716	1.000	-1.919	1.652
	Control	MBSR	-1.600	0.563	0.021	-3.005	-0.195
		CFT	-0.911	0.563	0.340	-2.316	0.494
	MBSR	CFT	-0.689	0.563	0.685	-2.094	0.716
	Control	MBSR	-3.844	0.938	0.001	-6.185	-1.504
		CFT	-1.511	0.938	0.345	-3.851	0.829
	MBSR	CFT	-2.333	0.938	0.051	-4.674	0.007

According to the results, there are significant differences between the control group and CFT for direct confrontation, avoidance, and restraint ($P < 0.01$), and the scores of CFT group are significantly higher than the controls. But, there are no significant differences between the scores of MBSR with control and CFT.

For the component of responsibility, there is a significant difference between the control group and the MBSR ($P < 0.01$) and the scores of the MBSR are significantly higher than the control group. Also, regarding this component,

there is a significant difference between the scores of MBSR and CFT ($P < 0.01$). For the escape-avoidance component, there is a significant difference between the control group and the MBSR and CFT ($P < 0.01$) and the scores of MBSR and CFT are significantly more than the control group. For the planned problem-solving component, there is a significant difference between the control group and the MBSR ($P < 0.01$) and the scores of the MBSR are significantly higher than is the control group. For the positive reappraisal

component, there is a significant difference between the control group and the MBSR ($P < 0.01$) and the scores of the MBSR are significantly higher than the control group.

Discussion

Based on the results, CFT increases the level of direct confrontation and restraint and decreases the avoidance, and escape-avoidance coping styles, significantly. Also, MBSR increases responsibility, planned problem-solving and positive reappraisal styles, and has been effective in reducing to use the escape-avoidance coping style. Also, there is a significant difference only between the efficacy of MBSR and CFT on the responsibility component of stress coping styles. Based on the results, the efficacy of MBSR on responsibility was higher than CFT.

There was no research in the field of comparing the efficacy of MBSR with CFT on coping styles in cardiac patients.

Although, in Iran, Izanloo et al. compared the effectiveness of CFT and MBSR on cognitive emotion regulation in patients with coronary heart disease. They assessed 45 patients who referred to cardiology department of Shahid Rajaei Hospital of Karaj city in 2019. The patients were divided into three groups of CFT, MBSR, and control. The experimental groups received intervention in eight sessions and all patients fulfilled the cognitive emotion regulation scale in pre-test, post-test, and follow-up. Based on the results, both treatments had a significant and positive effect on emotion regulation and there was no significant differences between two interventions (23). These findings support our results about the efficacy of CFT and MBSR on emotions and coping with stress.

In a research, Karimi et al. compared the effectiveness of compassion treatment and mindfulness stress reduction treatment in symptoms of type-D personality in patients with coronary arteries diseases. They revealed that both treatments reduced type-D personality symptoms, significantly. Although, CFT was more effective than MBSR to reduce the negative emotions of type-D personality (24). This finding support the effect of mindfulness and compassion on negative emotions in cardiac patients like as negative emotional coping styles.

There are studies which conducted on other physical patients and compared the

effectiveness of MBSR and CFT on psychological symptoms of these patients. For example, Shokoohi Nejad, Bayat, and Zanganeh Motlagh compared the effectiveness of mindfulness therapy and compassion therapy on automatic negative thoughts, quality of life, psychological symptoms, and pain intensity of patients who suffered from fibromyalgia. The researchers evaluated 30 patients through quality of life questionnaire (WHOQOL BREF), Depression, Anxiety, Stress Scale (DASS), pain intensity questionnaire, and questionnaire of automatic negative thoughts. These patients were divided into three groups (mindfulness therapy, compassion therapy, and control). The results indicated that both treatments can improve stress, anxiety, and depression of these patients. Also two interventions are effective on quality of life, negative thoughts, and pain intensity (25). These findings support the effectiveness of these interventions on stress and psychological symptoms in patients with chronic physical illnesses.

In the field of cardiovascular diseases, Ghahremani Ochghaz et al. compared the compassion therapy and mindfulness therapy on fear of compassion and self-criticism in 30 patients with heart failure. They found that compassion therapy decreased fear of compassion more than mindfulness therapy, but no significant difference was seen between two treatments in self-criticism (26).

Also, Amirkhani et al. assessed the effectiveness of CFT and MBSR on psychological flexibility of HIV patients. They concluded that both treatments were effective but the effect of CFT was greater than MBSR (27). These results indicated the effectiveness of mindfulness and compassion on patients who suffer from chronic and even incurable physical diseases.

In the field of stress coping styles, the effect of mindfulness-based stress reduction training on stress coping styles in the researches by Haji Aliani et al. (28), and Yahyai et al. (29). Their findings are consistent with the results of the present study.

Also, Babak et al. evaluated the effects of MBSR on blood pressure, depression, anxiety, stress, and quality of life in 80 hypertensive adult women. They found that MBSR intervention reduced mean systolic and diastolic blood pressure, decrease stress, anxiety, and depression scores significantly and

improved quality of life in these patients (30). These findings indicate the impact of MBSR on stress in patients with cardiovascular diseases.

In addition, Thai Bui et al. assessed the mediating role of self-compassion between perceived stress and proactive coping in 384 undergraduate students in Vietnam. They revealed the mediating role of self-compassion and they found among the six factors contributed in the concept of self-compassion, mindfulness is the most important factor that explain the relationship between perceived stress and proactive coping style (31). These findings are consistent with our results and indicate the role of self-compassion and mindfulness in coping with stress among healthy and ill patients. In this line, in New Zealand, Dev, Fernando, and Consedine found that self-compassion acts as a stress moderator in nurses and reduce their occupational burnout (32). Also, in line with the findings about the effects of compassion-based training on stress coping styles in patients with coronary heart disease, it can be said that coping with stress in ineffective and inconsistent ways not only improves emotions. Unpleasantness will not help, but will also increase the stress. In the present study, it was shown that compassion-focused therapy has reduced avoidant coping

style and increased direct coping in patients with coronary heart disease. Since people experience negative emotions such as sadness, discomfort, dissatisfaction and failure in their lives, they need to relieve themselves and smooth out their problems to deal with these negative emotions. People should increase self-compassion to deal with negative emotions and thus strengthen their emotional flexibility (33). So, these treatments based on mindfulness and compassion can improve coping styles in patients with chronic diseases to use more effective and problem-solving coping styles.

This study has some limitations such as limited patients to one cardiac clinic in one city, small sample size and non-matched patients in demographic variables.

Conclusion

It seems mindfulness-based stress reduction training and compassion-focused training can improve the psychological condition of patients with coronary artery disease.

Acknowledgements

The authors thank all participants. This study approved by ethical committee of Branch of Mashhad, Islamic Azad University. The authors declare any conflict of interest.

References

1. Dahale ABC, Menon JT. A narrative review of the relationship between coronary heart disease and anxiety. *Iran J Psychiatry Behav Sci* 2017; 11(3): e7722.
2. Joseph P, Raman Kutty V, Mohan V, Kumar R, Mony P, Vijayakumar K, et al. Cardiovascular disease, mortality, and their associates with modifiable risk factors in a multi-national South Asia cohort: a PURE substudy. *Eur Heart J* 2022; 43(30): 2831-40.
3. Svensson T, Inoue M, Sawada N, Charvat H, Iwasaki M, Sasazuki S, et al. for the JPHC Study Group. Coping strategies and cancer incidence and mortality: The Japan Public Health Center-based prospective study. *Cancer Epidemiol* 2016; 40(3): 126-33.
4. Wang H, Xia Q, Xiong Z, Li Z, Xiang W, Yuan Y, et al. The psychological distress and coping styles in the early stages of the 2019 coronavirus disease (COVID-19) epidemic in the general mainland Chinese population: A web-based survey. *PLoS One* 2020; 15(5): e0233410.
5. Masiran R, Ismail S, Ibrahim Na, Tan KA, Andrew B, Seng Choi C, et al. Associations between coping styles and psychological stress among medical students at Universiti Putra Malaysia. *Curr Psychol* 2018; 40(3): 101-12.
6. Apriliyani I, Maryoto M. The relationship between coping mechanisms and stress levels in thesis writing among undergraduate nursing students. *Advances in health sciences research* 2020; 20(9): 64-67.
7. Lazarus RS, Folkman S. *Stress, appraisal, and coping*. New York: Springer; 1984.
8. Leszko M, Iwański R, Jarzębińska A. The relationship between personality traits and coping styles among first-time and recurrent prisoners in Poland. *Front Psychol* 2020; 10(2): 29-69.
9. Williams RB, Barefoot JC, Schneiderman N. Psychosocial risk factors for cardiovascular disease: More than one culprit at work. *JAMA* 2003; 290(16): 2190-92.
10. Kriakous SA, Elliott KA, Lamers C, Owen R. The effectiveness of mindfulness-based stress reduction on the psychological functioning of healthcare professionals: A systematic review. *Mindfulness* 2021; 13(12): 1-28.
11. Cladder-Micus MB, Speckens A, Vrijzen JN, Donders AR, Becker ES, Spijker J. Mindfulness-based cognitive therapy for patients with chronic, treatment-resistant depression: A pragmatic randomized controlled trial. *Depress Anxiety* 2018; 35(10): 914-24.

12. Svendsen JL, Osnes B, Binder PE, Dundas I, Visted E, Nordby H, et al. Trait self-compassion reflects emotional flexibility through an association with high vagally mediated heart rate variability. *Mindfulness* 2016; 7(5): 1103-13.
13. Butz S, Stahlberg D. The relationship between self-compassion and sleep quality: An overview of a seven-year German Research Program. *Behav Sci* 2020; 10(3): 64.
14. Finlay-Jones A, Boyes M, Perry Y, Sirois F, Lee R, Rees C. Online self-compassion training to improve the wellbeing of youth with chronic medical conditions: protocol for a randomized control trial. *BMC Public Health* 2020; 6(20): 106.
15. Chavanon ML, Meyer T, Belnap BH, Huang Y, Abebe KZ, Rollman BL, et al. Emotion regulation in patients with heart failure: Its relationship with depressive symptoms and rehospitalization. *J Psychosom Res* 2019; 2: 10-98.
16. Appleton AA, Kubzansky, LD. Emotion regulation and cardiovascular disease risk. In: Gross JJ. (editor). *Handbook of emotion regulation*. New Jersey: Guilford; 2014: 596-612.
17. Delavar A. [The research method in psychology and educational sciences]. Tehran: Virayesh; 2020. (Persian)
18. Vaghee S, Mirzaei AA, Modarres Gharavi M, Ebrahimzadeh S. [The effect of relationship skills on coping styles of nursing students in stressful situations]. *The quarterly journal of Faculty of Nursing and Midwifery of Mashhad* 2011; 1(1): 91-102. (Persian)
19. Brooki Milan H, Kamarzarrin H, Zare H. [The effectiveness of cognitive-behavioral therapy on improvement of coping styles and addiction symptoms in substance dependent patients]. *The scientific quarterly journal of research in addiction* 2014; 8: 143-55. (Persian)
20. Toosi F, Alipoor A, Hashemi T, Babapour Kheiraddin J. [The relationship between coping styles and happiness in university students]. *The scientific quarterly journal of Tabriz University* 2010; 18(4): 71-86. (Persian)
21. Kabat-Zinn J. *Coming to our senses: Healing ourselves and the world through mindfulness*. NewYork: Hyperion; 2005: 52.
22. Gilbert P. Introducing compassion focused therapy. *Adv Psychiatr Treat* 2009; 15(4): 199-208.
23. Izanloo M, Peyvandi P, Borjali A, Sirafi MR, Mohsenzadeh Y. Comparison of the effectiveness of compassion-focused therapy and mindfulness-based stress reduction on cognitive emotion regulation among patients with coronary heart disease. *Journal of vessels and circulation* 2020; 1(3): 31-39.
24. Karimi M, Emadi SZ, Mohsenzadeh Y, Izanloo M. Comparison the effectiveness of compassionate treatment and mindfulness stress reduction treatment in reducing symptoms-type D Personality in patients with heart coronary arteries. *Journal of vessels and circulation* 2021; 2(4): 161-69.
25. Shokoohi Nejad N, Bayat MR, Zanganeh Motlagh F. Comparing the effectiveness of cognitive therapy based on mindfulness and compassion therapy on automatic negative thoughts, psychological symptoms, pain intensity, and quality of life in patients with fibromyalgia. *Journal of Arak University of Medical Sciences* 2021; 25(1): 156-73.
26. Ghahremani Ochghaz M, Mohammadkhani P, Hatami M, Mohammadrezaei R. [Comparing compassion-based therapy and mindfulness-based cognitive therapy to reduce fear of compassion and self-criticism in people with heart failure]. *Contemporary psychology* 2020; 15(1): 123-37. (Persian)
27. Amirkhani M, Ghorban Shiroodi S, ZARBAKHSH Bahri MR, Seyyed Ali Naghi SA. [Comparative effectiveness of compassion-based therapy and mindfulness-based stress reduction on psychological flexibility of HIV patients of Imam Khomeini hospital]. *Management strategies in health system* 2021; 6(2): 103-16. (Persian)
28. Haji Aliani V, Bahrami Ehsan H, Noferesti A. [The effect of cognitive therapy based on mindfulness on coping styles, depression and suicidal thoughts in university students]. *Journal of psychological sciences* 2020; 19: 1557-68. (Persian)
29. Yahyai Gh, Moshkbid Haghighi M, Jamshasb M. [The efficacy of mindfulness-based group training on aggression and stress coping styles in students]. *Proceeding of the Sixth International Conference of School, Tehran, Iran, 2020*. (Persian)
30. Babak A, Motamedi N, Mousavi SZ, Ghasemi Darestani N. Effects of mindfulness-based stress reduction on blood pressure, mental health, and quality of life in hypertensive adult women: A randomized clinical trial study. *J Tehran Heart Cent* 2022; 17(3): 127-33.
31. Thai Bui TH, Trang Nguyen TN, Dung Pham H, Thanh Tran C, Hien Ha T. The mediating role of self-compassion between proactive coping and perceived stress among students. *Sci Prog* 2021; 104(2): 1-14.
32. Dev V, Fernando NT, Consedine NS. Self-compassion as a stress moderator: A cross-sectional study of 1700 doctors, nurses, and medical students. *Mindfulness* 2020; 11: 1170-81.
33. Germer CK, Neff KD. Self-compassion in clinical practice. *J Clin Psychol* 2013; 69(8): 856-67.