

RESEARCH ARTICLE

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The Effectiveness of Mindfulness-Based Cognitive Therapy to Improve Anxiety Symptoms and Quality of Life in Breast Cancer Patients

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Abstract

Background: Breast cancer patients often experience anxiety, impacting their Quality of Life (QOL). Mindfulness-Based Cognitive Therapy (MBCT) is a 3rd generation psychotherapy from CBT combined with MBSR where mindfulness methods are carried out in a structured and scheduled manner, able to provide a pause between the stressor and the automatic response it causes. This study aimed to assess MBCT's effectiveness in alleviating anxiety and enhancing QOL in Stage III breast cancer patients undergoing chemotherapy, with mild-moderate anxiety disorders. **Method:** The experimental research, conducted at Moewardi General Hospital Surakarta from March to June 2023, employed a quasi-experimental pretest–posttest control group design. Thirty subjects were divided into intervention (MBCT) and control (psychoeducation) groups. Participants completed demographic forms, disease history, and assessments using the Hospital Anxiety & Depression Scale (HADS-A) and European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ-C30). **Result:** There was a significant improvement in HADS-A scores in both groups ($P < 0.001$) where the difference in the median HADS score in intervention group was higher compared to the control group. The effect of MBCT to the score improvement of HADS-A showed statistically significant results $P = 0.003$ with HR 1.288. In the EORTC QLQ C30 Global score, the intervention group experienced a significant increase $P < 0.001$, and in the control group, it did not significantly increase $p = 0.087$ although multivariate analysis showed that MBCT was not significant in improving the global EORTC score. From the continued multivariate analysis of the EORTC QLQ C30 function, score improvement was significantly influenced by MBCT with $P = 0.035$ and HR 3.086. Meanwhile, for the EORTC symptoms, score improvement was influenced by MBCT with $P = 0.005$ and HR 3.401. **Conclusion:** There is a score improvement in HADS-A and EORTC with the provision of MBCT psychotherapy and with the provision of psychotherapy. However, the HADS and EORTC improvement scores were significantly higher with MBCT compared to psychotherapy alone.

Keywords: MBCT- psychotherapy- anxiety- quality of life- breast cancer

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Introduction

Breast cancer is the most common type of cancer and the second leading cause of cancer death among Asian-American women (1). In Indonesia, PERABOI (Surgical Oncology Forum of Indonesia) collected data from 4959 cases from 16 of 38 provinces in Indonesia. From the data collected from 2014 to 2018, 50.9% were diagnosed with Stage III and 20.1% with Stage IV (2). In our center, about 100 new cases are recorded every year. (28) At the initial diagnosis of breast cancer, 38.6% of patients experience adjustment disorders (Tang et al., 2020), and 70% of advanced breast cancer patients

who are waiting for the treatment process experience anxiety (3). Asian women are known to have a Post Traumatic Stress Disorder (PTSD) score 24 times higher than American and European women when they receive a breast cancer diagnosis (1). Risk factors for anxiety symptoms in breast cancer patients include 3 aspects consisting of biological, psychological, and social aspects. Chronic inflammation triggered by cancer cells can affect the nervous system, Sympathetic-Adrenal-Medullar (SAM), and Hypothalamic-Pituitary-Adrenal (HPA) axis which eventually leads to psychiatric symptoms such as anxiety (4). Anxiety can further trigger sensations of body tension and pain that make attention focused

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on physical symptoms and continuing the process can strengthen anxiety levels (5). Anxiety can ultimately lead to a decrease in quality of life (QoL), decreased self-confidence in women after mastectomy, and interference with sexual and financial life (6).

Psychosocial interventions from the onset of cancer diagnosis can improve outcomes and QoL for patients with cancer (7). Mindfulness-Based Stress Reduction (MBSR) is one of the developments of mindfulness therapy that shows good efficacy for psychopathology in breast cancer patients (8). Mindfulness-Based Cognitive Therapy (MBCT) is a third-generation psychotherapy derived from Cognitive Behavior Therapy (CBT) by combining MBSR with CBT which is effective for treating and preventing anxiety and depression (9). Compared to MBSR, MBCT has a more explicit psychoeducational component on the relationship between mood, bodily sensations, and cognition including emphasizing 'ruminative' thoughts as a target to address (10). Psychoneuroimmunologically, the role of MBCT on anxiety symptoms can be proven through the process of Top-Down Regulation, Bottom-Up Regulation on Neural Stress Reduction Pathways, SAM, and HPA on Peripheral Stress Pathways (11). MBCT intervention contributes positively to overcoming psychological distress such as depression, anxiety, fear, fatigue, and QoL with a sample of breast cancer patients (12). Seeing the high prevalence of anxiety symptoms in breast cancer patients caused by biopsychosocial factors, as well as the impact of treatment on patients so that it worsens the underlying disease, and of course can affect function and QoL, this study aims to analyze the effectiveness of MBCT to reduce anxiety symptoms and improve the QoL of breast cancer patients.

Materials and Methods

Quasi-experimental research with a pretest-posttest control group design was conducted in the inpatient ward of RSUD Dr. Moewardi Surakarta from March to June 2023. The research has received approval from the Ethics Committee of FK-UNS/RSUD Dr. Moewardi Surakarta Number 525/IV/HREC/2023. The purposive sampling technique was used to select research subjects, with the calculation of the sample size based on the formula for determining the size of the numerical analytic sample. The mean HADS-A score of breast cancer patients before the study was 8.34 ± 3.52 . Type I error of 5% and type II error of 10% were used in the sample size determination.

Inclusion criteria included stage III breast cancer patients undergoing chemotherapy, aged 18-55 years, minimum junior high school education, ability to read, write, online access, understand and speak Indonesian, willingness to be a research subject, having mild to moderate anxiety symptoms (score 8-14 HADS). Exclusion criteria included severe mental disorders with psychotic symptoms, manifestations of multiorgan disorders and severe comorbidities (Karnofsky performance status ≤ 70), having received mindfulness-based training, consumption of antidepressants and anti-anxiety drugs during treatment, and refusal to participate in the study.

The study subjects filled out demographic data forms

and disease history, as well as filled out the HADS-A and EORTC QLQ C30 questionnaires by the subjects. Subjects in the treatment group received MBCT training through Zoom with 5 training sessions for 60-90 minutes, 2 times per week. After the training session was completed, the subjects were asked to fill out the questionnaire regarding HADS-A and EORTC QLQ C30 again. The collected data were analyzed using SPSS to compare the scores before and after the intervention.

Data analysis to determine the difference in mean HADS-A and EORTC QLQ C30 scores in the control group and intervention group, pre and post e-MBCT was carried out for 5 sessions. Unpaired difference test (2 groups) uses the independent t-test if the data distribution is normal or the Mann-Whitney test if not. Then the paired difference test (2 groups) uses the paired t-test if the data distribution is normal or the Wilcoxon test if not. Multivariate analysis tests were carried out to see the differences in research variables and confounding variables. The analysis carried out in this study was linear regression analysis. Normality test using Shapiro-Wilk. The basis for making the decision to accept the hypothesis is based on a significance level (α value) of 0.5%; if $p < \alpha$ ($\alpha = 0.05$; $df = 1$) then the hypothesis is accepted.

Results

The total samples were 32 subjects taken and divided into two groups by drawing lots. A total of 16 research respondents were included in the intervention group and received 5 MBCT sessions for 3 weeks online. While 16 research respondents were included in the control group who were given psychoeducation for 3 sessions for 3 weeks. During the study, 2 respondents dropped out due to condition and cannot continue MBCT for 1 respondent and psychoeducation for 1 respondent. We identify factors that are thought to influence the subjects' outcomes. The respondents were found to have most of their education below high school (53.5%), married marital status (96.7%), income ≥ 2.5 million (63.3%), and daily commuting (53.3%) (Table 1). The t-test between groups did not show statistically significant differences with a value of $p > 0.05$, or it can be said that the characteristics of the subjects of this study were in the same or homogeneous population, so it did not interfere with the results of the experiments that were carried out.

There was a significant improvement in HADS-A scores after providing interventions using both MBCT (< 0.001) and providing psychoeducation alone (0.001). Even though the HADS-A scores had increased significantly, the difference in the HADS-A score had increased and was also significantly higher in the MBCT group compared to the psychoeducation (control) group ($p < 0.001$). Before the intervention, HADS-A scores in both groups showed no significant difference ($p = 0.121$).

The comparison of EORTC Global scores did not show significant results in the pretest sample ($p = 0.168$) (Table 2). There was a significant improvement in the EORTC Global score in the group after MBCT ($p = 0.001$) but not in the control group who got psychoeducation only ($p = 0.087$). The difference in improvement was also

Table 1. Characteristics in 2 Groups of Research Subjects

Characteristics	Total (n=30)	Control (n=15)	Intervention (n=15)	p-Value
Education				
< High School graduates	16 (53.3%)	9 (60%)	7 (46.7%)	0.464 ¹
≥ High School graduates	14 (46.7%)	6 (40%)	8 (53.3%)	
Marital Status				
Married	29 (96.7%)	14 (93,3%)	15 (100%)	0.309 ¹
Single	1 (3.3%)	1 (6,7%)	0 (0%)	
Income				
< 2.5 Million	11 (36.7%)	5 (33,3%)	6 (40.0%)	0.705 ¹
≥ 2.5 Million	19 (63.3%)	10(66,7%)	9 (60.0%)	
Jobs				
Daily commuting	16 (53.3%)	8 (53,3%)	8 (53.3%)	10.00 ¹
Working at home	14 (46.7%)	7 (46,7%)	7 (46.7%)	
Age (Years)	41.3±4.60	41,6±4,65	40.9±4.69	0.671 ²
Duration of diagnosis (Months)	6.9±2.27	6,13±2,09	7.73±2,21	0.052 ²

¹, Chi-Square; ², Unpaired T-test

significantly higher in the MBCT group compared to the control group (p=0.001).

In addition, there was a significant improvement in the median EORTC function scores. In the control group (p<0.001) and MBCT group (p=0.001), the difference in the decrease in EORTC function score was better in the MBCT group (p<0.001). Based on the results of the study, an unpaired t-test comparison of EORTC function scores between the control and MBCT groups did not show significant results in the pretest (p=0.733) and posttest (p=0.157) samples (Table 2).

The results of the EORTC Symptom Score of the MBCT group showed a significant median improvement (p=0.001), while in the control group, there was no

significant median improvement (p=0.142). Then, in the pre-post difference score, it is known that the intervention group experienced a significant improvement in EORTC Symptoms scores (p=0.001).

In the demographic data in the two treatment groups, there was a variable distribution of length of diagnosis with p <0.2. Therefore, we carried out a regression on the difference in score improvement by including the time of diagnosis in the multivariate analysis to ascertain whether the increase was influenced by the length of diagnosis. Multivariate analysis of HADS showed that MBCT was a strong factor in improving HADs scores with P=0.003 and HR 1.288, while the effect of time diagnosis was not significant with P=0.748. The global EORTC

Table 2. Differences in Anxiety Symptoms (HADS-A) & Quality of Life (EORTC QLQ C30) pre and Post-Intervention

Groups	Median		Difference	95% CI		p-value
	Pre	Post		Lower	Upper	
HADS						
Control	10 (8-13)	6 (4-7)	4 (2-6)	< 0.001	0.001	0.001 ⁵
MBCT	11 (9-13)	3 (2-5)	7 (5-10)	6.994	8.472	<0.001 ³
p-value			<0.001			
EORTC Global						
Control	67 (58-92)	75 (58-83)	0 (-9-17)	0.53	0.63	0.087 ⁵
MBCT	67 (58-75)	83 (67-100)	17 (0-34)	<0.001	0.001	0.001 ⁵
p-value			0.001			
EORTC Function						
Control	78 (53-89)	78 (58-89)	2 (-2-7)	-3.888	-1.179	<0.001 ³
MBCT	71 (53-85)	78 (67-89)	11 (-7-16)	-12.471	-5.929	0.001 ³
p-value			<0.001			
EORTC Symptoms						
Control	28 (5-49)	20 (8-51)	-2 (-3-3)	-1.265	7.932	0.142 ³
MBCT	33 (18-64)	20 (15-43)	-10 (-2-0)	<0.001	0.001	0.001 ⁵
p-value			0.002			

², Unpaired T test; ³, Paired T test; ⁴, Mann-Whitney test; ⁵, Wilcoxon test.

Table 3. The Multivariate Analysis of Patient Characteristics on HADS-A and EORTC

	HR	p	CI 95%	
			Lower	Upper
HAD-s				
Time from diagnosis	2.325	0.748	-0.242	0.329
MBCT	1.288	0.003	0.326	1.226
Improvement of EORTC global				
Time from diagnosis	2.78	0.775	-2.324	3.045
MBCT	16.94	0.832	-0.531	0.649
Improvement of EORTC Function				
Time from diagnosis	2.188	0.476	-0.896	1.81
MBCT	3.086	0.035	-0.622	-0.027
Improvement of EORTC Symptom				
Time from diagnosis	4.349	0.675	-1.395	0.935
MBCT	3.401	0.005	-0.478	-0.109

improvements showed that the two variables did not have a significant influence. However, when we examined the EORT symptoms further, they showed that the score improvement was influenced by MBCT with $P=0.005$ and HR 3.401, while the time of diagnosis did not affect it with $P=0.675$. In the EORTC function score, the effect of MBCT also improved with $P=0.035$ and HR 3.086, while the time from diagnosis was not significant with $P=0.476$ (Table 3). These 4 scores show that the analysis which included the length of diagnosis as a confounding variable actually showed that MBCT was still the main factor in improving HADS scores, EORTC functions, and EORTC symptoms.

Discussion

In this study, the average age of research subjects was 40.9 ± 4.69 and 41.6 ± 4.05 in the intervention group and the control group respectively. In educational characteristics, 53.3% of the research subjects completed junior high school. There was 53.3% of the research subjects have jobs and are actively working with the majority of subjects having an income above the provincial minimum wage. A total of 96.7% of the subjects in this study were married. These data were in line with research results found by Megawati at RSCM in 2012 showing that most of the subjects were aged 40- 50 years, patients were married and completed secondary school(13). A study by Naughton et al. (2020) showed that the majority of the subjects of the study experienced concerns and problems in their work after being diagnosed with cancer(14).

However, this contradicted research conducted by Timperi et al. (2013) which showed that continuing to work after a breast cancer diagnosis might be beneficial for some areas of QoL. However, working after a breast cancer diagnosis was still a challenge for some women (15,16).

The results showed that intervention with Mindfulness-Based Cognitive Therapy (MBCT) significantly reduced anxiety scores (HADS-A) in the intervention group. The result was in line with the findings in the study of

Chu et al. (2020) who compared MBCT with a control group of breast cancer patients. Other studies also noted a decrease in anxiety after MBCT intervention, as reported by Park et al. (2018), and better outcomes in psychological distress, fatigue, and spiritual well-being in MBCT group participants (12). The HADS-A score difference results showed significant differences between the intervention and control groups, confirming the effectiveness of MBCT in reducing anxiety levels in breast cancer patients. Another study also supported this finding by noting a decrease in psychological burden, including anxiety and depression, in non-metastatic breast cancer patients after MBCT intervention (17). Other studies showed that MBCT could influence brain networks and had a significant effect on modulating the reactivity of stress-processing regions, providing evidence regarding the neural pathways that influenced the effects of MBCT in breast cancer patients (18,19). Overall, MBCT had a positive impact on the psychological symptoms and QoL of breast cancer patients, confirming the important role of mindfulness-based cognitive therapy in managing the psychological aspects of the disease (20).

This study showed that intervention with Mindfulness-Based Cognitive Therapy (MBCT) resulted in a significant increase in functioning, but not Global subscale EORTC scores, as well as a significant decrease in Symptom subscale EORTC scores in the intervention group (EORTC, year). These results were consistent with previous studies, as reported by Eyles et al. (2015) who found significant improvements in cognitive and physical function EORTC scores after MBCT intervention. Other studies also supported the positive effects of MBCT, including improvements in QoL (21). Significant results were also seen in managing pain intensity, signaling MBCT as an effective pain rehabilitation strategy (22). In addition, cognitive behavioral therapy had also been shown to be effective in reducing symptoms and improving QoL and psychological health in breast cancer patients (23). Another study confirmed that mindfulness activities helped patients cope with their diagnosis (24). In this context, MBCT was also well received by breast

cancer patients, resulting in a positive impact on their QoL and psychological well-being (10,21).

The characteristic variables jointly influenced the HADS-A score, with the length of diagnosis becoming a variable that was likely to influence the increase in the value of HAD-s. From the multivariate analysis, the time of diagnosis together with MBCT showed that the time of diagnosis did not have much influence with $P=0.748$, while MBCT had an effect for improving HADS $p=0.003$ with HR 1.288. This finding was not in line with Burgess et al. (2014) who found higher levels of anxiety and depression early in the course of the disease, indicating an expectation that anxiety and depression levels improved with time since diagnosis (25). Regarding the symptoms of EORTC scores, the table shows time from diagnosed variables having no significant effect with $P=0.675$ while MBCT improved the EORTC score with $P=0.005$ and HR 3.401. Meanwhile, the EORTC function showed that the time from diagnosis had no effect on improving the EORTC function scores, while MBCT still showed improvement with $P=0.035$ and HR 3.086. The global EORTC showed no influence on either time of diagnosis or MBCT. Early diagnosis of breast cancer was often associated with anxiety related to the spread of cancer cells and negative public perceptions of the disease, affecting patients' QoL. This finding was not in line with the research results found by Juwita et al. (2018), but this finding was in line with the research results revealed by Rahmiwati et al. (2022) who did not find a significant relationship between the length of time of breast cancer diagnosis and QoL. The factors of age and cancer severity affect physical function impairment and were the most important aspects in affecting the QoL in breast cancer patients. (26,27). In breast cancer patients, there are increasing number of anxiety symptoms about 2 folds higher than depression. However no significant effect of anxiety ($p=0.399$) or depressive symptoms ($p=0.749$) towards cancer patients survival after 13 years follow-up(28).

The shortcomings in this study included the difficulty of keeping the research subjects to join the zoom session. Each group could not control the window effect. It was difficult to monitor the compliance of the research subjects in doing the homework given, and there was no further evaluation of the intervention effect obtained.

In conclusions, the results of this study show that there is a score improvement in HADS-A and EORTC with the provision of MBCT psychotherapy and psychotherapy. However, the HADS and EORTC improvement scores are significantly higher with MBCT compared to psychotherapy alone.

Author Contribution Statement

Katarina B. Dinda Sekar M: study conception and design, data collection, analysis and interpretation of results, draft manuscript preparation, reviewed the results and approved the final version of the manuscript; Monica Bellynda: study conception and design, data collection, analysis and interpretation of results, draft manuscript preparation, reviewed the results and approved the final

version of the manuscript Kristanto Yuli Yarsa: study conception and design, analysis and interpretation of results, reviewed the results and approved the final version of the manuscript; Wijaya Kusuma: study conception and design, analysis and interpretation of results, reviewed the results and approved the final version of the manuscript; Aris Sudiyanto: study conception and design, analysis and interpretation of results, reviewed the results and approved the final version of the manuscript;

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Ethical Approval

This research has been approved by Health Research Ethics Committee Dr. Moewardi General Hospital no. 525 / IV / HREC/ 2023, titled: "The Effectiveness of Mindfulness-Based Cognitive Therapy to Improve Anxiety Symptoms and Quality of Life in Breast Cancer Patients" and approved as thesis in Psychiatry Department.

Conflict of interest

The authors declare no conflict of interest

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