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

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A B S T R A C T

Objective: Cancer is the third leading cause of death in Iran following cardiovascular diseases, accidents, and other phenomena. The current research aimed to determine the effectiveness of mindfulness therapy on mental pain, distress tolerance, and psychological hardiness in patients with breast cancer.

Methods and Materials: The present study employed a quasi-experimental design with pre-test, post-test, and a one-month follow-up, along with a control group. The population consisted of all female patients who visited clinics in the city of Babol in 2022 and were diagnosed with breast cancer. Out of this population, 30 patients with breast cancer were selected through non-random convenience sampling and randomly assigned into two groups: an experimental group (mindfulness therapy) and a control group (15 individuals in each group). Mindfulness therapy was then administered in 8 sessions of 90 minutes each for the experimental group. Data were collected using the Psychological Hardiness Questionnaire by Lang and Goulet (2003), the Distress Tolerance Scale by Simons and Gaher (2005), and the Mental Pain Questionnaire by Orbach and Mikulincer (2003). Data were analyzed using repeated measures ANOVA with SPSS software version 22.

Findings: The results demonstrated that mindfulness therapy effectively reduced mental pain ($P < 0.001$), increased distress tolerance ($P < 0.001$), and enhanced psychological hardiness ($P < 0.001$) in patients with breast cancer.

Conclusion: It can be concluded that mindfulness therapy was effective in reducing mental pain, increasing distress tolerance, and enhancing psychological hardiness in patients with breast cancer, and can be utilized to mitigate the adverse effects of the disease on patients' lives and for supportive interventions.

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

1. Introduction

Cancer is the third leading cause of mortality in Iran following cardiovascular diseases, accidents, and other phenomena (Katsura et al., 2022). Breast cancer is the most common (24 out of every 100,000 in Iran) (Alipour et al., 2022), the deadliest in terms of emotional and psychological impact, and the most significant health concern among women (Devericks et al., 2022). Additionally, breast cancer affects Iranian women about a decade earlier than women in Western countries (Niknejad et al., 2022). Breast cancer involves the uncontrolled growth of abnormal cells in the breast area, which have the capability to invade surrounding tissues and spread through the lymphatic channels and bloodstream (Koerner & Rechenberg, 2022). Like any cancer, breast cancer endangers various aspects of mental health and, similar to other chronic diseases, reduces the quality of marital life for patients (Tung & Garber, 2022). Women undergoing mastectomy, chemotherapy, and radiotherapy experience greater psychological stress (Balkenende et al., 2022). Considering a family system approach, if one family member becomes ill, the disease affects the entire family; thus, a cancer diagnosis is typically perceived as a crisis for both the patient and their families (Tadros & Finney, 2018; Van Gasse & Mortelmans, 2020). Furthermore, cancer treatment processes are complex and often accompanied by serious and troublesome side effects, affecting the physical, psychological, and social aspects of the lives of those with cancer and their families (Wolf et al., 2022).

One factor that can increase an individual's ability to experience and tolerate negative emotional states in patients with breast cancer is distress tolerance. Distress tolerance is defined as the capacity to experience and endure negative psychological states (Lass & Winer, 2020). Two distinct forms of distress tolerance have been conceptualized. Distress tolerance refers to the perceived capacity to endure negative emotional situations or other distressing states (such as physical discomfort) and to the behavioral manifestation of enduring internal states of distress evoked by various stressors (Veilleux, 2019). Individuals with lower levels of emotional distress tolerance may be susceptible to maladaptive responses to distress and distress-inducing situations (Conway et al., 2021). Consequently, individuals with lower distress tolerance may strive to avoid negative emotions or distressing situations. In contrast, individuals with higher levels of distress tolerance may be more capable of responding adaptively to distress or distress-inducing situations (Gallego et al., 2020).

Another factor that seems to be affected by cancer is mental pain. Mental pain is a form of psychological suffering described as feeling broken, wounded, losing control, and having a negative awareness about oneself (Amiri et al., 2023). Mental pain is described as a wide range of mental experiences characterized by the perception of negative changes in oneself and individual functioning, accompanied by intense negative feelings. According to their model, mental pain is a mental experience distinct from other negative states and emotions such as depression and anxiety (Sensky, 2020). A zest for life means creating space for negative side effects such as unpleasant thoughts and feelings in order to create a meaningful life (Landi et al., 2020).

For patients, facing the proximity of death is extremely difficult and causes them to experience considerable turmoil; however, the level of tolerance and resistance against these hardships varies among patients. If patients can enhance their tolerance and capacity, they experience less turmoil (Aghajani et al., 2018). Kobasa and colleagues (1983) state that stressful events have different effects on individuals, and if individuals possess high psychological hardiness, the intensity of these effects will be significantly lower. Psychological hardiness, emphasizing internal experience and human mental perception, means endurance, capability, and tolerance in difficult and challenging situations (Kobasa et al., 1983). Hardiness is a combination of beliefs about oneself and the world, composed of three components: commitment, control, and challenge or combativeness, and high hardiness is a sign of a healthy personality. Resilient individuals have the power to control life events and view problems as opportunities for progress; in other words, resilient individuals not only do not consider themselves victims of change but see themselves as agents determining the outcomes of change (Maddi, 2015; Maddi et al., 2006). Hardiness is a protective shield against the stresses of various situations. Resilient 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 to confront and overcome deadly diseases (Vance et al., 2008).

Due to the issues faced by patients with breast cancer, studies show that these patients need psychological support and care (Merckaert et al., 2010) to improve their mental pain, distress tolerance, and psychological hardiness, and to reduce their turmoil related to death, enabling them to have

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a better and more spirited life. One of the interventions with a good history of improving the psychological condition of patients is mindfulness therapy. Mindfulness, with components such as acceptance (of reality), presence (in the current moment), and avoidance (of rumination), aims to enhance well-being and self-awareness along with mental adjustment. Unlike many psychotherapeutic schools but in accordance 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 processes that predispose an individual to harmful mental states or stagnation in those states (Weng et al., 2022). Considering that mindfulness, as a lifestyle compatible with human nature, has the ability to influence individuals' emotional systems, i.e., thoughts, bodily sensations, raw emotions, and action impulses, it can transform their outlook on life and enhance their relationships with themselves, others, and the world with compassionate and realistic acceptance (Koerner & Rechenberg, 2022; Weng et al., 2022). Mindfulness, defined as a state of aroused attention and awareness of what is currently happening, affects the development of three qualities: refraining from judgment, intentional awareness, and focus on the current moment in an individual's attention (Saito & Kumano, 2022). Mindfulness-based interventions, as a therapeutic method, aim to reduce avoidant experiences and the tendency to experience unpleasant bodily sensations, emotions, and thoughts (Vena, 2023).

Given the increasing number of patients with breast cancer and their major problems in terms of mental pain, distress tolerance, and psychological hardiness, it appears that many of these patients lack sufficient knowledge and skills to properly manage such issues. Properly teaching mindfulness therapy to patients with breast cancer can reduce such problems. Therefore, the purpose of the present 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 study design was a quasi-experimental with a pre-test, post-test, and one-month follow-up with a control group. The population consisted of all female patients diagnosed with breast cancer who visited clinics in the city of Babol in 2022. Among these, 30 patients with breast cancer were selected through non-random convenience sampling and randomly assigned into an experimental group (receiving Acceptance and Commitment Therapy) and a control group (15 individuals in each group). Then, 8 sessions of 90-minute Acceptance and Commitment Therapy were conducted for the experimental groups. Inclusion criteria were a definitive diagnosis of breast cancer, no psychiatric medication use in the past 6 months, no psychotherapy in the past 6 months, and willing and written consent to participate in the research. Exclusion criteria included absence from more than one psychotherapy session, unwillingness to continue psychotherapy, and prior diagnosis of mental disorders among participants.

2.2. Measures

2.2.1. The Psychological Hardiness

This self-report scale consists of 45 items, based on the conceptual definition of the psychological hardiness construct to assess this variable in specific and stressful situations created by Lang and Goulet (2003). This questionnaire, following the definition of hardiness, includes three subscales: control (16 items), commitment (16 items), and challenge (13 items). To adjust the wording, 15 items are negatively scored and randomly distributed throughout the scale. All items are rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The correlation between the total scores on the questionnaire and the scores on its subscales was moderate to high, and Cronbach's alpha coefficient reported good internal consistency for the questionnaire. The test-retest reliability coefficient was r=0.73, indicating the scale's relative stability and sensitivity to changes over time (Aghajani et al., 2018). In this study, Cronbach's alpha reliability coefficient obtained was 0.90, indicating significance and positivity.

2.2.2. Distress Tolerance

Created by Simons and Gaher (2005), this self-assessment index measures emotional distress tolerance with 15 items and four subscales: Tolerance, Absorption, Appraisal, and Regulation. Items are rated on a 5-point scale. The minimum and maximum possible scores are 15 and 75, respectively. Cronbach's alpha coefficient for this scale was found to be 0.82. The scale has good criterion and convergent validity, with a validity coefficient of 0.61 reported. It also showed high internal consistency for the total scale (0.71) and moderate reliability for the subscales (Zarabi et al., 2021). In this study, Cronbach's alpha

coefficient for the total scale was 0.77, and 0.89 for reliability, indicating significance and positivity.

2.2.3. Mental Pain

Orbach & Mikulincer Mental Pain Scale (OMMP): This scale, developed by Orbach et al. (2003), measures the intensity of mental pain. It consists of 44 questions, and its initial validation was conducted on 225 students. Exploratory factor analysis by Orbach et al. identified nine subscales measuring different aspects of mental pain. In a study, Orbach et al. reported Cronbach's alpha coefficients for these subscales ranging from 0.75 to 0.95. Items 25 and 42 are reverse-scored. The Kaiser-Meyer-Olkin measure was 0.942, and the Bartlett's test of sphericity was significant, indicating that six factors explained 66.404% of the total variance. Cronbach's alpha for the overall questionnaire of mental pain was 0.966, with subscales ranging from 0.617 to 0.952 (Amiri et al., 2023). In this research, Cronbach's alpha reliability coefficient obtained was 0.82, indicating significance and positivity.

2.3. Interventions

2.3.1. Mindfulness Therapy

Mindfulness therapy sessions were conducted over 8 weekly 90-minute sessions based on the protocol by Kabat-Zinn (2003) (Kabat-Zinn, 2003).

Session 1: Introduction to Mindfulness

The first session serves as an introduction to mindfulness, where participants are acquainted with the principles of mindfulness and its relevance to their experiences with breast cancer. The therapist explains how mindfulness can help manage mental pain, enhance distress tolerance, and build psychological hardiness. Participants engage in basic mindfulness exercises, such as mindful breathing, to become familiar with the practice of bringing attention to the present moment non-judgmentally.

Session 2: Body Scan Meditation

In the second session, participants are introduced to the body scan meditation technique. This session focuses on enhancing bodily awareness and recognizing the physical manifestations of stress and anxiety. Through guided meditation, participants learn to observe sensations throughout the body without judgment, fostering a deeper connection between mind and body, and starting to address mental pain through mindfulness.

Session 3: Mindful Movement

Session three integrates mindful movement, using gentle yoga and stretching exercises to cultivate awareness of bodily sensations during movement. This practice helps participants understand how stress and emotional pain manifest in the body and how mindful movement can aid in releasing tension and improving emotional and physical well-being.

Session 4: Awareness of Breathing

This session delves deeper into the practice of mindful breathing. Participants learn to use breath as an anchor to the present moment, helping them to manage distress and anxiety. Techniques to observe the breath and recognize the wandering mind are practiced, emphasizing the return to breath as a way to cultivate focus and calmness.

Session 5: Handling Emotions Mindfully

Focusing on emotional regulation, session five introduces strategies for recognizing and managing difficult emotions. Through mindfulness exercises, participants learn to observe their emotional responses without judgment, understanding that emotions are transient. This aids in developing distress tolerance and emotional hardiness.

Session 6: Developing Positive Relationships

Session six explores mindfulness in the context of relationships, emphasizing empathy, compassion, and effective communication. Participants engage in practices that enhance awareness of interpersonal dynamics and their impact on emotional well-being. This session helps in building supportive relationships that foster psychological hardiness.

Session 7: Mindfulness Meditation

The penultimate session is dedicated to cultivating a personal meditation practice. Participants are guided through various forms of meditation, including sitting meditation and loving-kindness meditation. The aim is to deepen the mindfulness practice and integrate it into daily life for ongoing management of mental pain and enhancement of psychological hardiness.

Session 8: Integration and Future Planning

The final session focuses on integrating mindfulness practices learned throughout the program into everyday life. Participants discuss challenges and successes encountered during the course and explore ways to maintain and deepen their mindfulness practice post-program. The therapist provides resources and guidance for continued practice and growth beyond the therapy sessions.

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2.4. Data analysis

Descriptive data analysis was performed using statistical indices for each research variable. Inferential statistics involved repeated measures ANOVA using SPSS-22 software.

3. Findings and Results

The mean (standard deviation) age of participants was 38.5 (8.7) years in the experimental group and 36.9 (7.7) years in the control group. The minimum and maximum ages in the experimental group were 26 and 43 years, respectively, and in the control group, 27 and 42 years.

Table 1

Descriptive Statistics of Research Variables by Test Type and Groups

Variable	Stage	Experimental Group		Control Group	
		Mean	SD	Mean	SD
Psychological Hardiness	Pre-test	57.53	10.22	58.86	11.87
	Post-test	73.60	13.54	57.80	11.05
	Follow-up	74.40	13.61	56.60	11.01
Distress Tolerance	Pre-test	36.42	3.12	35.76	3.27
	Post-test	27.63	3.79	37.14	2.65
	Follow-up	27.06	2.86	37.71	2.74
Mental Pain	Pre-test	77.73	14.51	76.66	14.43
	Post-test	69.26	13.19	75.21	14.09
	Follow-up	68.82	13.85	75.83	14.39

According to the results in Table 1, the means of all variables, which differed at the pre-test, post-test, and follow-up stages, showed changes in mean scores in the post-test and follow-up stages in the experimental group, while no change was observed in the control group.

In the course of this study, rigorous statistical checks were performed to ensure the validity and reliability of our findings. Assumptions underlying the statistical tests, including normality, homogeneity of variance, and sphericity, were meticulously examined and confirmed. Specifically, the Shapiro-Wilk test affirmed the normal distribution of the residuals for each variable, with values ranging from .90 to .95, indicating a satisfactory alignment with normality assumptions. Levene's test for equality of variances yielded results well above the threshold of significance ($p > .05$) across all measured variables, confirming homogeneity of variance. Mauchly's test of sphericity was also conducted, showing that the assumption of sphericity had not been violated ($p > .05$), justifying the use of parametric tests for repeated measures. These statistical assurances laid a robust foundation for the subsequent analyses and contributed significantly to the reliability of the study's conclusions regarding the effectiveness of mindfulness therapy on mental pain, distress tolerance, and psychological hardiness in breast cancer patients.

Table 2

Repeated Measures ANOVA for Comparing Pre-test, Post-test, and Follow-up of Research Variables in Experimental and Control Groups

Scale	Effect Source	Sum of Squares	df	Mean Square	F	Significance	Eta Squared
Psychological Hardiness	Time*Group	59.267	2	29.633	12.761	< .001	.313
	Group	35.267	1	35.267	10.891	< .003	.280
Distress Tolerance	Time*Group	156.800	2	78.400	15.116	< .001	.351
	Group	56.067	1	56.067	8.162	< .008	.226
Mental Pain	Time*Group	70.067	2	35.033	4.262	< .001	.132
	Group	187.267	1	187.267	10.830	< .001	.402

The results of the multivariate repeated measures ANOVA among the study groups for the research variables indicated that the between-subjects effect (group) was significant, meaning that at least one of the groups differed from the others in at least one of the research variables. The within-subjects effect (time) for the research variables was also significant, indicating that over time, from pre-test to

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follow-up, there was a significant change in at least one of the variables.

Results from Table 2 showed that the obtained F-ratio for the group factor in the research variables was significant. This finding suggests that mindfulness training led to improvements in psychological hardiness, distress tolerance, and mental pain. In this regard, a repeated measures ANOVA for the experimental group in three stages of the therapeutic intervention showed that the observed F-ratio for improvements in psychological hardiness, distress tolerance, and mental pain was significant ($p < .01$).

Table 3

Bonferroni Post-Hoc Within-Group Results for Mindfulness Training on Psychological Hardiness, Distress Tolerance, and Mental Pain in the Experimental Group

Variable	Comparison	Mean Difference	Standard Error	P-value
Psychological Hardiness	Pre-test vs. Post-test	-15.54	2.51	< .001
	Pre-test vs. Follow-up	-16.61	1.10	< .001
	Post-test vs. Follow-up	1.06	1.23	.114
Distress Tolerance	Pre-test vs. Post-test	-8.28	2.39	< .001
	Pre-test vs. Follow-up	-8.78	1.13	< .001
	Post-test vs. Follow-up	0.66	1.29	.245
Mental Pain	Pre-test vs. Post-test	-8.59	2.72	< .001
	Pre-test vs. Follow-up	-7.44	1.38	< .001
	Post-test vs. Follow-up	0.79	1.35	.347

Changes over time in the experimental group, as shown in Table 3, indicated that the dimensions of psychological hardiness, distress tolerance, and mental pain in the mindfulness training group were significantly different in the post-test compared to the pre-test ($P < .001$). Furthermore, a significant difference was observed in the follow-up stage compared to the pre-test ($P < .001$). However, no significant difference was observed in the follow-up compared to the post-test ($p < .01$).

4. Discussion and Conclusion

The current study aimed to determine the effectiveness of mindfulness therapy on mental pain, distress tolerance, and psychological hardiness in patients with breast cancer. The findings indicate that mindfulness therapy is effective in reducing mental pain, increasing distress tolerance, and enhancing psychological hardiness in patients with breast cancer. These findings are consistent with the results of prior research (Bai et al., 2022; Bao, 2022).

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 primary goals of mindfulness group therapy (Bao, 2022). Indeed, mindfulness-based group therapy techniques, such as mindful breathing, are used to increase awareness of one's situation to cope and survive during crises, allowing individuals to endure physical and emotional pain in both the short and long term. Mindfulness therapy recognizes that whatever happens in the present moment, making patients perceive events as less distressing than they might otherwise feel (Vena, 2023). This implies that with mindfulness therapy, an individual enhances a metacognitive construct known as distress tolerance within themselves. They attend to, evaluate, and, when unable to change circumstances, accept and endure it, regulating emotions, especially the force generated by action tendencies toward avoidance or immediate weakening of the experience, without disintegrating functionality; in other words, distress tolerance is an individual's capacity to withstand and experience negative psychological states, with individuals of low tolerance describing distress as an unbearable construct (Koerner & Rechenberg, 2022). Individuals with high distress tolerance can introspect and then focus on internal experiences with acceptance using the technique of mindfulness. This technique is a mindful way to deal with intense emotions and challenges, providing a proper refuge during distress.

It can also be said that considering individuals with chronic pain may adopt beliefs that lead to specific activities even during pain experiences, potentially affecting their ability to achieve goals hindered by illness or disability (Bai et al., 2022). Therefore, breast cancer patients undergoing

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mindfulness therapy are provided with the opportunity, in difficult and challenging life situations, to set aside conventional, ego-centric, experience-based, limited, and tangible perceptions and solutions, and to reach intelligent and logical decisions through the continuous review and questioning of possible solutions. On the other hand, negative beliefs and attitudes about oneself are considered a primary part of changes, and through mindfulness-based therapy, individuals learn to employ new experiences that organize beliefs such as alternative and more adaptive beliefs, ultimately improving illogical beliefs about problems and physical limitations of patients with breast cancer, thereby increasing their psychological hardiness and alleviating their mental pain (Vena, 2023).

5. Limitations & Suggestions

Among the limitations of this research are: since this study was conducted only among patients with breast cancer, caution is required in generalizing the results, as different outcomes might be presented in another population. The age range of 30 to 45 years is a factor that could present significant variations in results; therefore, age groups should be distinguished with greater precision. Considering that the research was conducted on a population of patients with breast cancer, it is suggested to carry out similar studies in non-breast cancer patient populations and compare the results with 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 holding 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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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

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

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed in this article.

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