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Website: www.jehp.net
DOI: 10.4103/jehp.jehp_660_19

# The effectiveness of mindfulness-based intervention on perceived stress and perception of disease in patients with acute coronary syndrome

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## Abstract:

**CONTEXT:** One of the most important issues in patients with coronary artery disease is their mental health indices such as perceived stress and perception of disease.

**AIMS:** The aim of this study was to evaluate the effectiveness of mindfulness-based intervention on the perceived stress and disease perception of patients with acute coronary syndrome.

**MATERIALS AND METHODS:** This is a clinical trial, two-group, and three-stage study on 76 patients with acute coronary syndrome who were randomly divided into intervention and control groups. Nine weekly sessions of mindfulness-based training program were administered to the intervention group. The control group received routine services during this period. Data collection was done before, immediately, and 1 month after the intervention, using the Perceived Stress Scale and the Illness Perception Questionnaire. Data were analyzed using descriptive and inferential statistics.

**RESULTS:** There was no significant difference between the mean scores of perceived stress and illness perception before intervention. After the intervention and 1 month after it, the mean score of perceived stress in the intervention group was statistically significantly lower than the control group ( $P < 0.001$ ), and the perception of disease in the intervention group was statistically significantly higher than that of the control group ( $P < 0.001$ ).

**CONCLUSIONS:** It is worthwhile to suggest the mindfulness-based training program to reduce the perceived stress and correct the perception of disease for patients with acute coronary syndrome.

## Keywords:

Acute coronary syndrome, illness perception, mindfulness, perceived stress

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Received: 04-11-2019  
Accepted: 05-01-2020  
Published: 28-05-2020

## Introduction

Coronary artery disease is the leading cause of premature death and disability in developed countries;<sup>[1]</sup> it is generally accepted that it is the most common cause of death in the world in the next few years.<sup>[2]</sup> In Iran, the prevalence of coronary artery disease and its resulting mortality is increasing, accounting for 46% of the causes of death. According to surveys, the prevalence of coronary artery disease in Isfahan is 19.4%.<sup>[3]</sup>

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In most patients with cardiovascular disease, mental disorders are seen as a comorbid condition,<sup>[4]</sup> which leads to a defective cycle of exacerbation and poor care and treatment outcomes.<sup>[5,6]</sup> One of the predictors of mental health status of the involved patients is their experience and understanding of stress.<sup>[7]</sup> The concept of perceived stress refers to the level of stress experienced by the individual as a function of the stressful events and coping strategies faced by them.<sup>[8]</sup> Some evidence has shown that the perceived stress in cardiac patients is an important predictor of mental well-being in these patients<sup>[9]</sup> and

**How to cite this article:** Nasiri Z, Alavi M, Ghazavi Z, Rabiei K. The effectiveness of mindfulness-based intervention on perceived stress and perception of disease in patients with acute coronary syndrome. *J Edu Health Promot* 2020;9:130.

the higher levels of perceived stress are associated with a higher risk of death in these patients.<sup>[10]</sup>

In addition to the perceived stress, the researchers nowadays have focused on the crucial role of the perception of disease and its relationship to many outcomes related to the care and treatment in the patients' physical and mental health.<sup>[11,12]</sup> Although awareness of the cardiovascular risk factors is essential for each individual to help him/her make informed decisions about the continuation of specific behaviors that increase the risk of the disease,<sup>[13]</sup> what is important is the individual's perception of the danger and the nature of the disease that affects his/her health-related performances. The results of studies have emphasized the dynamic relationship between the perception of disease and the mental health indices, especially in the cardiac patients, even though they identified it as a strong predictor of anxiety and depression in those patients.<sup>[14]</sup> It has also emphasized its effect on the adherence of treatment and quality of life in these patients.<sup>[15,16]</sup>

So far, the researchers have taken various steps to improve mental health and influence mental health determinants in patients with chronic diseases, especially heart disease. For example, the findings of the study by Sadeghimoghaddam *et al.* supported the impact of relaxation and prayer therapy on anxiety and hope in patients with coronary artery disease.<sup>[17]</sup> According to Zeraatkar *et al.*, considering the high costs of hospital stay and the length of cardiac disease treatment, the psychological intervention have significant impact on improving the patients' quality of life and their mental health.<sup>[18]</sup>

One of the interventions that has been considered in recent years and has been attempted to influence mental health indices and determinants in chronic patients is the mindfulness-based interventions. These interventions include various meditations, stretch yoga, introductory stress training, body exercises, and several cognitive therapy exercises that show the relationship between mood, thoughts, feelings, and physical sensations, and are a kind of therapies. The following three basic goals are pursued: (a) attention regulation; (b) metacognitive awareness; and (c) decentralization and acceptance of mental states and contents.<sup>[19,20]</sup>

Some researchers have investigated the effect of mindfulness-based interventions on the different aspects of health in chronic patients. The results suggest that these interventions play a key role in reducing perceived stress<sup>[21]</sup> and anxiety symptoms in cancer patients<sup>[22]</sup> and improving stress management in patients with asthma.<sup>[23]</sup>

One of the areas of increasing use of mindfulness-based interventions is medical centers and specialized heart

hospitals. Nowadays, the specialist doctors and nurses working in heart departments speak of the importance of mindfulness exercises alongside a healthy lifestyle to prevent heart disease. Some researches on this group of patients have shown that this intervention improves irregular cardiac activities<sup>[24]</sup> and may reduce the risk factors for these diseases.<sup>[25]</sup>

Based on the previous researches and studies, it was found that despite increasing attention to the mental health status of cardiac patients, the focus of studies is not on the predictive and preventable indices of mental health (such as perceived stress and perception of disease). They have focused on the indices of the occurrence of mental disorders (such as depression and anxiety disorders). The literature review also shows that despite the value and importance of mindfulness-based interventions in chronic disease patients, the impact of these interventions, especially on these indices in cardiac disease patients, has not been addressed. The purpose of this research is to investigate the effect of mindfulness-based intervention on the perceived stress and perception of disease in patients with acute coronary syndrome.

## Materials and Methods

The present study was a pretest-posttest study with a follow-up clinical trial conducted from September 2018 to July 2019.

### Setting and sample

The study population comprised patients with acute coronary syndrome who were admitted, being discharged, or discharged (within a week before) in the internal wards of Chamran Medical Center affiliated with Isfahan University of Medical Sciences (IUMS), Iran. They were selected by convenience sampling method. After selecting the participants, they were randomly assigned to two (i.e. intervention and control) groups of 38 people [CONSORT diagram, Figure 1].

### Inclusion criteria

The inclusion criteria for participation in the study were completion of the consent form, ability to attend interventional sessions, minimum reading and writing literacy, age between 35 and 70 years, no attendance in other training and treatment courses over the past year, having coronary artery disease diagnosed (based on clinical and paraclinical diagnosis and file summary), being fully alert as required to attend in the intervention sessions, having ability to complete the research instruments, and living in Isfahan city. Patients who did not have these conditions, had other concomitant diseases, had a medical history of psychiatric diagnosis, or had mental retardation were not included in the study.

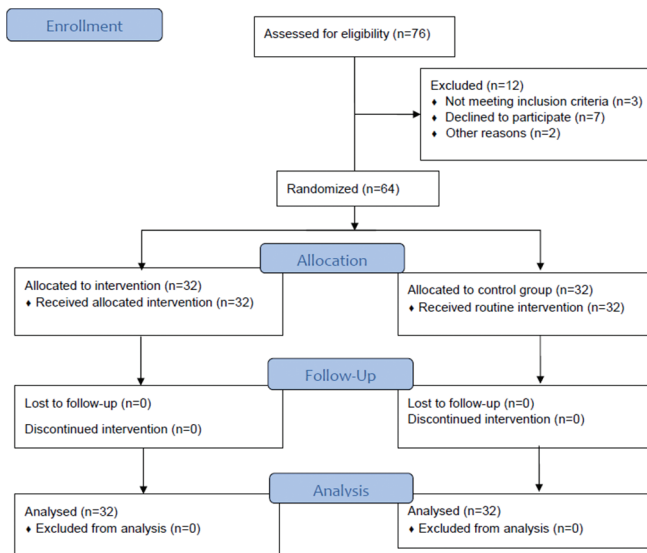


Figure 1: CONSORT followflow diagram of the study

### Data collection and instruments

Data were collected by a three-part assessment tool, first of which included demographic and personal information questionnaire (i.e. age, gender, marital status, occupation, insurance status, history of hospitalization, education level, financial status, and duration of disease).

#### Perceived Stress Scale-14

This questionnaire was developed by Cohen *et al.*<sup>[8]</sup> and has three 4-, 10-, and 14-item versions to measure perceived general stress over 1 past month. The 14-item scale measures thoughts and feelings about stressful events and the ability of controlling, overcoming, and coping with mental stress and experienced stress through examining responses. Each item is awarded based on a 5-point Likert scale of “never” 0, “almost never” 1, “sometimes” 2, “often” 3, and “most often” 4. Items 4, 5, 6, 7, 9, 10, and 13 are reverse coded. The lowest score is 0 and the highest is 56. In the study by Cohen *et al.*, the internal consistency coefficients for each subscale and overall Perceived Stress Scale (PSS) score ranged from 0.84 to 0.86.<sup>[8]</sup> In a study by Safaei and Shokri, the Persian version of PSS has been evaluated and Cronbach’s alpha coefficients for the total perceived stress score has been reported as 0.76.<sup>[26]</sup>

#### Brief Illness Perception Questionnaire

The brief Illness Perception Questionnaire (IPQ) has nine subscales designed by Broadbent *et al.*<sup>[27]</sup> to assess the emotional and cognitive visualization of the disease. The number 0 represents the lowest level and the number 10 represents the highest level of perception. The overall score for illness perception indicates a grade based on which the patients perceive their illness as a threatening or benign factor. Cronbach’s alpha for this questionnaire was 0.80, and the reliability-retest coefficient of 6 weeks was 0.42–0.75.<sup>[27]</sup>

### Study process and intervention

Before the study process, this trial was registered in the Iranian Registry of Clinical Trials (IRCT) (code: IRCT20160927030002N2). After official arrangements for conducting the intervention, the participants from both groups were asked to participate in a briefing. At this meeting, outlining the aims of the research, it was attempted to gain the necessary motivation and consent of the clients to participate in the research. The clients completed the consent form to participate in the research and were assured that the information presented in the interventional sessions and the results of the questionnaires would be confidential.

The interventional group received a mindfulness-based program during nine 2-h sessions (one session per week) [Table 1] at the hospital and the control group received no intervention other than routine services. Data collection was done in three stages of before, immediately, and 1 month after the intervention. In order to appreciate the control group’s participation, after the follow-up stage, four similar compressed sessions of intervention were held for them.

### Ethical considerations

This study was approved by the Deputy Dean for Research Affairs (grant number 397665) and Ethics Committee (code: IR RESEARCH. REC.1397.491) of IUMS. All participants completed and signed informed consent form, and they were free to discontinue participating in this study whenever they wished.

### Data analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 18 (SPSS Inc., Chicago, IL, USA). Data were analyzed using descriptive and inferential statistics. Independent sample *t*-test, Chi-square test, and Fisher’s exact test were used for between-group baseline comparisons. Analysis of covariance was used for between-group comparisons to assess the effect of intervention on PSS and IPQ scores controlling for baseline scores. Assumptions of normality and homogeneity of variance were assessed using Kolmogorov–Smirnov test and Levene’s test.

### Results

Patients were in the age range of 35–70 years. The age range of the participants in the intervention group was 34–72 years, with a mean of 52.71 and a standard deviation of 10.94; in the control group, it was from 15 to 72 years, with a mean of 52.16 and a standard deviation of 13.56 years. The independent sample *t*-test showed that the mean age was not statistically significantly different between the two groups ( $t = 0.17$ ,  $df = 0.62$ ,  $P = 0.86$ ).

Other demographic characteristics of the participants were compared between the two groups and their results are reported in Table 2. The results showed that there was no significant difference between the two groups in terms of demographic variables and disease characteristics. Table 3 summarizes the statistics for between-group comparison of PSS and IPQ scores. According to the findings, the mean score of perceived stress immediately and 1 month after the intervention was statistically significantly lower in the intervention group than that of the control group ( $P < 0.05$ ). In addition, the results showed that the mean score of illness perception immediately and 1 month after the intervention was

statistically significantly higher in the intervention group than that of the control group ( $P < 0.05$ ).

## Discussion

The purpose of this research was to investigate the effect of mindfulness-based intervention on the perceived stress and perception of illness in patients with coronary artery disease. The results of the research showed that the mindfulness-based intervention can significantly reduce the perceived stress and this effect has been continued 1 month after the intervention. This finding is in line with that of the studies demonstrating

**Table 1: Mindfulness training program**

Content
Session 1: Recognition of excitements, compositional excitements, describe excitement, enjoy the beauty of nature
Session 2: Skill one: Focus on a particular object, skill two: Focus on a single moment, familiarity with the concept of mindfulness at the moment, see the wonders of the present moment
Session 3: Skill three: Inner and outer experience, The concept of physical mindfulness, eating raisins, the great taste of mindfulness, enjoy the journey
Session 4: What is the excitement? What is the feeling? Recognition of excitements, familiarity with some types of excitement, awareness of feelings and excitements, providing a list of main feelings and subfeelings, listening to unpleasant excitements
Session 5: What is the excitement? What is the feeling? recognition of excitements, familiarity with some types of excitement, awareness of feelings and excitements, providing a list of main feelings and subfeelings, listening to unpleasant excitements
Session 6: Recognition of thoughts, necessity of training, identifying the difference between thought and feeling, and the concept of thought in mindfulness, Skill five: The fault of thought, Skill six: Record 30 min of thought, keep in your mind that you are different from your thoughts
Session 7: Understanding the concepts of body, thought, and feeling mindfulness, skill seven: mindful breathing
Session 8: A few key methods for a mindful life, Skill eight: A mindful diet, mindfulness in mindful activities

**Table 2: Baseline demographic and clinical characteristics of the study participants**

Variable	Characteristics	Group control, n (%)	Intervention group, n (%)	$\chi^2$	df	p																																																																																																			
Gender	Female	14 (43.8)	12 (37.5)	0.26	1	0.61 <sup>a</sup>																																																																																																			
	Male	18 (56.2)	20 (62.5)				Marital status	Married	27 (84.4)	28 (87.5)	-	-	0.50 <sup>b</sup>	Single	5 (15.6)	4 (12.5)	Job	Employee	28.1 (9)	3 (9.4)	6.63	4	0.14 <sup>a</sup>	Worker	3 (9.4)	6 (18.7)	Free	3 (9.4)	7 (21.9)	Homemaker	14 (43.7)	15 (46.9)	Others	3 (9.4)	1 (3.1)	Supported by insurance		29 (90.6)	32 (100)	-	-	0.12 <sup>b</sup>	History of admission		3 (9.4)	6 (18.8)	-	-	0.2 <sup>b</sup>	Variable	Characteristics	Group control, n (%)	Intervention group, n (%)	Z		p	Level of education	Elementary	9 (28.1)	3 (9.4)	0.78		0.44 <sup>c</sup>	Cycle degree	9 (28.1)	9 (28.1)	Diploma	7 (21.9)	7 (21.9)	Associate degree	1 (3.1)	1 (3.1)	Bachelor's degree and higher	5 (15.7)	5 (15.7)	Income status	Less than spending	12 (37.5)	15 (46.9)	0.59		0.55 <sup>c</sup>	At the expense level	20 (62.5)	16 (50)	More than spending	0	1 (3.1)	Duration of the disease (year)	<1	23 (71.9)	20 (62.5)	0.93		0.35 <sup>c</sup>	1-3	4 (12.5)	4 (12.5)	4-6	3 (9.4)	3 (9.4)	7-9	0 (0)	1 (3.1)	10 and more
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<sup>a</sup>Chi-square test, <sup>b</sup>Fisher's exact test, <sup>c</sup>Mann-Whitney U-test

**Table 3: Comparison of mean scores of perceived stress and illness perception in the intervention and control groups before, immediately, and 1 month after intervention**

Variable	Time	Group control		Intervention group		Test statistics t (df) or f(df)	p
		Mean	SD	Mean	SD		
Perceived stress	Before intervention	31.02	5.74	30.83	7.86	t (df)= 0.11(62)	0.91*
	Immediately after intervention	32.06	0.61	28.01	6.97	f (df)= 17.25 (1)	<0.001**
	1 month after intervention	33.75	3.78	23.03	7.79	f (df)= 48.35 (1)	<0.001**
Brief illness perception	Before intervention	45.47	6.95	46.63	15.08	t (df)= 0.39(60)	0.69*
	Immediately after intervention	44.56	2.94	49.41	9.01	f (df)= 9.50 (1)	<0.003**
	1 month after intervention	46	3.80	57.75	11.55	f (df)= 32.61 (1)	<0.001**

\*T-test, \*\*ANCOVA. ANCOVA=Analysis of covariance, SD=Standard deviation

the benefits of mindfulness training to effectively manage perceived stress.<sup>[28,29]</sup> Our findings are also consistent with the results of the research conducted by Radmehr and Yousefvand,<sup>[30]</sup> supporting the reduction of perceived stress in patients with coronary artery disease, and have been supported by Akbari *et al.*,<sup>[31]</sup> who supported the effect of mindfulness training on perceived stress of cancer patients. According to Snippe *et al.*,<sup>[28]</sup> mindfulness-based intervention reduces negative affect (i.e. stress sensitivity) and also reduces the extent to which individuals perceive their living situations as stressful.

Furthermore, according to the findings of the study, the intervention was able to significantly modify the perception of the disease both after the intervention and 1 month after it. The findings of the present research on the illness perception are in line with the findings of some studies in the field of other diseases. For example, this finding is similar to the findings of the study conducted by Fowler and Baas in identifying and positively perceiving the disease in order to minimize the perceived consequences of the disease in patients with chronic kidney disease who underwent hemodialysis.<sup>[32]</sup> We can refer to the findings of a study done by Scharloo *et al.* in restructuring the perception of the disease, in order to better treat people recently diagnosed with head-and-neck cancer.<sup>[33]</sup> The findings of the study conducted by Ljótsson *et al.*<sup>[34]</sup> confirm the effectiveness of mindfulness-based intervention in reducing the psychological symptoms of patients with irritable bowel syndrome. That is the case also about the findings of a study done by Mohamadi *et al.*<sup>[35]</sup> that supported the effectiveness of this intervention in improving the perception of illness in patients with irritable bowel syndrome in Iran.

This study provides evidence in support of the feasibility and effectiveness of mindfulness-based intervention in patients with acute coronary syndrome.

Limitations of the study included reliance on self-report data and absence of a long-term follow-up. Another limitation of the study was that the studied sample was

restricted to Isfahan patients only, so caution should be exercised in generalizing its results. Further research is needed to confirm these results and to examine the potential of such interventions.

As the use of mindfulness-based training intervention was associated with a decrease in perceived stress and a positive perception of disease in patients with coronary artery disease, it is suggested that nurses and other health professionals be able to use this technique so that they can communicate more effectively with these patients in order to take steps to improve their mental health.

## Conclusions

Considering the mindfulness-based training intervention, it may be worthwhile to suggest launching this training program in respective units to reduce the perceived stress and correct the perception of disease for patients with acute coronary syndrome.

## Acknowledgment

This study was approved by the Research Committee of IUMS (code: IR RESEARCH.REC.1397.491). The authors express their gratitude to the Research Deputy of the IUMS. The authors also thank all the study participants who made this study possible through their cooperation and support.

## Financial support and sponsorship

This study was financially supported by IUMS, Isfahan, Iran.

## Conflicts of interest

There are no conflicts of interest.

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