Mindfulness-Based Therapy in Patients with Breast Cancer with Depression and Anxiety: A Literature Review

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Abstract. Breast cancer is the most common cancer among women. Breast surgery and follow-up treatment for breast cancer patients are accompanied by side effects, which have a negative impact on both the mental health and quality of life of breast cancer survivors. At present, mindfulness is regarded as an effective way to improve psychological problems. Mindfulness based interventions are common means to improve the depression, anxiety of breast cancer patients. This paper reviews the mindfulness based interventions related to breast cancer, and studies the impact of MBSR, MBCT and MBAT in MBI on breast cancer patients. The results showed that MBI had a positive effect on depression, anxiety in breast cancer patients. This review found that the intervention time and the participation of breast cancer patients played an important role in the intervention effect.

Keywords: Mindfulness; Breast Cancer; Mindfulness-based Intervention; Depression/ Anxiety.

1. Introduction

According to the World Health Organization statistics, by the end of 2020, 2.3 million women had breast cancer worldwide, of which 685000 women died of breast cancer. About 13% of American women will be diagnosed with breast cancer. Breast cancer accounts for 12.5% of global cancer cases and is the most common cancer (WCRF, 2020).

To prevent the further spread of malignant tumors in the breast, patients with breast cancer usually undergo surgery to remove part of or all of the breast (Vaz-Luis et al., 2016). The operation is also accompanied by side effects such as appearance change, pain, and sclerosis (Yarnold et al., 2005). The change in breast shape has a negative impact, such as depression, on women's emotional expression, self-evaluation, and spouse relationships (Keskin & Gumus, 2011).

In addition, because breast cancer is highly dependent on hormones, in order to prevent the recurrence and metastasis of malignant tumors, drugs used to treat breast cancer, such as raloxifene or tamoxifen, belong to anti-estrogen drugs that inhibit biological flavonoids (Akram et al., 2017; Gompel, 2019). Estrogen plays an essential role in regulating anxiety. Lack of estrogen corresponds to an increase in anxiety (Kalandakanond-Tongsong et al., 2012; He et al., 2021).

Breast cancer treatment also includes chemotherapy, which can cause nausea, fatigue, vasomotor symptoms, and other side effects. Vasomotor symptoms can cause insomnia (Masood, 2016; Shapiro & Recht, 2001). At the same time, cancer-related fatigue (CRF) is also reflected in breast cancer patients before and after chemotherapy. These side effects significantly reduce the quality of life of breast cancer patients (Fox et al., 2020).

Patients after breast cancer surgery showed higher anxiety, stress, and depression and decreased quality of life. Therefore, some breast cancer survivors choose breast reconstruction to restore their body image. Fanakidou et al. (2017) studied the impact of breast reconstruction on the health-related quality of life (HRQoL) of breast cancer survivors. The participants were breast reconstruction patients and without breast reconstruction patients one year after surgery. Patients undergoing breast reconstruction have a more positive psychological state but also have more persistent physical discomfort. The results show that breast reconstruction is not the best way to improve the quality of life. Patients get help through psychological intervention and support.

The research on psychological intervention for breast cancer patients shows that mindfulness-based intervention (MBI) can effectively improve patients' mental health and solve psychological issues. Furthermore, the effect of this intervention is not short-term, and the patient can maintain a good state for four weeks (Park et al., 2020).

Mindfulness is a concept that focuses on the present purposefully and finds change from it. This concept effectively improves the divergence of thinking, and mindful evaluation of the current changes will improve the quality of life. Negative emotions stem from mindless ruminations, and excessive attention to external evaluation will lead to more stress (Langer, 2014; Langer & Moldoveanu, 2000).

This study reviewed the three most common MBI methods in rehabilitation of breast cancer patients to assess the impact of different mindfulness therapies on anxiety and depression in breast cancer patients.

This article reviews the literature on the impact of a mindfulness-based intervention on breast cancer patients, aiming to assess the impact of MBI on the depression and anxiety of breast cancer patients.

2. Background of MBI

Mindfulness originated from Buddhism and is a kind of non-deliberate ongoing concern and feeling of the present, regarded as a form of natural observation. The intervention based on mindfulness is a cognitive behavior practice proposed by western researchers in combination with Buddhist mindfulness theory (Grossman et al., 2004). In recent years, there have been more and more studies on the clinical application of MBI, and many studies have also proved the positive effects of MBI on cancer patients, such as improving physical pain, postoperative anxiety, depression, and quality of life (Teasdale et al., 2000; Zhao et al., 2019). MBI usually regulates stress through different forms of mindfulness meditation and yoga. Two common interventions are mindfulness-based stress reduction (MBSR) and mindfulness-based cognitive therapy (MBCT). In addition, mindfulness-based art therapy (MBAT) is also widely used (Newland & Bettencourt, 2020).

1. MBSR

MBSR is an eight-week training program that includes mindfulness meditation, yoga, and daily application of mindfulness thinking. MBSR helps breast patients improve chronic health problems, such as stress, anxiety, and depression, through mindfulness-related training (Lenacher et al., 2011; Alsubaie et al., 2017).

2. MBCT

MBCT was initially developed for patients with depression to prevent the recurrence of depression (Crane et al., 2016). However, MBCT is now more widely used to reduce breast patients' depression, anxiety, and fatigue (Van der Lee&Garssen, 2010).

3. MBAT

MBAT combines art with mindfulness to better regulate attention, body awareness, and emotion. MBAT training generally bases on mindfulness thinking for painting, writing, and other artistic creation (Prioli et al., 2017; Newland&Bettencourt, 2020).

MBCT also bases on the combination of MBSR and cognitive behavioral therapy.

3. Materials and Methods

The data for this review is from PubMed's papers since 2017. A search of the PubMed database with the following search terms: (Mindfulness) AND (Breast cancer); (Mindfulness) AND (Depression); (Mindfulness) AND (Anxiety); (MBSR) AND (Breast cancer); (MBCT) AND (Breast cancer); (MBI) AND (Breast cancer).

The adoption criteria of the article are as follows: 1. the publication time is from 2017 to 2022, 2. the target population of the article must be breast cancer patients suffering from depression or anxiety, 3. the article type is a randomized controlled trial, 4. the article must include mindfulness therapy (Fig. 1).

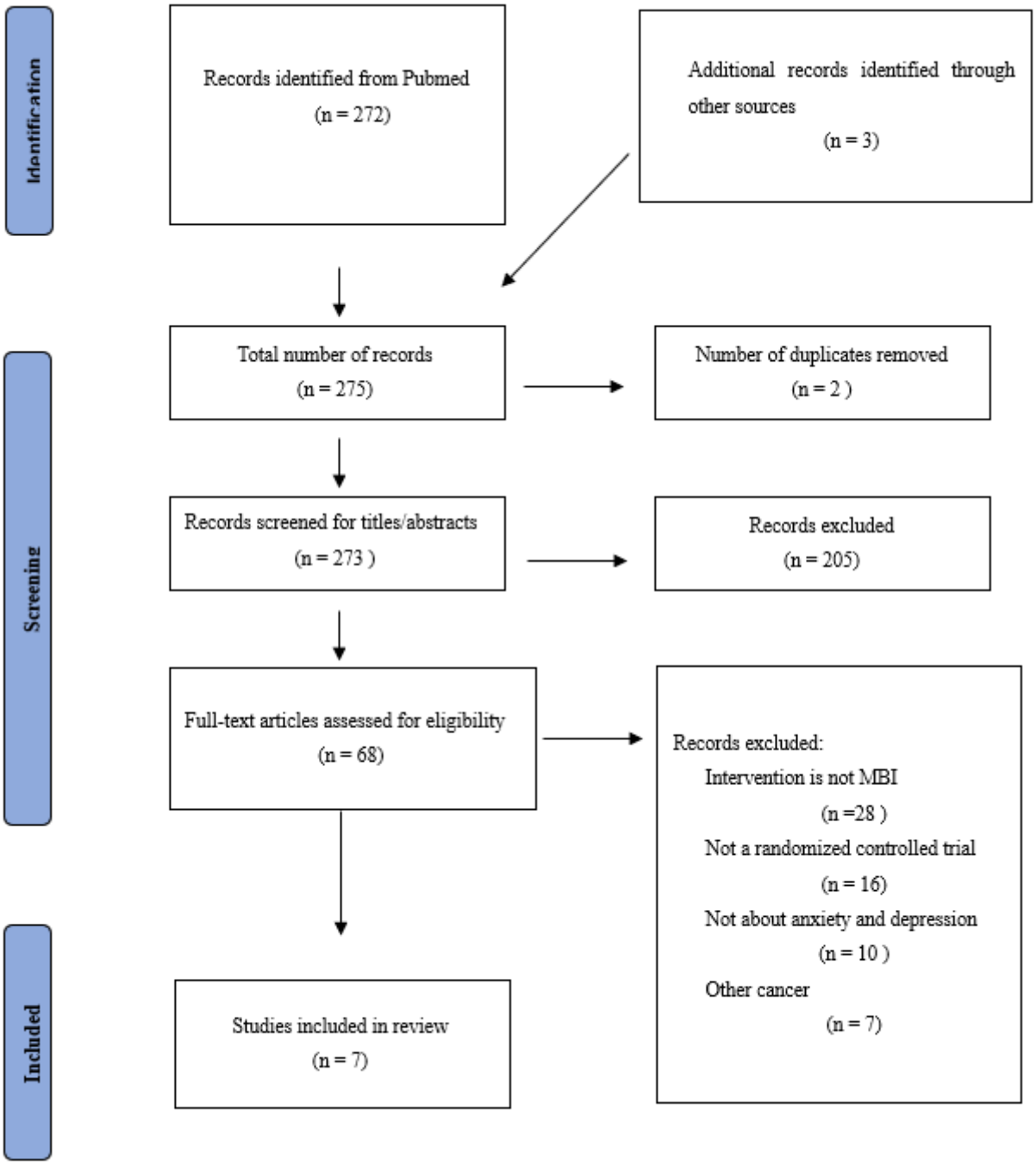


Fig 1. PRISMA flow diagram

4. Results

The papers included in this review are listed below. This review includes seven studies. The sample size of these studies ranges from 44 to 299. Most participants were patients with stage 0-III breast cancer or cancer survivors who had completed treatment. Randomized controlled design is used in all studies. One study did not describe the stage of the participant's disease (Mir Mahmoodi et al., 2020), and another did not describe the treatment of breast cancer (Jalambadani&Borji, 2019) (Table 1).

Table 1. Demographics and characteristics of studies (n=7)

	Paper	Sample Size	Age	Stage	Treatment/ Situation	Research Design	Research Method	Intervention Category and Description
1	Reich et al., 2017	299	mean 56.6	Stage o-III	Mastectomy, radiation and chemotherapy	Two-armed randomized cotrolled design	Participants were divided into MBSR intervention and BC control group.	Participants who received MBSR training showed significant improvement in mental health (depression, anxiety, and quality of life) and fatigue.
2	Jalambadani & Borji, 2019	100	55.75 ± 3.53 (40-60)	Any stage	No mentioned in paper	Randomized controlled study	Participants were divided into intervention and control groups, and the intervention group carried out MBAT activities.	BCS undergoing MBAT activities have significantly improved their physical health, psychology, social relations, and environment.
3	Park et al., 2020	74	mean 53.7	Stage I-III	Clinical prognosis of one year or longer	Randomized controlled Trial	Participants were divided into MBCT intervention and WLC control groups.	The psychological distress of the intervention group was significantly reduced.
4	Mirmahmoodi et al., 2020	44	mean 44.89	No mentioned in paper	Breast cancer has been diagnosed for 3 months to 5 years and has undergone at least one chemotherapy or operation.	Randomized controlled Trial	Participants were divided into MBSR intervention and UC control groups.	The anxiety of the control group increased with time, and the anxiety of the intervention group decreased significantly.
5	Lengacher et al., 2021	299	mean 56	Stage o-III	Mastectomy, radiation and chemotherapy	Randomized controlled Trial	Participants were divided into MBSR intervention and UC control groups. And stratified according to the type of breast cancer surgery, follow-up treatment, and breast cancer stage.	MBSR has a positive impact on patients' perceived stress, anxiety, and fear of recurrence.
6	Tamura et al., 2021	74	mean 53.69	Stage o-III	Some participants received chemotherapy, radiotherapy and hormone therapy within one month before the project began.	Randomized controlled Trial	Participants were randomly assigned to MBCT group or control group.	The psychological problems of patients who frequently and seriously participated in MBCT courses were better alleviated.
7	Liu et al., 2022	136	51-60	Stage I-II	Patients received a mastectomy and postoperative chemotherapy	Randomized controlled Trial	Participants were randomly assigned to MBSR group or UC group.	Mindfulness yoga has a positive effect on the mental health of patients with early breast cancer.

Note. MBSR: mindfulness-based stress reduction; MBCT: mindfulness-based cognitive therapy; MBAT: mindfulness-based art therapy; UC: usual care; WLC: wait-list control; BCS: breast cancer survivors.

4.1 Studies Focused on the Effects of MBSR on Depression and Anxiety.

In the review of the research on MBSR intervention, all showed the positive impact of MBSR on the mental health of breast cancer patients. Reich et al. (2017) studied the symptom clusters of breast

cancer survivors (BCS) after treatment and the impact of MBSR intervention on the symptom cluster. Symptom clusters include psychological, pain, fatigue, and cognition. The participants were breast cancer patients of stages 0-III who stopped treatment and were divided into the MBSR intervention group and the usual care group (UC). The researchers provided MBSR training for the experimental group for six weeks, two hours a week, including meditation, Hatha yoga, and body scan. Participants must practice meditation techniques for 15 to 45 minutes daily and record the practice time. The researchers evaluated the symptom cluster scores at baseline, six weeks, and twelve weeks of BCS. The final results are divided into three steps. The results first support the coexistence of multiple symptom clusters in BCS; for example, survivors with depression may also feel anxious. The second result is that after the intervention, MBSR has shown effectiveness in the psychological (depression, anxiety, stress, and fear of recurrence) and fatigue of BCS ($p < 0.05$). However, there is no difference in the impact on cognitive cluster and pain ($p = 0.97$). The third result showed that the improvement of BCS by MBSR did not decrease or increase six weeks after the intervention, indicating the continuity of the intervention (psychological, $p = 0.84$; fatigue, $p = 0.80$; cognition, $p = 0.26$; and pain, $p = 0.09$).

Mir Mahmoodi et al. (2020) studied the impact of mindfulness on the psychological (anxiety, depression, stress) and physical regulation (C-reactive protein (CRP) and cortisol) of women with breast cancer; MBSR was used as the intervention group and UC as the control group to carry out a controlled trial with a longer intervention time. The participants were patients aged 18-70 years diagnosed with breast cancer from three months to five years. Participants must have at least one chemotherapy session or surgery, and no breast cancer metastasis. There was no drug addiction or severe mental disorder prior to intervention. The researchers conducted eight weeks of MBSR training for breast cancer patients in the intervention group. The results showed that MBSR effectively improved breast cancer patients' anxiety. Compared with the increase in anxiety in the UC group, the anxiety of patients in the MBSR intervention group was reduced significantly ($p = 0.01$, mean difference = -10.88). The patients' stress and depression also improved in clinical practice, but there was no statistical significance. MBSR had no significant effect on the reduction of cortisol and CRP.

Lenacher et al. (2021) further studied the working mechanism of MBSR to improve the mental health of breast cancer patients. BCS participating in the experiment are divided into the MBSR (BC) group and the UC group. After MBSR (BC) intervention, BCS had less fear of recurrence. MBSR (BC) regulated the cognitive mechanism of fear of recurrence so that BCS could achieve self-regulation. The experimental results proved that the cognitive mechanism supported the success of the MBSR (BC) intervention. Patients achieved a positive result in reducing stress and anxiety through better cognitive control of internal and external experiences.

So far, studies on the impact of MBSR on breast cancer patients have not considered the effects according to the stage of breast cancer. Therefore, in a recent study, Liu et al. (2022) conducted MBSR intervention on patients with early breast cancer. Early breast cancer patients are considered curable, but there is no denying that they will still have mental health problems and other complications. The researchers recruited stage I or II female patients who had undergone mastectomy and postoperative chemotherapy. The expected survival needs of participants are greater than or equal to one year, and there are no other serious diseases. The researchers provided 8-weeks of MBSR intervention training for the intervention group while the control group continued to receive routine hospital care. Results were divided based on time intervention after intervention received; groups included baseline (T0), eight weeks (T1), and twenty weeks (T2). The results showed that the anxiety and depression of the patients in the experimental group was reduced, which had clinical significance. Mindfulness is more helpful for emotional disorders of early breast cancer patients than UC. It can be noted that the difference between the experimental and control groups significantly reduced at T2, indicating that the positive effects of MBSR are not permanent and training needs further review.

In the review of MBSR related interventions, all studies showed that MBSR significantly improved anxiety and depression, and had statistical significance for anxiety.

4.2 Studies Focused on the Effects of MBCT on Depression and Anxiety.

Park et al. (2020) studied the effect of MBCT on the extensive symptoms of patients with non-metastatic breast cancer. The participants are breast cancer patients of stages 0-III and have no MBI-related experience, so they need to score at least 5 points on the Hospital Anxiety and Depression Scale (HADS). The researchers divided the patients into an MBCT experimental group and a control group, and the results were divided into groups on time; baseline (T0), eight weeks (T1), and 12 weeks (T2). The experimental group needs to participate in at least four interventions, and less than four interventions is considered abandonment. The researchers divided the results into two categories; primary and secondary. The main results measured the psychological distress (anxiety and depression) of the control and experimental groups.

In contrast, secondary results assessed the fear of cancer recurrence, fatigue, mental health, quality of life, and mindfulness skills. The results showed that patients' psychological distress with MBCT intervention was significantly improved. The secondary results showed that MBCT positively impacted a wide range of symptoms, and MBCT reduced recurrent fear and fatigue. It is worth noting that the positive effect of the intervention lasted for four weeks.

Tamura et al. (2021) further studied the predictive and regulatory factors of MBCT to understand the optimal number of courses of MBCT. The participants were breast cancer patients of stages 0-III who were allocated 1:1 to the MBCT intervention group or the control group. The MBCT group had eight two-hour courses and needed to complete relevant homework daily. The results showed that patients who participated more time got better relief and MBCT-related homework increased their happiness.

4.3 Studies Focused on the Effects of MBAT on Depression and Anxiety.

Jalambadani and Borji (2019) studied the impact of mindfulness art therapy on the quality of life of women with breast cancer. The participants were married homemakers between 40 and 60 years old with breast cancer. They were randomly assigned to the MBAT and control groups; the MBAT team conducted 12 weeks of related courses. The course content includes artistic creation based on a mindfulness attitude and sharing with group members. After the intervention, the patients improved in physical health, psychology, social relations, and environment. Participants expressed themselves creatively through art therapy and mindfulness thinking. The group mode also provides group therapy, which effectively improves self-acceptance.

5. Discussion

In other words, it can be seen from the research results in the review that the positive impact of MBI on breast cancer patients was confirmed. MBSR, MBCT, and MBAT all improved breast cancer patients' depression, anxiety, and health-related quality of life to varying degrees. Compared with UC, MBI is more conducive to the mental health of breast cancer patients.

In addition, it is worth noting that the improvement degree of patients is related to compliance and treatment time. Patients who have participated for a long time tend to be associated with lower levels of depression and anxiety. The influence of MBI on psychological distress may be indirect. As a potential mechanism, MBI affects the patients' mentality to achieve the goal of self-regulation. The MBI course conducted in the group mode is conducive to the social participation of patients and the positive evaluation from the group members to improve the self-assessment. Although some research results have no statistical significance, the positive clinical significance cannot be ignored.

In this review, some researchers explored the relationship between MBI and physical health, and the results showed that MBI had no significant impact on pain reduction or body regulators. However, some studies have proved the effectiveness of mindfulness in improving the immune system of breast cancer patients (Meyer et al., 2018), which provides a direction for further development of the content and form of MBI in the future. It is to reduce the recurrence of breast cancer by regulating inflammatory factors in breast cancer patients through mindfulness based intervention.

There are many causes of psychological problems in breast cancer patients. Negative self-evaluation of appearance after surgery, disharmonious marital life, and economic pressure may lead to anxiety and depression. When implementing MBI measures, we must consider the patient's situation. The studies in review all used face-to-face interventions. Breast cancer patients will reduce their physical strength and energy after mastectomy and subsequent treatment (chemotherapy, radiotherapy, and drug treatment). It may lead to many patients not adapting to face-to-face MBI training. Therefore, we can try to promote web-based mindfulness-based intervention (eMBI) in the future. Several studies have demonstrated the positive effects of eMBI on chronic cancer. It gives patients more time and space for mindfulness training (Maas et al., 2020).

6. Conclusion

Depression and anxiety are the main psychological problems faced by breast cancer patients. Long-term psychological distress will reduce the survival rate of breast cancer patients, while first-line medications for emotional disorders will also increase the mortality of breast cancer patients (Liu et al., 2022). Therefore, mindfulness therapy as a non-pharmacological treatment is essential. It can be seen from the review that mindfulness therapy needs to be carried out continuously. Considering the patient's time, capital, and energy, it is necessary for patients to integrate mindfulness into their lives. Meditation and yoga are tools and forms to improve psychological problems. Mindfulness thinking mode may be more beneficial to patients.

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