

Does Mindfulness Training Affect Rumination in Women with Breast Cancer?

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Abstract

Background: Cancers cause not only physical and social impairments but also psychological stress responses such as rumination, which require more attention from researchers as well as clinicians.

Aim: This study aimed to investigate the effect of mindfulness training on rumination in women with breast cancer.

Method: This randomized controlled trial was performed on 46 women with breast cancer in Bushehr city (2018). Subjects were randomly assigned to two intervention and control groups. The intervention was 8 sessions of group mindfulness training. A rumination questionnaire was administered before the intervention, immediately, and one month after the intervention. The data were analyzed by analytical tests at the 0.05 significance level.

Results: There was no significant difference between the rumination scores of the intervention group at the three stages of measurement. For the control group, the mean rumination scores at the posttest and follow-up stages were both significantly higher than the pretest score ($P < 0.001$). Also, the follow-up mean rumination score of the control group was significantly higher than that posttest ($P = 0.02$). Comparison of the two groups where adjusted for baseline, showed a significant difference between the two groups in terms of mean rumination score at the posttest stage ($P = 0.01$) and at the follow-up stage ($P < 0.001$).

Conclusion: Subjects in the intervention group were more successful in avoiding increasing rumination than those in the control group, an ability that must be attributed to the effect of mindfulness training. Still, further research is needed to determine whether longer interventions will be able to reduce rumination.

Trial registration

Trial registration number: IRCT20090522001930N2

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Introduction

Many people face psychological trauma that occurs as a result of distressing events and causes post-traumatic disorder (1). Cancer is one of those events; apart from the negative physical effect, the diagnosis of cancer, as a chronic medical problem, intensifies the mental disorders (2), provides the basis for many mental-psychological disorders, and causes poor quality of life (3). In Iran, cancer is the second most common non-contagious disease and the third cause of mortality following cardiovascular diseases and other natural disasters. Breast cancer is the most prevalent disease in women (4). Based on the statistics reported in 2019, breast cancer solely consists of 30 percent of all newly-diagnosed cancer related to women (5). Based on the latest statistics of the Cancer Research Center, around 8500 cases of breast cancer are registered in Iran annually and 1400 cases lose their lives (6). Physical and social dysfunction happens after the diagnosis of breast cancer and its treatment. Further, it imposes sexual dysfunction, mentality changes, and psychological disorders such as depression, anxiety, feelings of worthlessness,

frustration, reactions such as denial, anger, and feeling guilty; and it hurts the general health of patients and disorganizes their life routines (7). Among the many possible variables that can develop psychological disorders, it seems that rumination requires more attention (2). Rumination is defined as a constant preoccupation with thoughts. Rumination is a layer of mindful thoughts. Most of the people believe that they must try to concentrate on their inside during the depression period because they think that such assessment and concentration give them an attitude to find a solution to their problem. Thus, they will have rumination which extends their depression (8). In recent years, rumination has been increasingly considered as one of the main components of depression (9). Rumination is defined as a constant preoccupation with thoughts. It is a layer of mindful thoughts centered on a specific thing and they are reproduced independent of environmental demands (10). Based on the estimation of WHO, the rate of psychological problems such as rumination and concerns in patients with cancer is estimated 8 times higher than the healthy people (11) and 80 percent of these patients feel concerned, frustrated and have rumination at the first stages of their treatment (12); therefore, they must learn skills to think and react logically facing difficulties and tensions.

Different interventions on overcoming the rumination were examined in different diseases and reported different results (13, 14). Mindfulness-based stress reduction: MBSR is one of those interventions (15). MBSR is a group of psychological intervention that includes mindful meditation and yoga exercises. Aiming at mitigating stress and symptoms of the disease, MBSR was tested in many chronic diseases such as cancer (16). Various studies investigated the effect of mindfulness on mental and physical variables in patients with breast cancer and each of them reported different results. For instance, Campbell et al (2012) and Heydarian et al (2016) found that mindfulness decreases rumination in women with cancer (16, 17). Andersen et al (2013) examined the effect of mindfulness on sleep quality and found that although mindfulness has a short term and minor effect on sleep disorders of patients with breast cancer, it was not effective in follow up period (18). Other studies investigated the effect of mindfulness on the level of lymphocytic biomarkers (19), Physiological symptoms (16, 20), quality of life (21, 22), pain (21), psychological status (22), fatigue (19), rumination (16, 17, 23), depression and stress (24) and sexual function (16, 25, 26) and each reported contradictory results. Paradoxical results from literature reviews, domestic studies in available databases and rumination as the main component in depression, affect problem-solving and people's motivation and can cause an absence of adaptation with disease and affect the course of treatment and prognosis. Furthermore, we cannot ignore the cultural and social effects on human behaviors and consequently the incidence of behavioral and mental disorders, treatment search, and the effectiveness of psychological interventions (27). Considering this issue, nursing is one of those professions which facilitates the use of complementary medicine. In this regard, holistic care, nursing theories, prominent categories in nursing science, and nursing ethics justify the necessity of using complementary medicine is the nursing function (28). Nurses and complementary medicine consider the patients as a whole in all stages of life and their relationship with the environment (29); Further, this study seeks to find whether mindfulness training affects the rumination of women with cancer.

Methods

The present study was a randomized controlled trial done as pretest-posttest and follow-ups with control and intervention groups. The study adheres to CONSORT guidelines. The sample included all women with breast cancer referred to the Hematology ward at Bushehr hospitals, Oncologist's offices, and Shafashar Hematology clinic, Bushehr in 2018, and Convenience Sampling was done as well. According to Falsafi et al. (2019) (23), the sample size was estimated concerning the mean and standard deviation of rumination in the intervention ($M = 45.10$, $SD = 37.83$) and control ($M = 7.53$, $SD = 5.97$) groups and the alpha Type I error ($\alpha = 0.05$) and 90% power for each group ($n = 23$). The sampling was done with a convenience method. Samples were randomly classified into intervention and control groups. Inclusion criteria included consent and willingness to participate in the study, undergoing breast surgery at least lobectomy, reading and writing literacy to fill out the questionnaire, having physical ability to attend the meeting and cooperate in doing assignments, and passing at least three months from the last chemotherapy/ radiotherapy. The exclusion criteria included unwillingness to continue the intervention, patient's death, illness severity, traveling, and physical disability due to treatment periods, thus making the patient's participation impossible. The data collection tools included demographic and rumination questionnaires. Rumination questionnaire evaluating four different reactions to the negative tempers was designed by Susan Nolen-Hoeksema and Marlo (1991). The response styles questionnaire consists of rumination response and distracting response scales. The scale of rumination responses includes 22 phrases and the respondents were asked to scale each of them from 1 (never) to 4 (sometimes). The lowest and highest scores are 22 and 88, respectively. In Iran, this questionnaire was translated to Farsi by Bagherinejad, Salehi, and Tabatabaei. In their studies, the correlation of this questionnaire with depression and anxiety scores in a sample of Iranian students was 0.63, and Cronbach's alpha coefficient was reported 0.88. In general, the results of different studies suggest that the questionnaire has high internal validity and its Cronbach's alpha ranges from 0.88 to 0.92. Test-Retest correlation for more than 12 months was reported to be 0.67 (30). The intervention was performed from 21/4/2018 to 23/7/2018. First, the aims and research methodology were elaborated to patients before signing the consent form and after checking the medical files. Patients willing to participate in the study were randomly allocated into two groups. Then, the demographic data form and rumination questionnaire were filled by each woman with breast cancer.

The intervention was done based on the Kabat-Zinn MBSR protocol (1990). For the effectiveness of mindfulness training, the intervention group was divided into two groups ($n = 13$). Each group was trained in eight sessions of mindfulness training (90 min). To persuade and motivate the participants, commuting and catering costs were paid by the research team. The intervention was done in a silent place specific for the mindfulness training and it was carpeted and equipped with chairs, visual learning. Each session practices were shared in the Whatsapp group and followed up. In the control group, no intervention was performed.

A rumination questionnaire was filled by the participants of both groups before the intervention, immediately after the intervention, and follow-up (one month after the intervention). Further, due to the ethical considerations, the participants of the control group who were willing to get the education program received a pamphlet and CD containing MBSR tutorials and they were introduced to the MBSR training group. Data were analyzed using SPSS 19. Concerning research objectives, descriptive statistical indicators

(mean, standard deviation, percentage, frequency) and analytical tests, Chi-Square and Mann-Whitney were used to compare demographic variables, repeated measures ANOVA, and analysis of covariance. It is worth noting that the assumptions related to the analysis of covariance and repeated measures ANOVA were considered. The Significant level was less than 0.05. In the analysis of covariance, the score of pretest rumination was considered as covariance.

Results

The mean age of the intervention and control group was 44.50 ± 7.72 and 49 ± 7.48 , respectively. There was not a statistically significant difference between the mean age ($P = 0.06$, $Z = -1.884$) and mean duration of disease. Other demographic data were similar in both homogenous groups (Table 1). The repeated measures ANOVA suggested that in the intervention group, the mean score of rumination among three times was not significantly different; but in the control group, the difference among three times was statistically significant (Table 2). Post hoc test demonstrated that the mean score of rumination increased immediately and one month after the intervention compared to pre-intervention ($P < 0.01$). Moreover, the mean score of rumination in the control group increased significantly one month after the intervention compared to immediately after the intervention ($P = 0.02$). Figure 1 shows the ascending and descending (non-significant) trends of rumination scores in control and test groups, respectively. Considering the effect of pre-intervention, the comparisons suggested that there is a significant difference between control and test groups regarding the rumination score immediately and one month after the intervention.

Table 1
Comparison of demographic variables and the variables related to disease between intervention and control groups

		Control	Intervention	Fisher or χ^2
		No. (%)	No. (%)	No. (%)
Education level	Primary school	3(13.6)	10 (41.7)	0.157
	Secondary school	3(13.6)	3(12.5)	5.17*
	Diploma	5(22.7)	5(20.8)	
	Academic	11(50)	6(25)	
occupation	Housewife	15(68.2)	18(75)	0.746
	Employed	7(13.8)	6(25)	0.263*
Insurance	Medical Services	3(13.6)	7(29.2)	0.71
	Army forces	6(27.3)	1(4.2)	5.17*
	SS	13(59.1)	16(66.7)	
breast surgery	Complete removal of a breast	10 (45.5)	15(62.5)	0.303
	Complete removal of both breasts	1(4.5)	0	2.045*
	Removal of a part of the breast	11 (50)	9(37.5)	
The dose of tamoxifen	None	5(22.7)	12(50)	0.69
	20 mg	5(22.7)	3 (12.5)	2.695*
	40 mg	12(54.5)	9(37.5)	

Table 2
comparison of scores of rumination before the intervention, immediately after and one month after the intervention in patients of control and intervention groups in Bushehr, 2018

	Group	before the intervention	immediately after the intervention	one month after the intervention	Comparison of three times		
		Mean (SD)	Mean (SD)	Mean (SD)	Mean square	F	Sig
Variable	Intervention	43.18 (13.59)	40.36(10.28)	40.82 (9.67)	63.582	0.920	0.302
	Control	42.96(13.93)	45.63(12.54)	47.29(12.58)	164.394	18.793	< 0.001

Table 3

Comparison of both groups in terms of mean score of rumination immediately and one month after the intervention considering the impact of pre test

Group	Time	
	Immediately after the intervention	one month after the intervention
For F	7.348	15.179
Sig for the difference between both groups	0.01	< 0.001
For the impact of pre-test, F	84.424	125.474
Sig for the impact of pre-test	< 0.001	< 0.001

Discussion

The present study aimed to investigate the effect mindfulness training on the rumination in women with breast cancer. Results showed that the mean score of rumination before the intervention in both groups was average. These results are consistent with those of Falsafi et al study, (2019) in women with frequent abortion and with those of Campbell et al study (2011) in women with breast cancer living in Alberta, Canada (16, 23). In the study of Mohammadpour et al (2016) on women with breast cancer in Tehran (31) as well as that of Ghanavati et al (2018) on women with breast cancer in Ahvaz, the mean score of rumination was more than that of the present study (32). In this regard, the results were different from the present study. This difference results from the research population. In the study of Mohammadpour et al., all participants were undergoing chemotherapy which can increase the score of rumination; while in the present study, those patients whose chemotherapy period passed three months included in the study. In the study of Ghanavati et al, the education level of participants was lower than that of participants in the present study which can cause a difference in score of rumination (32). Studies showed that those who have higher education level know the ways of struggling with the problem because they focus on the problem-solving thoughts in stressful conditions rather than negative and repetitive emotions resulting from a failure (33). This can be a reason for the low score of rumination in the present study. Following diagnosis and treatment, patients with breast cancer experience not only physical disabilities but also depression and anxiety. Emotions associated with anxiety and depression, including the feeling of worthlessness or hopelessness cause reactions such as denial, anger, and guilt that affect their mental health (7). In the study of Heydarian et al (2016), the mean score of rumination was more than average which was different from the present study. The reason for this difference may be associated with the period in which the participants' information was received and the demographic features of the research units. In the study of Heydarian et al, the research participants were doing treatment or cancer has metastasized which can increase the score of rumination. Besides, in their study, some research participants were single while all patients in the present study were married and lived with their wives. According to studies, spouse support can improve people's mental health (34). The between- group study indicated that there is a significant difference between the mean scores of rumination in both groups which

means that immediately and one month after the intervention, the mean score of rumination in the control group was more than that of intervention group; although in within-groups comparison, the decrease caused in the intervention group was not significant, the between- group difference resulting from this decrease in the intervention group and an increase in mean score in control group show that patients in the intervention group are better than the control group in terms of rumination. The results of the present study are consistent with those of some studies (Campbell et al. (2012), Zhang et al. (2016), Heydarian et al. (2016), Mohammadpour et al. (2016), Falsafi et al. (2019), Nobakht and Nikmanesh. (2019)) (16, 17, 23, 31, 35, 36). These studies aimed to demonstrate the effectiveness of mindfulness and the results indicated the positive effect of mindfulness on decreasing rumination in patients with breast cancer. It is worth noting that the difference between both groups in this study results from the process of aggravating the rumination in the control group. In other words, although there was a statistically significant difference between the control and intervention group in terms of rumination,; the reason for the difference was falling the rumination in the intervention group in the mentioned studies and increasing rumination in the control group in the present study. Consequently, the intervention group acts well psychologically. In explaining this result, mindfulness decreases rumination and anxiety using some techniques such as teaching relaxation techniques, accepting the status quo without any judgment, and increasing the awareness of the present moment (17). Further, the qualitative study points to the positive effects of mindfulness by decreasing the stigma, being able to face the difficulties, and feeling the sense of control as a specific factor (37).

The results of the within-group comparison indicate that in the intervention group, the mean score of rumination decreased after the intervention compared to pre-intervention but this difference was not statistically significant. In the control group, there was a significant difference among three times meaning that the score of rumination had ascending trend over time.

Considering the ascending trend of scores from the time of pre-intervention to one month after the intervention in the control group and lack of difference in the intervention group, the result of the present study was inconsistent with those of Mohammadpour et al, which showed the lack of difference in different times in control group and a decrease in the intervention group (31). The reason for this difference may be the primary scores of rumination. In Mohammadpour's study, the mean scores of rumination were higher. On one hand, this highness can significantly decrease with interventions that are not long and on the other hand, the rumination is so high that remains unchanged (stable) in the control group that no intervention was done; In Mohammadpour's study, although the intervention decreases the rumination, it failed to bring the rate to the average level or lower. The results of the present study in which rumination is average showed that if not any intervention for decreasing the rumination is done for patients with breast cancer, the level of rumination goes up; on the other hand, they show that although the intervention decreases the rumination immediately after and one month after the intervention compared to pre-intervention, the decrease was not significant. It shows that to bring the rumination below the average, the intervention is needed in the long term. It seems that although increasing the mean score of rumination one month after the intervention is not significant compared to immediately after the intervention, the rumination starts increasing in case of intervention stoppage and it shows the need for intervention continuity so that the intervention becomes an integral part of individual's daily behavior. A comparison of

the effect of a mindfulness-based intervention on different levels of rumination can show how this intervention affects groups with different levels of rumination and thus recommends to use this intervention in the groups that benefit from it. In the study of Heydarian et al (2016), the scores of ruminations in the intervention group were different before and after the intervention but it was the same in the control group (17) which was inconsistent with the result of within-group comparison in the present study. The reason for this difference may be related to the research tool and the reason mentioned in Mohammadpour's study. In the study of Falsafi et al (2019), although the significant level of the within-group test was not reported, the mean score of rumination decreased after the intervention but the mean score of the control group did not change (23). The result of their study is inconsistent with those of within-group comparison in the present study. The reason for this inconsistency relies on the target population. Falsafi et al performed a study on women with frequent abortion; as a result, mindfulness can decrease rumination by making them concentrated on the present moment meaning that it disappears the effects of past events. In patients with breast cancer, changing the attitude and making a pleasant feeling is difficult concerning that cancer is considered an incurable disease from the viewpoint of many people; while cancer is the current issue of patients, not a past event; dealing with rumination resulting from this issue needs longer intervention or a combination of different interventions. Investigation of other psychological interventions along with mindfulness can determine the best type of effective intervention on the psychological state of women with breast cancer. These patients are preoccupied with unpleasant thoughts due to the complications of the disease and its treatment. Further, they have depression and rumination due to the deformation of their body and concern about metastasis to other parts of the body (38). To prevent the intensification of the general health of patients with breast cancer in terms of the psychological consequences, treatment and complications such as rumination, we can use the metacognitive-based therapies from the third generation of psychotherapy. These treatments exercise therapeutic effects by stopping resistant processing activities such as anxiety and rumination (39). Accordingly, we can remove or minimize the consequences.

The present study had some limitations. One of the most important limitations includes the small sample size and consequently its limited statistical power. Another limitation of this study was the lack of long-term follow-up due to the inaccessibility to all participants during the period. It is suggested to conduct studies with a large sample size as well as longtime intervention and follow-ups.

Clinical practice

Generally speaking, the intervention group was better than the control group in terms of rumination which results from the effect of the intervention on the prevention of the ascending trend of rumination. It is needed to investigate whether elongating and continuing the intervention can decrease rumination. Moreover, using other therapies along with mindfulness and its comparison with this type of intervention can determine the best and the most effective intervention to deal with min rumination resulting from breast cancer and its complications. In this regard, performing further studies is recommended. Besides, the mindful intervention on women with breast cancer can decrease the rumination. Thus, it can be used as a supportive treatment to improve the mental health of these patients in all treatment processes.

Declarations

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Ethics approval and consent to participate

The study is approved by Medical Research Ethics Committee of Bushehr university od Medical Sciences. (IR.BPUMS.REC.1396.1396.218).

Consent for publication

Not applicable.

Competing interests

The authors of this study declare that there is no conflict of interest in publishing this paper.

Availability of data and materials

All rquired data are mentione in the manuscript. Any more data will be available upon request from corresponding author.

Authors contribution

This study was conceived and designed by RB, and HV and RS made substantial contributions to the acquisition of data. TG conducted the analysis with input. FM, RB, and TG made substantial contribution to the analysis of data and provided important intellectual content. HV and RS wrote the first draft; all authors critically reviewed each draft. All authors approved the final manuscript for publication.

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Figures

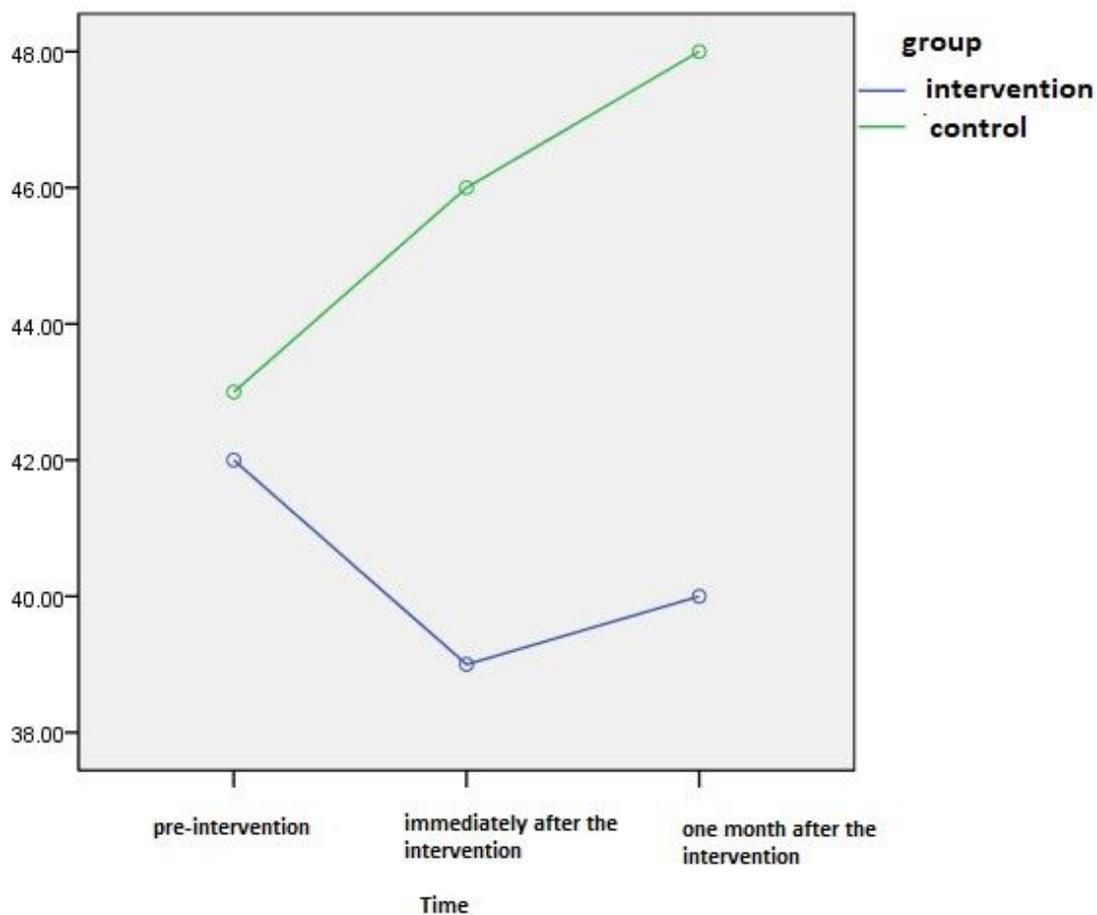


Figure 1

Rumination changes during a period of time in both intervention and control groups

Supplementary Files

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