


The Effectiveness of Mindfulness-Based Stress Reduction on Stress, Anxiety, and Depression of Patients with Breast Cancer

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Quantitative Study

Abstract

Background: The mental health of patients with cancer can be affected by the disease, treatment stages, and their own personal experiences of acute suffering. This study aims to investigate the effectiveness of mindfulness-based stress reduction (MBSR) on stress, anxiety, and depression in patients with breast cancer.

Methods: This study was a quasi-experimental research with a pretest-posttest and follow-up design with a control group. The statistical population of the present study was women with breast cancer in the chemotherapy phase who were referred to Yarmouk Teaching Hospital, Baghdad, Iraq, from May to October 2020. Among 214 women, 40 were chosen using the available method and divided into experimental and control groups (20 women in each group). The Depression, Anxiety, and Stress Scale-21 Items (DASS-21) pre-test was performed for both groups. SPSS software was utilized for statistical analysis. Throughout this study, descriptive statistical indices [mean and standard deviation (SD)] and inferential indices [repeated measures analysis of variance (ANOVA)] were used.

Results: There was a considerable difference between the scores of stress, depression, and anxiety of the two groups in the field of the efficacy of mindfulness training on stress, anxiety, and stress in women with breast cancer. The levels of depression ($F = 26.235$, $P < 0.001$), anxiety ($F = 22.374$, $P < 0.001$), and stress ($F = 23.416$, $P < 0.001$) were significantly reduced under the influence of this treatment ($P < 0.001$). Besides, the mindfulness method had a good lasting effect, and the effects of this treatment were stable in the follow-up period of ten days and one month.

Conclusion: The MBSR effectively reduces stress, depression, and anxiety in women with breast cancer. Therefore, it could be considered that mindfulness as a psychological intervention can help patients facing breast cancer.

Keywords: Breast neoplasms; Mindfulness; Anxiety; Depression; Psychosocial intervention

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Introduction

Cancer is among the most common illnesses that has affected numerous individuals worldwide. It is an illness that begins at one point in the body, and if diagnosed late, it can impact the whole body (Zugazagoitia, Guedes, Ponce, Ferrer, Molina-Pinelo, & Paz-Ares, 2016). Cancer causes some of the body cells to separate non-stop and spread to surrounding parts. Normally, the body cells grow and divide to form the new cells that the body needs. When cells age or are damaged, they die and are replaced by new cells. When cancer occurs, the process breaks down, and old and damaged cells survive while they must die (Berghmans et al., 2020; Fonnes et al., 2021). Today, breast cancer is among the most critical health concerns in women, because it is the most common cancer and is the second-highest reason for cancer death behind lung cancer (Muller et al., 2022; Sharma, Dave, Sanadya, Sharma, & Sharma, 2010). Results of breast cancer vary depending on the sort of cancer, its clinical stage, and age (Burstein et al., 2019). Survival rates in Britain and the United States (US) are between 80% and 90%, respectively, and are lower in developed countries (Noguchi, Marinovich, Wylie, Lund, & Houssami, 2022).

Although a cancer diagnosis is no longer the equivalent of imminent death, many studies have shown that such a diagnosis causes profound emotional problems such as stress, anxiety, and depression in the patient and his/her family. Meanwhile, patients with breast cancer often experience severe psychological helplessness when becoming aware of cancer and throughout treatment. Findings have shown that psychological helplessness and trauma to these patients in the mental health field correlate with the severity of side effects of chemotherapy and radiation therapy. In some studies, the depression prevalence in women with breast cancer is estimated to be twice that of the general female population. The agreed prevalence of depression in these patients is 13% for severe depression and up to 33% for mild depression (Fann et al., 2008; Foster & Niedzwiedz, 2021; Ng, Mohamed, Kaur, Sulaiman, Zainal, & Taib, 2017). Common results of breast cancer include anger, depression, anxiety, loneliness, resentment, and the like. The risk of mental health disorders in patients with cancer is estimated at 30% to 40%. Most patients experience shock and stress in response to an initial diagnosis and do not believe it. Overcoming this condition over the patient is likely to lead to an acute psychological crisis (Civilotti, Botto, Maran, Leonardis, Bianciotto, & Stanizzo, 2021; Puigpinos-Riera et al., 2018). Cognitive feedback from helplessness, frustration, and mental perception about a person's mental health level can negatively impact the quality of life. Various studies have shown that mental health indicators can reduce the quality of patient cooperation with medical staff by reducing their self-esteem, hope, and quality of life, and cause extreme failure in following the therapist's instructions, as well as mental health disorders. Weakening of the immune system reduces the effectiveness of therapeutic measures and jeopardizes the amount and quality of recovery (Burstein et al., 2019; Zugazagoitia et al., 2016).

Breast cancer is the most common, deadly, and emotionally and psychologically most effective cancer among women. Most women with breast cancer experience a period of stress. Meanwhile, some patients experience more severe mental health problems that lead to decreased quality of life, dysfunction, anxiety, depression, and a general decline in mental health (Sharma et al., 2010; Yu et al., 2022). Several researchers studying patients with cancer between 18 and 65 years old found that anxiety was the most critical factor in mental health affecting their quality of life

(Distefano et al., 2008). In the study by Kissane et al. (2003), on women dealing with breast cancer at the Institute of Psychology of University Of Melbourne, Australia, the prevalence of major depression was 10%, minor depression was 27%, and anxiety disorders was 9%. Extensive studies have also shown high levels of mental health disorders in patients facing breast cancer; for instance, several studies showed that about 40% of patients with breast cancer had major depression (Alacacioglu et al., 2014; Bower et al., 2015).

It can be considered that breast cancer can cause some personal injuries in women. These personal injuries also affect family, work, and social issues. Strategies that can help women with breast cancer to reduce depression and frustration should be considered. Strategies such as reality therapy, neurofeedback, and logotherapy can be considered. However, one of the approaches that play an essential role in raising the psychological power of individuals is teachings and interventions based on mindfulness.

Mindfulness means paying special, purposeful, present-day attention without prejudice or judgment. In this method, the individual becomes acquainted with the mind style at each point and learns cognition skills in more valuable ways. There are two main ways for the mind: one to do and the other to be (Nissen et al., 2020). This type of cognitive therapy includes various meditations, stretching yoga, introductory training on depression, body review exercises, and several cognitive therapy exercises that show the relationship between mood, thoughts, feelings, and bodily sensations. These exercises somehow make it possible to pay attention to physical and peripheral situations in the present moment and reduce depressing automatic processing. The primary mechanism of this treatment is self-control and self-attention, because frequent focusing on the neutral stimulus creates a suitable attention environment (Garcia-Martinez, Zhang, Nakata, Chan, & Morey, (2021; Hecht et al., 2021).

Many studies, especially in recent years, have analyzed the results of mindfulness in clinical settings that show the positive effects of this intervention on stress, anxiety, and depression. Janssen et al. (2018) showed that mindfulness training was practical for depression, anxiety, and job stress. According to MacKenzie and Kocovski (2016), teaching mindfulness as psychotherapy through possible mechanisms of change leads to increased concentration and reduced negative repetitive thoughts, thereby reducing depression. Branstrom et al. (2012) also reported that mindfulness was valuable in increasing psychological health and reducing stress in patients with cancer. Barnhofer et al. (2009) also concluded that mindfulness training effectively treated chronic depression in sufferers.

According to the above, mindfulness skills training has been utilized to decrease psychological issues and develop the mental health of different communities. Nevertheless, it is essential to note that these skills need to be explored to be used for women with breast cancer. Therefore, the present study examined the effectiveness of mindfulness-based stress reduction (MBSR) on stress, anxiety, and depression in patients with breast cancer.

Methods

This study was a quasi-experimental research with a pretest-posttest and follow-up design with a control group. The sample population of this study was women with breast cancer in the chemotherapy phase who were referred to Yarmouk Teaching Hospital, Baghdad, Iraq, from May to October 2020. The documents of women with

breast cancer at this hospital were investigated. Those who were suitable for this study were contacted, and the research goals were explained to them. After these steps, 214 women agreed to participate in this study. These women came to the study office and read and answered the Depression, Anxiety, and Stress Scale (DASS) questionnaire. After this stage, 40 women were chosen using a simple random sampling technique and were separated into experimental and control groups (20 women in each group). The sample size was selected based on the minimum sample size in pilot studies (Queen, Quinn, Keough, 2002). Inclusion criteria were: 1- presence of breast cancer record, 2- being in the stages of chemotherapy, 3- no liver, lung, kidney, and heart diseases, 4- age range of 35 to 65 years, and 5- willingness to partake in the study. Exclusion criteria were: 1- existence of extreme psychological issues, 2- history of any treatment in other ways like neurofeedback, reality therapy, and logotherapy, 3- liver, lung, kidney, and heart diseases, and 4- the unwillingness to continue the collaboration. In order to comply with the ethical guidelines, the participants were assured that their details would remain confidential. Moreover, they could leave the study at any time that they wanted.

At first, the 21-item DASS (DASS-21) pre-test was performed for both groups. The experimental group experienced eight 2-hour weekly mindfulness sessions. At the end of the intervention, posttest, ten-day follow-up, and one-month follow-up were performed by research questionnaires. The educational package of the present study has been prepared based on the Baer et al. (2006) edition of mindfulness protocol and is as follows:

Session 1: Introducing the members and setting goals, doing mindfulness exercises, practicing awareness of every moment, practicing physical examination, and breathing three times a day

Session 2: Focusing more on the body and control of daily events, dealing with mental barriers, and recording daily reports of pleasant experiences

Session 3: Practicing breathing and walking with the presence of mind, preparing a list of unpleasant events, and identifying and recording unpleasant experiences

Session 4: Learning to breathe and meditate for three minutes and stay in the present

Session 5: Accepting and emphasizing the concentration of thoughts, feelings, and bodily sensations, reacting to them, and repeating the previous steps

Session 6: Creating awareness of breathing and body, practicing moods and thoughts, practicing alternate views and thoughts, and emphasizing the effect of breathing on the body
Session 7: Providing the best way to care for and understand personal relationships and making a list of enjoyable activities

Session 8: Regular mindfulness practice, physical examination, total review, and increased concentration to improve performance and repeat the previous steps.

The instrument used in this study was DASS-21. This questionnaire has 21 questions designed to measure stress, anxiety, and depression. The creators of this scale were Lovibond and Lovibond (1995), who released the final version in 1995. It is based on a 4-point Likert scale. Each question is scored from one (applies to me completely) to four (does not apply to me at all). This scale includes three subscales of anxiety, depression, and stress, each with seven parts or questions. The depression subscale measures sadness, scarcity of self-confidence, despair, worthlessness, absence of energy, ability, and enjoyment of life. The anxiety subscale contains terms assessing physiological arousal, fear, and anxiety in different situations. The stress subscale contains difficulty reaching peace, nervous tension, crankiness, and turmoil.

The scoring in this questionnaire for the depression subscale is: 0-9: normal, 10-12: mild, 13-20: moderate, 21-27: severe, and ≥ 28 : very severe. The scoring in this questionnaire for anxiety subscales is: 0-7: normal, 8-9: mild, 10-14: moderate, 15-19: severe, and ≥ 20 : very severe. The scoring in this questionnaire for stress subscales is: 0-14: normal, 15-18: mild, 19-25: moderate, 26-33: severe, and ≥ 34 : very severe (Lovibond & Lovibond, 1995). Osman et al. (2012) examined the factor scale, which again showed the existence of three factors: depression, anxiety, and stress. The study's results demonstrated that three factors measured 68% of the whole variance of the scale. The study's eigenvalues of stress, depression, and anxiety were 9.07, 2.89, and 1.23, respectively, and the alpha coefficient for these three factors was 0.97, 0.92, and 0.95, respectively.

SPSS software (version 16, SPSS Inc., Chicago, IL, USA) was operated for statistical analysis, and descriptive statistical indicators [mean and standard deviation (SD)] and inferential indicators [repeated measures analysis of variance (ANOVA)] were used.

Results

This study was conducted on 40 women with breast cancer undergoing chemotherapy. The average age and SD of the experimental group was 48.72 ± 5.80 , and for the control group was 51.46 ± 6.10 . The duration of chemotherapy in the experimental group was 9.3 ± 4.7 months, and for the control group, it was 8.7 ± 3.5 months. Statistics related to pretest and posttest depression, anxiety, and stress scores are illustrated in table 1. The average of depression, anxiety, and stress in the posttest and follow-up stages in the experimental group improved more than in the control group.

By performing the Kolmogorov-Smirnov test, the normality of the distribution was determined and showed that the distribution was normally based on Z-values and significance level. A parametric test can be used for analysis. In addition, to check the slope of the regression coefficients, the calculations obtained from F at a notable level of more than 0.05 showed that the slope of the regression coefficients was established. In this way, it became possible to use repeated measures ANOVA. Moreover, the calculations performed in Levene's test showed that the condition of homogeneity of variances was not significant ($P > 0.05$).

Table 2 displays the results of the analysis of within-subject and between-subject effects on depression, anxiety, and stress scores. According to the results of this table, there was a considerable difference in the average depression, anxiety, and stress scores in the experimental and control groups ($P < 0.001$). The results demonstrated that 64.2% of the difference in depression, 58.3% in anxiety, and 67.4% in stress scores were due to mindfulness training.

Table 1. Mean and standard deviation (SD) of depression, anxiety, and stress

Group	Depression		Anxiety		Stress	
	Experimental	Control	Experimental	Control	Experimental	Control
Pretest	19.57 \pm 3.12	21.03 \pm 1.86	19.21 \pm 3.84	21.84 \pm 2.04	19.42 \pm 4.25	21.87 \pm 1.78
Posttest	14.48 \pm 1.96	21.74 \pm 2.01	15.60 \pm 3.14	19.68 \pm 1.87	15.62 \pm 3.89	21.45 \pm 1.80
Follow-up (10 days)	14.20 \pm 2.41	21.31 \pm 2.38	15.37 \pm 2.34	21.78 \pm 1.88	14.61 \pm 2.48	22.08 \pm 2.11
Follow-up (1 month)	14.65 \pm 3.49	19.42 \pm 2.65	15.63 \pm 3.12	19.84 \pm 19.50	15.08 \pm 3.17	22.21 \pm 2.34

Data are presented as mean \pm standard deviation (SD)

Table 2. The results of the analysis of within-subject and between-subject effects on depression, anxiety, and stress scores

Effects	Sources	SS	df	MS	F	P-value	Effect size	Statistical power
Depression								
Between-subjects	Pretest	6.274	1	6.274	0.642	0.486	0.039	0.213
	Group	835.697	1	835.697	26.235	0.001	0.728	1
	Error	439.824	27	17.638	-	-	-	-
Within-subjects	Time effects	13.568	2	6.874	3.425	0.148	0.041	0.435
	Time effects × pretest	9.537	2	4.271	1.740	0.457	0.034	0.317
	Time effects × group	36.749	6	5.973	2.984	0.038	0.147	0.781
Anxiety								
Between-subjects	Pretest	63.783	1	63.783	5.934	0.034	0.093	0.811
	Group	764.572	1	764.572	22.374	0.001	0.617	1
	Error	574.394	27	22.015	-	-	-	-
Within-subjects	Time effects	13.568	2	21.143	7.782	0.001	0.186	0.904
	Time effects × pretest	37.724	2	18.349	6.442	0.037	0.152	0.911
	Time effects × group	79.527	6	14.521	4.875	0.001	0.192	0.991
Stress								
Between-subjects	Pretest	28.427	1	28.427	3.868	0.184	0.052	0.439
	Group	901.336	1	901.3367	23.416	0.001	0.714	1
	Error	5919.371	27	216.371	-	-	-	-
Within-subjects	Time effects	35.428	2	18.637	4.932	0.048	0.093	0.886
	Time effects × pretest	29.932	2	16.357	4.691	0.079	0.086	0.824
	Time effects × group	23.617	6	4.081	1.627	0.023	0.148	0.946
		28.427	1	28.427	3.868	0.184	0.052	0.439

SS: Sum of squares; df: Degree of freedom; MS: Mean squares

The interaction between the pretest and the effect of time on the variable of depression scores was not significant ($P > 0.05$), which shows that the effect of the pretest was not significant on the posttest and follow-up stages. However, the interaction of the pretest and the effect of time on the two variables of anxiety and stress was significant, which indicates the effect of the pretest on the posttest and follow-up phases.

The interaction effect of time and group membership in anxiety, stress, and depression variables was significant ($P < 0.001$). In other words, the difference between the scores of stress, anxiety, and depression in the three stages of the posttest, ten-day, and one-month follow-up in the entire research sample and the difference in the scores of these variables in the three stages of the research in the two groups were significant. These results showed that the process of changing scores in the posttest, ten-day, and one-month follow-up stages was different in the two groups.

Table 3 illustrates the results of evaluating the parameters separately for depression, anxiety, and stress scores in the posttest, ten-day, and one-month follow-up stages.

The results showed a significant difference between the control group with mindfulness training scores in depression, anxiety, and stress scores in the posttest, ten days, and one-month follow-up stages ($P < 0.001$). In general, the results indicated the efficacy of mindfulness training on stress, anxiety, and depression of women facing breast cancer in the chemotherapy stage.

Table 3. The result of evaluating the depression, anxiety, and stress scores

Variable	Stage	B	SDE	t	P-value	VF	Statistical power
Depression	Posttest	-4.235	0.634	-5.124	0.001	0.412	1
	Follow-up (10 days)	-4.081	0.637	-4.927	0.001	0.335	0.998
	Follow-up (1 month)	-2.314	0.742	-3.248	0.001	0.249	0.959
Anxiety	Posttest	-4.631	0.842	-5.032	0.001	0.374	1
	Follow-up (10 days)	-4.596	0.914	-4.971	0.001	0.368	1
	Follow-up (1 month)	-1.937	0.768	-2.465	0.034	0.093	0.791
Stress	Posttest	-4.329	0.809	-4.271	0.001	0.4.01	1
	Follow-up (10 days)	-3.982	0.807	-4.427	0.001	0.397	0.996
	Follow-up (1 month)	-4.105	0.81	-4.300	0.001	0.276	0.989

SDE: Standard deviation of error; VF: volume fraction

Discussion

This research aimed to analyze the effectiveness of MBSR on stress, anxiety, and depression of patients with breast cancer. Results indicated that there was a considerable difference between the scores of stress, anxiety, and depression of the experimental and the control groups in the field of the efficacy of mindfulness training on stress, anxiety, and depression in women facing breast cancer and the levels of depression, anxiety and stress were significantly reduced under the influence of this treatment. These results agree with the results of the researches on the effectiveness of mindfulness in reducing depression, anxiety, and stress. In this regard, the results of a study have shown that mindfulness training in patients with asthma reduced anxiety and depression (Pbert et al., 2012). Mindfulness training is helpful in reducing depression and anxiety and enhancing the quality of life of patients with multiple sclerosis (MS) (Grossman et al., 2010). Janssen et al. (2018) also emphasized the favorable consequences of mindfulness training on anxiety, depression, and occupational stress. MacKenzie and Kocovski (2016) showed that mindfulness training as psychotherapy through the possible mechanisms of change led to a growth in concentration and a decline in repetitive negative thoughts, resulting in a decrease in depression. In other studies, it was remarked that mindfulness training was practical for patients with chronic pain suffering from anxiety and depression. This group can profit from mindfulness in their therapy plans (Rod, 2015; Rosenzweig, Greeson, Reibel, Green, Jasser, & Beasley, 2010).

It can be noted that when women with breast cancer feel depressed, they have negative thoughts and look at everything from a negative perspective. Mindfulness training enhances non-judgmental attention to something specific in the present. In other words, this training course helps these people increase their awareness of negative thoughts and change their focus on something that makes them feel better at the moment. Mindfulness training teaches the patients that they could assess whether these thoughts are chronically negative and explain how these thoughts lead to negative feelings by paying attention to the content of thoughts whenever they notice feelings of hopelessness, sadness, or depression. When this is done repeatedly, this process gradually rewires the brain to think more positive thoughts automatically (Burstein et al., 2019; Garcia et al., 2021).

In mindfulness training, using the technique of changing the thought channel, patients were helped to recognize things that were relaxing and pleasant for them. Whenever they became aware of their anxiety, they focused on the identified things. In general, in mindfulness training, a person becomes aware of the way of thinking at

every moment and learns the skills of identifying more valuable ways (Bower et al., 2015; Rosenzweig et al., 2010).

Cancer is one of the most dangerous diseases that can affect everyone's life and drive issues and emotions of desperation and depression. Therefore, the strategies that can improve the mental health of these patients had better be considered to find the most suitable treatment strategies. It is strongly suggested that other techniques such as neurofeedback, reality therapy, and cognitive-behavioral therapy are considered in other researches. Researchers could also consider treating depression and stress in youngsters who deal with cancer or consider people living with other cancers in future research. In addition, considering the family's primary part in supporting and helping patients with cancer, it is recommended that in future research in this field, practical methods to reduce the anxiety and care pressure of family members of these patients should be considered.

Conclusion

The results revealed that mindfulness helped reduce stress, anxiety, and depression in women suffering from breast cancer. Therefore, this method can be supposed to be a psychological intervention that can enhance the quality of life and decrease the morale problems of patients suffering from chronic diseases such as cancer. Hence, considering the effectiveness of mindfulness on depression, anxiety, and stress in patients with cancer, it is recommended that counselors, psychiatrists, and psychologists pay more attention to it in this field.

Conflict of Interests

Authors have no conflict of interests.

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