



Effectiveness of Mindfulness-Based Cognitive Therapy on Mental Pain, Distress Tolerance and Psychological Hardiness in Breast Cancer Patients

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ABSTRACT

The aim of this study was to determine the effectiveness of mindfulness therapy on mental pain, distress tolerance and psychological hardiness in breast cancer patients. The method of this study was quasi-experimental with pretest-posttest design and a one-month follow-up with control group. The statistical population consisted of all female patients referred to the medical clinics of Babol in 2022 who received definite diagnosis of breast cancer. Among these, 30 patients with breast cancer were selected by non-random sampling method and were randomly assigned to two experimental groups (mindfulness therapy) and control group (15 patients in each group). Mindfulness therapy was performed in 8 sessions of 90 minutes in the experimental group. Data were collected using Psychological Hardiness Questionnaire (2003), Distress Tolerance Scale (2005) and Mental Pain Inventory (2003). Data were analyzed using SPSS-22 software and repeated measure analysis of variance. The results showed that mindfulness therapy is effective on mental pain, distress tolerance and psychological hardiness in patients with breast cancer. It can be concluded that mindfulness therapy is effective on subjective pain, distress tolerance and psychological hardiness in patients with breast cancer and can be used to reduce the adverse effects of the disease on patients' lives and to take supportive measures.

Keywords: *Mindfulness therapy, Mental pain, Distress tolerance, Psychological hardiness, Breast cancer.*

1. Introduction

Cancer is the third leading cause of death in Iran, following cardiovascular diseases and accidents (1). Breast cancer is the most common (24 per 100,000 in Iran) (2), the most emotionally and psychologically impactful,

and a significant health concern among women (3). Moreover, Iranian women are affected by breast cancer approximately a decade earlier than women in Western countries. Breast cancer is the uncontrolled growth of abnormal cells in the breast area capable of invading surrounding tissues and spreading through lymphatic

channels and blood flow (4). Like all cancers, breast cancer jeopardizes various aspects of mental health and, like other chronic diseases, reduces the quality of marital life (5). Women who undergo mastectomy, chemotherapy, and radiotherapy experience greater psychological stress (6). Considering a family systems approach, when a family member becomes ill, the whole family is affected; cancer diagnosis is often perceived as a crisis for both the patient and their families (7). Furthermore, cancer treatment processes are complex, often accompanied by severe and problematic side effects that impact the physical, psychological, and social aspects of cancer patients and their families (4).

One factor that can increase an individual's ability to experience and endure negative emotional states in breast cancer patients is distress tolerance. Distress tolerance is defined as the capacity to experience and bear negative psychological states (8). Two distinct forms of distress tolerance have been conceptualized: the perceived capacity to endure negative emotional states or other distressing conditions (like physical discomfort) and the behavioral manifestation of bearing internal distressing states elicited by various stressors (9). Individuals with lower levels of emotional distress tolerance may be prone to maladaptive responses to distress and distressing situations (10). Consequently, individuals with lower distress tolerance may strive to avoid negative emotions or distressing conditions. In contrast, those with higher levels of distress tolerance may be more capable of adaptively responding to distress or distressing situations (11).

Another factor that seems to be affected by cancer is mental pain. Mental pain is a form of psychological suffering characterized by feelings of being broken, wounded, losing control, and negative self-awareness (12). Mental pain is described as a broad range of mental experiences characterized by the perception of negative changes in oneself and individual functioning, accompanied by intense negative emotions. According to their model, mental pain is a mental experience distinct from other negative states and emotions like depression and anxiety (13). The aspiration for life means creating space for negative side effects like unpleasant thoughts and feelings to foster a meaningful life (14).

Understanding the proximity of death is very difficult for patients and causes them much turmoil; however, their tolerance and resilience against these hardships vary. If patients can increase their tolerance and strength, they experience less turmoil (15). Kobasa et al. (1983) state that

stressful events have different effects on individuals; those with high psychological hardiness experience significantly less impact. Psychological hardiness, emphasizing inner experience and mental perception, means endurance, capability, and tolerance in difficult and harsh situations (16). Hardiness is a combination of beliefs about oneself and the world, comprising three components: commitment, control, and challenge or combativeness, and high hardiness is a sign of a healthy personality. Hardy individuals have the power to control life events and view problems as opportunities for progress; in other words, hardy individuals do not see themselves as victims of change but as agents determining the outcomes of change (17). Hardiness is a protective shield against the stresses of various situations. Hardy individuals have a better ability to cope with life's pressures. Research by Vans and colleagues showed that individuals with high psychological hardiness have more strength and hope in facing deadly diseases (18). A meta-analysis by Schleman and colleagues showed that individuals with high hardiness can maintain their mental health in stressful situations and move towards growth and flourishing (19).

Due to the problems faced by breast cancer patients, studies show that these patients need psychological support and care (20) to improve mental pain, distress tolerance, and psychological hardiness, and to reduce turmoil related to death, enabling them to lead better and more spirited lives. One intervention with a good track record in improving the psychological state of patients is mindfulness therapy. Mindfulness, with elements like acceptance (of reality), presence (in the current moment), and avoidance (of rumination), aims to promote well-being and self and environmental awareness, along with mental regulation. Unlike many psychotherapeutic schools but in line with the goals and assumptions of positive psychology, the purpose of practicing mindfulness is not to create ideological changes but to help become aware of the processes that lead to harmful mentality or stagnation in those mental states (21). Since mindfulness, as a lifestyle in harmony with human nature, can affect individuals' emotional systems, i.e., thoughts, bodily sensations, raw emotions, and action impulses, it transforms their outlook on life and enhances their relationships with themselves, others, and the world with compassionate and realistic acceptance (22). Mindfulness is defined as an attentive and aware state of what is currently happening, influencing the growth of three qualities: non-judgmental restraint, intentional awareness, and focus on the present moment in

individual attention (23, 24). Mindfulness-based interventions, as a therapeutic approach, involve reducing avoidance experiences and the tendency to experience unpleasant bodily sensations, emotions, and thoughts (25, 26).

Given the increasing number of breast cancer patients and their major problems in terms of mental pain, distress tolerance, and psychological hardiness, it seems that many of these patients lack sufficient knowledge and skills to properly manage such problems. Proper training in mindfulness therapy can reduce these issues. Therefore, the aim of this research was to determine the effectiveness of mindfulness therapy on mental pain, distress tolerance, and psychological hardiness in patients with breast cancer.

2. Methods and Materials

2.1. Study Design and Participants

The research design was a quasi-experimental pre-test-post-test with a one-month follow-up involving two groups, including a control group. The statistical population comprised all female breast cancer patients who visited the clinical centers in Babol city in 2021 and had a confirmed diagnosis of breast cancer. From this population, 30 breast cancer patients were non-randomly selected and randomly assigned to the experimental group (Acceptance and Commitment Therapy) and the control group (15 participants in each group). The experimental group underwent eight 90-minute sessions of Acceptance and Commitment Therapy. Inclusion criteria were a confirmed diagnosis of breast cancer, no psychiatric medication use in the past six months, no psychotherapy in the past six months, and voluntary participation with signed informed consent. Exclusion criteria included missing more than one psychotherapy session, no longer wishing to continue the psychotherapy process, and a prior diagnosis of mental disorders in the participants.

Ethical considerations in this study were as follows: Participation was entirely voluntary. Before the start of the project, participants were familiarized with the details and regulations of the plan. Individual beliefs and attitudes were respected. Members of both the experimental and control groups were allowed to withdraw from the study at any stage. Additionally, members of the control group could receive the same intervention as the experimental group in similar therapy sessions after the completion of the project. All documents, questionnaires, and confidential records were exclusively in the possession of the

researchers. Informed written consent was obtained from all volunteers.

2.2. Measures

2.2.1. Psychological Hardiness

In this regard, the self-report scale (2003) consists of 45 items to evaluate psychological hardiness in specific situations and stressful conditions. The questionnaire encompasses three subscales: control (16 items), commitment (16 items), and challenge (13 items). To modify the expression of the statements, 15 items are scored inversely and distributed randomly throughout the scale. All items are rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The correlation between total scores and subscale scores was medium to high. The Cronbach's alpha coefficient indicated good internal consistency. The test-retest reliability coefficient was 0.73, suggesting the scale's relative stability and sensitivity to changes over time (15, 17). In this study, the Cronbach's alpha reliability coefficient was 0.90, which is significant and positive.

2.2.2. Distress Tolerance

Developed by Simons and Gaher (2005), this self-assessment index of emotional distress tolerance comprises 15 items and four subscales: Tolerance (enduring emotional distress), Absorption (being absorbed by negative emotions), Appraisal (mental estimation of distress), and Regulation (regulating efforts to alleviate distress). The scale is scored on a 5-point scale. The minimum and maximum scores are 15 and 75, respectively. The Cronbach's alpha coefficient was 0.82, indicating good criterion and convergent validity, with a reported reliability coefficient of 0.61. The scale also showed high internal consistency for the overall scale (0.71) and moderate reliability for the subscales (0.54 for Tolerance, 0.42 for Absorption, 0.56 for Appraisal, 0.58 for Regulation) (27, 28). In this study, the Cronbach's alpha coefficient for the overall scale was 0.77, and the reliability coefficient obtained was 0.89.

2.2.3. Mental Pain

This scale, developed by Orbach and Mikulincer (2003), consists of 44 items for measuring the severity of mental pain. Its initial validation was conducted on 225 students. Exploratory factor analysis by Orbach and Mikulincer

(2003) identified nine subscales for measuring different aspects of mental pain: Immutability, Lack of Control, Narcissism/Worthlessness, Emotional Turmoil, Stunned (Shock), Alienation, Confusion, Social Withdrawal, and Void (Meaninglessness). In a study by Orbach et al. (2003), the Cronbach's alpha coefficients for the subscales were reported as follows: Immutability 0.95, Lack of Control 0.95, Narcissism/Worthlessness 0.93, Emotional Turmoil 0.93, Stunned (Shock) 0.85, Alienation 0.79, Confusion 0.80, Social Withdrawal 0.80, and Void (Meaninglessness) 0.75. It should be noted that items 25 and 42 are scored inversely (Karami et al., 97). The Kaiser-Meyer-Olkin measure was 0.942, and the Bartlett's test of sphericity was significant ($P \leq 0.001$) with a value of 11127.989. The total explained variance table showed that six factors explained 66.404% of the total variance. The Cronbach's alpha

reliability coefficient for the entire questionnaire was 0.966, and for the Void (Meaninglessness) and Worthlessness factor 0.952, Confusion and Emotional Turmoil factor 0.893, Lack of Control factor 0.877, Immutability factor 0.872, Social Withdrawal – Alienation factor 0.869, and Fear of Loneliness factor 0.617 (12, 13). In this study, the Cronbach's alpha reliability coefficient was 0.82, which is significant and positive.

2.3. Intervention

2.3.1. Mindfulness Therapy

The mindfulness therapy sessions were conducted in eight 90-minute weekly sessions based on the protocol of Kabat-Zinn (2003) (29).

Table 1

Mindfulness therapy sessions

Session	Content
1	1. Introduction of participants and a brief overview of the 8 sessions. 2. The technique of raisin eating followed by a 30-minute body scan meditation, discussing feelings arising from these meditations. 3. Homework: Being present in the moment and expanding the raisin eating technique to other activities.
2	1. Body scan and discussion about this experience; 2. Discussion about the difference between thoughts and feelings; 3. Performing seated meditation; 4. Homework: Mindfulness of a pleasant event, performing seated meditation and body scan, and mindfulness of a daily activity.
3	1. Practice of observing and focusing on emotions. 2. Attention to the exercise in the moment, attention to breathing, and attention to the body; 3. Performing one of the mindfulness movement exercises; 4. Homework: Seated meditation, body scan, 3-minute breathing space exercise, mindfulness of a new daily activity, and mindfulness of an unpleasant event.
4	1. Meditation with attention to breathing; 2. Practice of expressing and listening to one's emotions; 3. Homework: Seated meditation, body scan or one of the physical mindfulness movements, and 3-minute breathing space exercise.
5	1. Performing meditation; 2. Practice of self-acceptance and accepting emotions; 3. Homework: Seated meditation and experiencing a relationship with acceptance. Fifth
6	1. Breathing space and imagination exercises; 2. Practice of non-judgment of emotions and events; 3. Homework: Seated meditation and experiencing a situation with acceptance without judgment
7	1. Meditation and awareness of whatever enters consciousness at the moment; 2. Homework: Performing a combination of meditation in daily activities.
8	1. Review of experiences and conducting the post-test.

2.4. Data Analysis

In the descriptive analysis, statistical indices related to each of the research variables were calculated. In the inferential statistics section, analysis of variance with repeated measurements and SPSS-22 software were used.

3. Findings

The results showed that the majority of respondents were aged 28 to 38 years with a frequency of 24, while the least were aged 18 to 28 years, considering the upper age limit of 50 in this study.

Table 2

Mean (M) and standard deviation (SD) of research variables in sample groups

Group	Variable	Pre-test		Post-test		Follow-up	
		M	SD	M	SD	M	SD
Exp.	Distress tolerance	63.44	12.29	78.18	14.49	76.73	13.96
	Psychological hardness	26.81	8.23	35.98	10.31	36.16	11.33

	Mental pain	85.89	22.98	74.36	20.14	72.10	19.03
Control	Distress tolerance	64.14	13.46	64.20	13.39	64.29	13.47
	Psychological hardiness	25.71	7.56	26.82	7.79	26.91	7.41
	Mental pain	83.35	21.22	82.21	21.19	83.17	20.68

In Table 2, the mean (M) and standard deviation (SD) for distress tolerance, psychological hardiness, and mental pain are reported for both the experimental group at pre-test, post-test, and follow-up stages. For example, in the experimental group, distress tolerance's mean score improved significantly from 44.63 (SD = 29.12) at pre-test

to 73.76 (SD = 96.13) at follow-up. Similarly, psychological hardiness increased from 81.26 (SD = 23.8) at pre-test to 16.36 (SD = 33.11) at follow-up, and mental pain decreased from 89.85 (SD = 98.22) at pre-test to 10.72 (SD = 03.19) at follow-up.

Table 3

The results of Kolmogorov-Smirnov, Levene's and Mauchly's tests

Variable	Group	K-S			Levene			Mauchly		
		df	Statistics	p	df	Statistics	p	df	Statistics	p
Distress tolerance	Exp.	15	0.69	0.39	28	1.66	0.238	2.77	0.89	0.19
	Control	15	0.75	0.34						
Psychological hardiness	Exp.	15	0.88	0.29	28	2.46	0.20	2.63	0.85	0.24
	Control	15	0.81	0.21						
Mental pain	Exp.	15	0.69	0.39	28	1.66	0.238	2.77	0.89	0.19
	Control	15	0.75	0.34						

Table 3 presents the results of Kolmogorov-Smirnov, Levene's, and Mauchly's tests, which are crucial for assessing the normality, homogeneity of variances, and sphericity, respectively. Specifically for distress tolerance in the experimental group, the Kolmogorov-Smirnov test

showed a statistic of 69.0 with a p-value of 39.0, the Levene's test had a statistic of 66.1 with a p-value of 238.0, and Mauchly's test resulted in a statistic of 77.2 with a p-value of 89.0, indicating the statistical robustness of the data.

Table 4

The results of analysis of variance with repeated measurements

Variable	Source	SS	df	MS	F	p	Eta ²
Distress tolerance	Time	170.60	1.45	117.57	175.61	0.001	0.86
	Time*Group	116.86	1.45	80.54	120.30	0.001	0.81
	Group	211.60	1	211.60	31.53	0.001	0.35
Psychological hardiness	Time	25.62	2	12.81	70.48	0.001	0.71
	Time*Group	12.86	2	6.43	35.39	0.001	0.55
	Group	142.40	1	142.40	54.08	0.001	0.57
Mental pain	Time	170.60	1.45	117.57	175.61	0.001	0.86
	Time*Group	116.86	1.45	80.54	120.30	0.001	0.81
	Group	211.60	1	211.60	31.53	0.001	0.35

The results of Table 4 indicate that the analysis of variance for the within-group factor (time) is significant and between-group is significant. This means that considering the effect of the group, the effect of time is also

significant on its own. Additionally, the interaction of group and time is also significant. The Bonferroni post-hoc test was used for pairwise comparisons of the groups.

Table 5

The results of analysis of variance with repeated measurements

Variable	Group	Stage	Pre-test	Follow-up
Distress tolerance	Exp.	Pre-test	-2.*20	-1.77*

		Post-test	-	0.42*
	Control	Pre-test	0.01	0.01
		Post-test	-	0.00
Psychological hardiness	Exp.	Pre-test	4.60*	4.75*
		Post-test	-	0.15*
	Control	Pre-test	-0.06	-0.08
		Post-test	-	-0.11
	Exp.	Pre-test	-2.20*	-1.77*
Mental pain		Post-test	-	0.42*
	Control	Pre-test	0.01	0.01
		Post-test	-	0.01

The results of [Table 5](#) show that the experimental group had a significant effect on increasing distress tolerance and psychological hardiness and reducing mental pain in breast cancer patients. These results also indicate that distress tolerance, psychological hardiness, and mental pain remained stable in the experimental group during the follow-up phase.

4. Discussion

The present study aimed to determine the effectiveness of mindfulness therapy on mental pain, distress tolerance, and psychological hardiness in patients with breast cancer. The findings suggest that mindfulness therapy is effective in improving mental pain, distress tolerance, and psychological hardiness in breast cancer patients. This finding is in line with the results of previous studies ([21](#), [22](#), [25](#), [26](#), [30-32](#)).

Regarding the effectiveness of mindfulness therapy in improving mental pain, distress tolerance, and psychological hardiness, it can be said that mindfulness skills include the ability to be aware of emotions and accurately interpret related bodily sensations. Facing negative emotions rather than avoiding them in distressing situations is one of the key goals of mindfulness group therapy ([31](#)). In fact, in mindfulness-based group therapy methods, techniques such as mindful breathing are used to increase self-awareness in crisis situations and to endure both short-term and long-term physical and emotional pain. Mindfulness therapy recognizes that everything happens in the present moment, making patients perceive events in the present as less distressing than they actually are ([26](#)). This suggests that with mindfulness therapy, an individual increases a meta-emotional construct called distress tolerance within themselves. This means that they pay attention to it, evaluate it, and when they cannot change the conditions, they accept and endure it, and regulate emotions, particularly the force arising from the desire to

avoid or immediately weaken the experience, without becoming functionally disintegrated. In other words, distress tolerance is the individual's ability to resist and experience negative psychological states; individuals with low tolerance describe distress as an intolerable construct ([22](#)). Individuals with high distress tolerance can use the technique of raining to observe within themselves and then focus on internal experience with acceptance. This technique is a mindful way to work with intense and difficult emotions, providing a proper refuge during moments of distress.

Additionally, it can be said that given that usually adopted beliefs in individuals with chronic pain can lead to specific activities even during the experience of pain and potentially impact the ability to achieve goals hindered by illness or disability ([30](#)), breast cancer patients undergoing mindfulness therapy have the opportunity in difficult and challenging life situations to set aside conventional, self-centered, experience-based, limited, and tangible realities and ideas, and with logical questioning and continuous review of possible solutions, reach intelligent and logical decisions. On the other hand, it can be said that negative beliefs and attitudes about oneself are a primary part of the changes and through mindfulness-based therapy, individuals learn to employ new experiences that organize beliefs such as alternative and more adaptive beliefs and eventually improve irrational beliefs about problems and physical limitations in breast cancer patients, increasing their psychological hardiness and alleviating their mental pain.

5. Conclusion

The study conducted on individuals with gender dysphoria, specifically focusing on male-to-female individuals, has produced significant insights into the interplay between distress tolerance, psychological hardiness, and mental pain. The findings underscore the

profound impact that therapeutic interventions, particularly those centered around mindfulness and psychological resilience, can have on this population.

In conclusion, this study provides compelling evidence for the effectiveness of mindfulness-based interventions in enhancing distress tolerance, fostering psychological hardiness, and reducing mental pain in male-to-female individuals with gender dysphoria. It paves the way for further research in this field and underscores the importance of comprehensive, empathetic care approaches in the journey towards gender affirmation and overall mental health.

The limitations of this study include the following: Since this study was conducted only among breast cancer patients, caution should be exercised in generalizing the results as different results might be obtained in other populations. The age range of 30 to 45 years is a factor that might significantly affect the results; therefore, more precise differentiation of age groups is needed. Since the research was conducted on breast cancer patients, it is suggested that it be conducted in populations other than breast cancer patients and the results be compared with those of this study. Conducting similar research with a broader sample in different communities, controlling demographic variables, utilizing individual interventions, increasing the number of sessions are fundamental suggestions, and organizing educational sessions and delivering messages with a mindfulness approach for affected individuals and all relevant institutions are proposed as applications of the current research.

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Authors' Contributions

Both authors contributed similarly in writing the manuscript, doing the calculations, devising the study and other tasks.

Transparency Statement

The authors are willing to share their data, analytics methods, and study materials with other researchers. The material will be available upon reasonable request.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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