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The Effects of Mind Subtraction Meditation on Breast Cancer Survivors' Psychological and Spiritual Well-being and Sleep Quality: A Randomized Controlled Trial in South Korea

--Manuscript Draft--

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Abstract:	<p>Background: Most breast cancer survivors experience psychological and spiritual distress, including depression, anxiety, perceived stress, and loss of meaningfulness in life. This distress can negatively impact physical health, quality of life, and quality of sleep.</p> <p>Objective: The study was conducted to compare and examine the effectiveness of mind subtraction meditation (MSM) and a self-management education group (SME) on breast cancer survivors.</p> <p>Interventions/Methods: A randomized control trial was conducted on South Korean female breast cancer survivors (stages I-III). Self-reported questionnaires were administered to both MSM group (n = 22) and SME group (n = 24) to measure psychological and spiritual well-being, as well as quality of sleep.</p> <p>Results: Compared to the SME group, the MSM group reported a significant decrease in depression (p = .034), anxiety (p = .036), and perceived stress (p = .009), and an increase in quality of life (p < .001), satisfaction with life (p < .001), posttraumatic growth (p = .007), and quality of sleep (p = .010).</p> <p>Conclusions: MSM may have positive therapeutic effects among breast cancer survivors. This meditation program may be useful to manage psychological and spiritual distress, as well as improve quality of life and sleep, in clinical settings among breast cancer survivors.</p>

Implications for Practice: This study demonstrated the clinical effectiveness and the feasibility of applying the MSM method to breast cancer survivors. The participants had a high attendance rate in the program, which speaks to the likelihood of the applicability of the meditation program on an outpatient basis.

Reviewer Comments:

Reviewer #1: Note to reviewers: Use this box to place your review comments for authors. Please elaborate on each of the criteria (if applicable). Feel free to write as much as you wish and to address areas not listed.

A. Significance of topic: Significant

B. Appropriateness to CANCER NURSING: YES

C. Author's demonstration of authority: Good

D. Clarity/writing style: Acceptable

E. Organization of material: Good

F. Usefulness for practitioners

G. Clarity of objectives: Clearly indicated.

H. Conceptual/theoretical framework: Has been included.

I. Operationalization of variables

J. Sample/sample selection: Clarified

K. Methodology

L. Data analysis

M. Conclusions/implications for practice: Implications for practice part was stated differently in the abstract and in the text. Also the meaning of the last sentence (..The high portability of the meditation program makes it easily feasible and applicable in outpatient settings) is not clear.

(The last sentence (..The high portability of the meditation program makes it easily feasible and applicable in outpatient settings) was taken out from pg. 14; and the implications for practice section was corrected on pg. 14 and also abstract was corrected:

This study demonstrated the clinical effectiveness and the feasibility of applying the MSM method to breast cancer survivors. The participants had a high attendance rate in the program, which speaks to the likelihood of the applicability of the meditation program on an outpatient

basis.)

Thank you for your work on the revised version of the manuscript.

Reviewer #3: A. Significance of topic

The literature is also not short on reporting about the effect of breast cancer health education on the knowledge, attitudes and practice which reports that the women are not frequently carrying out breast cancer prevention practices. In this scenario, this kind of studies has an immense importance which carries in significant evidence about the therapies and/or holistic treatment for the patients.

B. Appropriateness to CANCER NURSING

For sure, it is appropriate to this platform as it is highlighting the scientific evidence in the form of studies for our future plans in dealing with any kind of cancer in respect to any gender.

C. Author's demonstration of authority

It's ok with the authors' specialization in oncology. As far as the treatment and the modalities undertaken are connected, the people also refer to the experts of other domains to help with mind relaxation techniques or practices. This goes on with getting holistic approach in treatments in dealing with diseases of such high incidence rates as far as the chemotherapy and its after-effects are concerned with the acute or chronic conditions.

D. Clarity/writing style

It is handled well with the keywords.

E. Organization of material

The material has good input of the social dimensions of health and illness.

F. Usefulness for practitioners

This would be useful for practitioners at a clinical and public health practice level also as the near future is tend to deal with problems of depression or mental health in general to be among the leading causes of deaths and disability globally as per the W.H.O. facts and figures reveal. Health care practitioners should be well-equipped in dealing with the scenarios representing the whole dimensions that contribute to one's quality of life wholly.

G. Clarity of objectives

A minor clarity of the objectives added would be good as to the patients in low-resource settings.

(Although the focus of this study was not on low-resource settings, the study did find that this meditation program can be possibly utilized for outpatient and low-resource settings, please see pg. 13 for the new addition:

...speaks to the likelihood of the applicability of the meditation program for outpatient and low- resource settings.)

H. Conceptual/theoretical framework

If the needs of the individual cancer patients are met then, the framework is reliable and needs to be reproduced and held accountable at different geographies.

I. Operationalization of variables

The domains selected to work on shows clinical effectiveness thereby validating the program sustainability.

J. Sample/sample selection

The study population is very small; however, the results show to be promising through evidence.

K. Methodology

The validated tools need to be upgraded and systematically reproduced as to the different cultures, and geographies, and ethics, and beliefs, and languages and populations selected.

L. Data analysis

It is sorted out! As to the follow-up, the data size and its analysis could be added thereby upgrading the results and our thinking.

M. Conclusions/implications for practice

Both point out the ways a clinical team needs to achieve in their practice.

Aug 11, 2016

Cancer Nursing

Editorial office

Dear Editor;

We would like to resubmit the attached manuscript titled, “**The Effects of Mind Subtraction Meditation on Breast Cancer Survivors’ Psychological and Spiritual Well-being and Sleep Quality: A Randomized Controlled Trial in Korea**” for your view. All authors have read and approved the manuscript. No funding or commercial financial supports were received for this research activity.

This is an original research manuscript that had not been published or submitted elsewhere for publication. No author has any conflicts of interest to declare.

If you have any questions about the manuscript, the corresponding author is Dr. Boas Yu, Associate Professor, Holy Family University, 9801 Frankford Ave. Philadelphia, PA, 19114. My email address is byu@holyfamily.edu, 267-341-3297.

I appreciate your kind consideration in this matter,

Dr. Boas Yu

The Effects of Mind Subtraction Meditation on Breast Cancer Survivors' Psychological and Spiritual Well-being and Sleep Quality: A Randomized Controlled Trial in South Korea

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ABSTRACT

Background: Most breast cancer survivors experience psychological and spiritual distress, including depression, anxiety, perceived stress, and loss of meaningfulness in life. This distress can negatively impact physical health, quality of life, and quality of sleep.

Objective: The study was conducted to compare and examine the effectiveness of mind subtraction meditation (MSM) and a self-management education group (SME) on breast cancer survivors.

Interventions/Methods: A randomized control trial was conducted on South Korean female breast cancer survivors (stages I–III). Self-reported questionnaires were administered to both MSM group ($n = 22$) and SME group ($n = 24$) to measure psychological and spiritual well-being, as well as quality of sleep.

Results: Compared to the SME group, the MSM group reported a significant decrease in depression ($p = .034$), anxiety ($p = .036$), and perceived stress ($p = .009$), and an increase in quality of life ($p < .001$), satisfaction with life ($p < .001$), posttraumatic growth ($p = .007$), and quality of sleep ($p = .010$).

Conclusions: MSM may have positive therapeutic effects among breast cancer survivors.

This meditation program may be useful to manage psychological and spiritual distress, as well as improve quality of life and sleep, in clinical settings among breast cancer survivors.

Implications for Practice: This study demonstrated the clinical effectiveness and the feasibility of applying the MSM method to breast cancer survivors. The participants had a high attendance rate in the program, which speaks to the likelihood of the applicability of the meditation program on an outpatient basis.

Key words: Breast cancer survivors; mind subtraction meditation; patient education; perceived stress; depression; anxiety; quality of life; satisfaction with life; post-traumatic growth; sleep quality

INTRODUCTION

As the long-term survival rates increase in cancer survivors, many reports indicate that breast cancer survivors experience psychological and spiritual distress following treatment.^{1,2} A large percentage of breast cancer survivors report depression, anxiety, and distress; and many causes of these are associated with low self-esteem, negative body image, fear of recurrent cancer, anger at oneself and others, and uncertainty about the future.³⁻⁵ Further, since many cancer survivors are in a state of crisis after their diagnosis, they are frequently concerned about cancer survival and spirituality. When such needs are unmet, spiritual distress may occur and this could possibly cause some difficulties with coping and decrease quality of life (QOL).^{4,6} In a study in South Korea, breast cancer survivors reported a significant loss of meaningfulness in life when comparing to a control group with no history of breast cancer.⁷

Psychological and spiritual distress in cancer survivors is problematic because this distress is not only correlated with physical symptoms, such as insomnia and fatigue, that may contribute to decreased QOL,^{7 8} but also may influence overall recovery, perhaps even survival.⁹⁻¹¹ For this reason, it is pertinent to investigate intervention strategies for cancer survivors to enhance their psychological and spiritual well-being.^{8 12}

Significant evidence indicates that meditation is a promising intervention to improve psychological and spiritual well-being and sleep quality in cancer populations.^{13-17 18} Mind Subtraction Meditation (MSM) is a well-known and popular meditation method in South Korea. Through the self-reflective method of eliminating negative feelings and mindsets, it can nurture an optimistic attitude and lead to the discovery of one's true self.^{19,20} The mechanism of MSM is similar to other meditations in that it has elements of attention,

awareness, and nonjudgmental observation. However, any causes of negative or undesirable emotions discovered while meditating and reflecting on one's life can be removed or inactivated through a nonjudgmental observation during the meditation.²¹⁻²³ MSM enables psychological healing through eliminating a negative mindset, which is rooted in a dysfunctional frame of mind. This could occur through a deep contemplation of one's mind, which formed through one's lived experience.

Prior research has demonstrated positive effects of MSM in improving psychological and spiritual well-being. MSM has been reported to decrease depression, anxiety, stress, aggression, anger, and somatization and to improve self-esteem, self-actualization, happiness, and satisfaction with life in children and adolescents,²⁴⁻²⁸ university students,^{29,30} and adults.^{19,21,22,31} Recent MSM studies have shown that the meditation is also effective for adult psychiatric patients exhibiting distressing clinical symptoms. An MSM study on patients with depression revealed that MSM reduced the duration of depression treatments as well as overall cost of the treatments.³² This effect was most evident in patients with highly distressing clinical depressive symptoms.³³ In addition, the researchers noted a decrease in *Hwa-Byung*, which is a unique cultural phenomenon in Korea related to chronic and persistent anger, as well as in psychosis, delusional disorders, somatization disorders, obsessive compulsive symptoms, depression, anxiety, hostility, and interpersonal difficulties. The same study also found positive changes in coping strategies: increases in assertive coping and positive interpretation of events, and decreases in negative emotional expressions, requests for emotional support, and passive withdrawals.²³ Considering such findings from previous research on MSM, the meditation may be useful in improving anxiety, depression, anger, self-

esteem, body image, and somatization in breast cancer survivors. However, at present, no MSM research has been conducted on cancer survivors.

The study was conducted to compare and examine the effectiveness of mind subtraction meditation (MSM) and a self-management education (SME) group on breast cancer survivors. We evaluated the psychosocial and spiritual effectiveness and sleep efficacy of MSM on breast cancer survivors through comparisons with SME. We hypothesized that participants who practiced MSM would report lower depression, anxiety, and stress response as well as higher QOL, posttraumatic growth, sleep quality, and life satisfaction in comparison to participants in an SME control group. The primary purpose of the study was to examine a decrease in depression, while the secondary outcomes were to measure the effects of MSM on the other measures of well-being.

CONCEPTUAL FRAMEWORK

This study utilizes the Quality of Life (QOL) Model Applied to Cancer Survivors,⁴ which incorporates four well-being domains of influence for QOL: physical, social, psychological, and spiritual/existential well-being. Psychological and spiritual well-being domains were the main focus for this study. According to Ferrell and colleagues,⁴ psychological well-being is related to having a sense of control and includes emotional issues such as distress, anxiety, and depression. Spiritual well-being relates to deriving meaning from the cancer experience and involves issues of transcendence and self-growth.

MATERIALS AND METHODS

Design

A randomized controlled clinical trial with simple randomization (1:1), parallel-group study, was conducted at Asan Medical Center in Seoul, Korea. The study was approved by the Asan Medical Center IRB (approval number 2013-0443) and registered with the Clinical Research Information Service for Korea Centers for Disease Control and Prevention, Ministry of Health and Welfare (registration number KCT0001185).

Study population

The participants of this study were stage I–III breast cancer survivors, aged from 30 to 60 years. The eligibility criteria specified for participation in this study were: breast cancer survivors who had completed surgery and/or adjuvant chemotherapy and/or radiotherapy after surgery up to 2 years and 6 months prior to the study; and were receiving follow-up observations on an outpatient basis with or without adjuvant endocrine therapy treatments. For the exclusion criteria, women who experienced relapse or had a primary cancer other than breast cancer; and those with psychiatric or other severe, uncontrolled, chronic illnesses were not eligible to participate. Women who have participated in similar programs previously or have any difficulty in participating in all meditation or education sessions were also excluded.

Procedures

The breast cancer survivors were recruited between June 24 and July 19, 2013, at the Asan Medical Center, the nation's largest tertiary hospital located in Seoul, South Korea. The

period of this study was from May 10, 2013 to April 7, 2014. Recruitment flyers were posted in the surgery, oncology, and radiology outpatient departments to recruit participants for this study. Soon after an oncologist briefly explained this study to eligible patients, research nurses approached the patients during post-treatment clinic visits. The nurses confirmed study eligibility, explained the purposes and methods of the study, and obtained written informed consent. The participants were randomly assigned using simple randomization procedures (1:1 allocation) to the MSM or SME condition. A website was used to produce a computer-generated sequence of random numbers: www.randomization.com. The random numbers were managed by a nurse who was not directly involved in this study. After the random assignment to a group, each participant was notified of their group placement over the phone. All participants were told that, after completion of the study, they would have the opportunity to participate in the program they were not assigned to if they wanted. To measure the conditions' differential effects, participants were administered questionnaires prior to the intervention and at the 4th and 8th weeks. Data were collected via postal mail or in person following the completion of the sessions.

Interventions

The MSM group participated in MSM twice a week, two hours per session, for eight weeks (16 sessions total). The instructions for the sessions were provided by one main and three assistant instructors certified in MSM, with longstanding experience in teaching. The participants of the MSM group were given four sessions, which were one-hour each, of self-management education during the first two weeks, which included educative sessions on

understanding life after cancer treatments, an exercise regimen for health, dietary management, and follow-up surveillance. The full-scale meditation began at the fifth session.

The MSM program also included a self-directed discovery of the most difficult aspects of oneself and the evaluation of difficulty level in numeric scales; this was to specifically evaluate the negative mindsets to eliminate. Once the participants identified the difficult mindsets (such as worry about disease, fear of recurrence, sadness, sorrow, conflicts in relationships, hatred, anger, obsession, and negative self-image), they were guided to subtract these mindsets through the meditation. The participants were also sent texts and emails encouraging home meditation two times each week. All sessions were held in a seminar room in the Asan Medical Center.

The SME group received education sessions, which were administered primarily in a lecture format, once per week for two hours each session over four weeks. The contents of the SME program were equal to the self-management education content the MSM group received during the first 4 sessions. Lectures on relationship improvement, communication skills, enhancing comfort and managing stress, and breast self-examinations were also added to the curriculum for the SME group. These classes were instructed by three certified oncology nurses, an oncologist, a dietician, and a professional coach.

Outcome measures

The following measurement tools were utilized to examine the effectiveness of the intervention. All measurements were administered in Korean using validated and translated versions of the original instruments.

Depression was evaluated using the Center for Epidemiologic Studies Depression Scale (CES-D),³⁴ which consisted of 20 items to measure symptoms of depression. *Anxiety* was evaluated with the Beck Anxiety Inventory (BAI),³⁵ which is composed of 21 items evaluating cognitive, emotional, and physiological aspects of anxiety, with higher scores signifying a severity of anxiety. *Perceived Stress* was assessed with the Perceived Stress Scale (PSS),³⁶ which consisted of 10 items, with higher scores indicating an increase in stress.

Quality of life was evaluated using the Functional Assessment of Cancer Therapy-Breast (FACT-B).³⁷ This measurement is composed of 44 items asking about the quality of life experienced in the last week. This tool has five subcategories to evaluate functional, social, emotional, physical, and breast-specific well-being, with higher scores indicating a better QOL. *Satisfaction with life* was assessed using the Satisfaction with Life Scale (SWLS),³⁸ which consisted of 5 items where higher scores indicate an increase in subjective life satisfaction. The highest scores of 30–35 indicated “*very satisfied*” and lowest scores of 5–9 indicated “*very dissatisfied*.” *Posttraumatic growth* was measured with the Posttraumatic Growth Index (PTGI),³⁹ which consists of 21 items to evaluate positive personal growth after traumatic experiences. The PTGI subcategories included areas such as increases in the depth of relationships, interest and expectations in life, the discovery of new possibilities and inner personal power, spiritual/religious interest, and appreciation of life. Higher scores indicate an increase in positive changes after traumatic experiences.

Sleep quality was assessed using the Korean Pittsburgh Sleep Quality Index (K-PSQI).⁴⁰ This tool includes 18 items in a self-reported questionnaire that measures sleep disturbances and quality of sleep over the past month, with higher scores representing more sleep disturbances and therefore, poorer sleep quality. Scores ≥ 5 on the K-PSQI total scale,

computed as a sum of the seven subscales, were indicative of a “*bad sleeper*,” and scores < 5 were indicative of a “*good sleeper*.”

Data analysis

The primary analytic focus of this study was depression. According to a previous meta-analysis of mindfulness-based stress reduction (MBSR) effectiveness on depression scores of breast cancer survivors, an effect size of 0.55 was reported.⁴¹ In this study, we also expected an effect size of 0.5. Using a statistical power analysis with the G-power 3 program, the effect size of 0.5 with a power of 0.9 (two-way alpha; $p = .05$) was calculated,⁴² which suggested a minimum of 21 participants in each group. With a possible attrition rate of 20%, 26 participants were assigned to each group.

The intention-to-treat analysis included those participants who were treated for at least one session; and to replace any missing values, the last-observation-carried-forward method was utilized. Pre-protocol analysis included the participants who completed the protocol and was conducted to evaluate the effectiveness on sleep quality. The homogeneity testing of the groups was analyzed using a t-test and a chi-square test (χ^2). A χ^2 test was also utilized to evaluate the differences in quality of sleep between the two groups. A repeated measures ANOVA (RM-ANOVA) evaluated the differences in changes in variables pre-test, post-4 weeks, and post-8 weeks in those groups. To evaluate the effectiveness of MSM, we examined the Group \times Time interaction effect by using an RM-ANOVA. To further examine the significant Group \times Time interaction, we performed an ANCOVA to examine the differences between the groups according to the time point of measurement. We also

performed the Mauchly test to validate the RM-ANOVA; and the Levene's test was used to examine and verify homogeneity in the phase error variation.

RESULTS

Participants

A total of 64 participants were eligible and recruited for the study. Ten participants declined to be included, so the remaining 54 participants were assigned randomly to the two groups. After the randomized assignment, two more participants withdrew their consent. Of the remaining 52 participants, 26 participants were assigned to the MSM and the other 26 participants to the SME group. After pre-tests were performed, the programs for each group were started. The attrition rate mid-program was 11.5%; a total of 46 participants remained with 22 in the MSM group and 24 in the SME group. Four participants were excluded from the MSM group and this was due to hidden history of alcohol abuse, acute hospitalization, scheduling difficulties, and family conflicts; and two participants were excluded from the SME group, due to acute hospitalization and refusal of assessment (Figure 1).

The individual attendance rates of the 22 participants in the MSM group ranged from 75% (13 sessions) to 100% (18 sessions) with an average of 83.0% (14.9 sessions). The individual attendance rates of the 24 participants in the SME group ranged from 75% (3 sessions) to 100% (4 sessions) with an average of 94.8% (3.8 sessions).

Baseline characteristics of the sample

There were no significant differences in the participants' demographics and clinical characteristics (Table 1). Additionally, variables of depression, anxiety, satisfaction with life,

perceived stress, quality of life, posttraumatic growth, and quality of sleep at baseline were shown to be relatively equal in both groups.

The effects of intervention

Negative emotions: depression, anxiety, and perceived stress (Table 2)

A significant difference was shown in depression scores. There was a significant Group \times Time effect ($F = 3.521, p = .034$) between the MSM group and the SME group. When comparing the pre- and post-4 weeks test, there was no significant group difference ($p = .921$). However, there was a significant group difference between post-4 weeks and post-8 weeks ($p = .019$) (Figure 2a).

Similarly with depression, a significant group \times time effect was shown in anxiety and perceived stress scores ($F = 3.428, p = .036; F = 5.220, p = .009$) between two groups. Per time measurement, for anxiety, there was a larger difference between the post-4 weeks and post-8 weeks ($p = .111$) measurements than the pre-test and post-4 weeks ($p = .957$) measures, but these were not significant statistically. For perceived stress, there was a significant group difference between post-4 weeks and post-8 weeks ($p = .003$), although no significant difference was observed between pre-test and post-4 weeks ($p = .964$) (Figures 2b, 2c).

Positive emotions: quality of life, posttraumatic growth, and satisfaction with life (Table 2)

There were significant group \times time effects shown in quality of life, posttraumatic growth, and satisfaction with life scores, ($F = 9.149, p < .001; F = 5.251, p = .007; F = 11.646, p < .001$). There were no significant group differences between pre- and post-4 week tests.

However, between post-4 and post-8 weeks, there were very significant group differences ($p < .001$; $p < .001$; $p = .007$) (Figures 3a–c).

The effects on sleep quality (Table 3)

Before the meditation program, 90.9% of the MSM group (20 participants) reported poor quality of sleep with only 9.1% ($n = 2$) reporting no sleep problems. After the meditation, there was a reduction to 54.5% ($n = 12$) in those who reported poor sleep and 45.5% ($n = 10$) reported good sleep quality. In contrast, 70.9% ($n = 17$) of the SME group had reported poor sleep pre-test and this increased to 83.4% ($n = 20$) after the 8-week post-test. A χ^2 test showed significant differences in changes in sleep quality between the two groups ($\chi^2 = 9.887$, $p = .010$).

DISCUSSION

In this randomized controlled trial, the 8-week MSM program significantly decreased perceived stress, depression, and anxiety, and also increased quality of life, life satisfaction, posttraumatic growth and quality of sleep.

In terms of depression scores, the results showed that the reduction of the mean CES-D score was 9.09 after participation in the MSM program. When comparing this to other research studies showing reductions in depression among breast cancer survivors, this study demonstrated a much greater decrease.^{41, 43, 44} For example, even though the pre-test mean score of the CES-D in this study was 16.36, indicating probable depression, the post-test showed a decrease to 7.27, indicating a normal range. This finding is meaningful when considering the conclusions of other research showing that depression is a major problem in

breast cancer survivors; and there is a strong correlation between survival rates and depression in the survivors.^{9,10} However, we could not analyze the effectiveness of the intervention in terms of reducing the severity of depression because of the small sample size.

When examining the time progression in relation to changes, there was no statistical significance during the first four weeks. However, post-8 weeks, the MSM group demonstrated a statistically significant decrease, whereas the SME group had only a slight decrease. Because the MSM group received only partial meditation sessions for the first two weeks of the study, once the MSM program was fully started, after the first two weeks, the differences in changes were notable (between the 4th and 8th weeks). These patterns are similar to results of the anxiety and perceived stress.

Quality of life, life satisfaction, and posttraumatic growth showed a very significant improvement. The fact that all of these variables significantly improved in the MSM group could indicate that the participants were able to change their perceptions positively about the traumatic event of cancer, discover their own strength, empathize with others, develop meaningful relationships, appreciate life, and acquire a state of superior spiritual well-being.

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The MSM program was also effective in improving sleep disturbance, which is one of the most onerous symptoms for the survivors. The improvement in the meditation group was far superior to other studies; in a similar study using MBSR, 91% of poor sleepers decreased to 79%¹⁸ and no differences in enhanced sleep functioning were noted.⁴⁵

Strengths of this study include that this was the first randomized clinical trial that evaluated the effects of MSM on breast cancer survivors. It is essential to point out that the present study used a control group that received a high-quality self-management education

program as opposed to having a control group without any treatment. Despite providing such high-quality self-management education to the control group, the MSM group still showed substantially significant improvements in all of the variables.

Regarding potential mechanism, it is widely accepted that meditation may lead to inactivation of negative emotional reactivity and changes in thought patterns or attitudes.⁴⁶ Further, it may assist in decreasing rumination and automatic thought patterns, as well as increasing individual's regulation of affect⁴⁷. Furthermore, the MSM enabled the participants to eliminate negative mindsets and to transform into having more positive mindsets. Using a core point of a mind-subtraction method, which allowed for self-directed reflections to eliminate negative mindsets without avoidance or evasion of painful past experiences, self-healing and changes in perception occurred.

This study also demonstrated the clinical effectiveness and the feasibility of applying the MSM method to breast cancer survivors who have experienced recent surgeries or chemotherapy treatments (within two years and six months). The participants had a high attendance rate in the program, which speaks to the likelihood of the applicability of the meditation program for outpatient and low-resource settings.

One limitation of our study was that the effectiveness of meditation methods alone could not be evaluated due to extraneous factors that may influence dependent variables (e.g., group interactions, psychological supports, and counseling effects). In order to overcome these limitations, we utilized a high-quality self-management education program for the control group. Additionally, to minimize other extraneous factors in the meditation group, the participants were asked to limit in their participation in other activities that would increase psychological support and enhance well-being. However, due to the realistic and moral

challenges present in the feasibility of controlling for all possible extraneous variables and circumstances, not all of these limitations were strictly controlled. Other limitations include the small sample size and that participants were recruited from only one medical center.

For future studies, we recommend following a larger sample size longitudinally, including qualitative approaches in the research design. To further explore the effectiveness of MSM, we recommend examining physiological indicators of distress and immunity.

CONCLUSION

Based on our findings, the MSM may have positive therapeutic effects among breast cancer survivors. This study also demonstrated a high feasibility of applying the MSM method to breast cancer survivors with an increased likelihood of the applicability of the meditation program on an outpatient basis. The meditation program may be useful to manage psychological and spiritual distress, as well as improve quality of life and sleep, in clinical settings among breast cancer survivors.

IMPLICATIONS FOR PRACTICE

This study focused mainly on psychological and spiritual well-being of the breast cancer survivors based on the Quality of Life (QOL) Model Applied to Cancer Survivors.⁴ This study demonstrated the clinical effectiveness and the feasibility of applying the MSM method to breast cancer survivors. The participants had a high attendance rate in the program, which speaks to the likelihood of the applicability of the meditation program on an outpatient basis.

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Tables and Figures

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Table 2. Comparison of Changes in Patient-Reported Outcomes at Baseline, Week 4, and Week 8 between the Mind Subtraction Meditation and Self-Management Education Groups

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Figure 1. CONSORT flow diagram

Figure 2. The effects of negative emotions: depression, anxiety, and perceived stress. CES-D = Center for Epidemiological Studies Depression Scale; BAI = Beck's Anxiety Inventory; PSS = Perceived Stress Scale; MSM = Mind Subtraction Meditation; SME = Self-

Management Education. ^a Group differences in baseline to 4 weeks means; ^b Group differences in means from 4 weeks to 8 weeks; ^c Group \times Time interaction from repeated measures ANOVA

Figure 3. The effects of positive emotions: quality of life, satisfaction with life, and posttraumatic growth. FACT-B = Functional Assessment of Cancer Therapy-Breast; SWLS = Satisfaction with Life Scale; PTGI = Post Traumatic Growth Index. ^a Group differences in baseline to 4 weeks means; ^b Group differences in means from 4 weeks to 8 weeks; ^c Group \times Time interaction from repeated measures ANOVA

TABLE 1. Homogeneity of Demographics and Clinical Characteristics Between Groups

Variables	Categories	MSM(n = 26)	SME (n = 26)	Total (n = 52)	χ^2/t	<i>p</i>
		n(%)	n(%)	n(%)		
Age: Mean (SD), years		49.04(8.70)	47.85(7.71)	48.44(8.16)	.523	.603
Education	High school or more	23(88.5)	22(84.6)	45(86.5)	*.165	.685
Economic status	Middle or more	21(84.0)	23(88.5)	44(86.3)	*.214	.703
Marital status	Married	20(76.9)	21(80.8)	41(78.8)	*.115	.734
Cancer Stage	I	11(42.3)	11(42.3)	22(42.3)	.001	1.000
	II-III	15(57.7)	15(57.7)	30(57.7)		
Chemotherapy	Yes	19(73.1)	24(92.3)	43(82.7)	*3.359	.140
Endocrine therapy	Yes	15(57.7)	12(46.2)	27(51.9)	.693	.579
Surgery	Mastectomy	4(15.4)	7(63.6)	11(21.2)	*1.061	.588
	Lumpectomy	20(76.9)	17(65.4)	37(71.2)		
Time since surgery: Mean(SD), months		9.15(6.69)	9.84(6.99)	9.50(6.78)	-.365	.717

MSM, Mind Subtraction Meditation; SD, Standard Deviation; SME, Self-Management Education.

* Fisher's exact test

Commented [C1]: Endocrine therapy를 삽입했어요.

TABLE 2. Comparison of Changes in Patient-Reported Outcomes at Baseline, Week 4, and Week 8 between the Mind Subtraction Meditation and Self-Management Education Groups

Variables	Group	Pretest		4 weeks		8 weeks		4 weeks		8 weeks		F	<i>p</i> ^c
		Mean	(SD)	Mean	(SD)	Mean	(SD)	Group Difference (95% CI)	<i>p</i> ^a	Group Difference (95% CI)	<i>p</i> ^b		
CES-D	MSM (n = 26)	16.36	(9.80)	14.27	(10.82)	7.27	(7.32)	0.19 (-3.72, 4.10)	.921	-3.30 (-6.02, -0.58)	.019	3.521	.034
	SME (n = 26)	13.91	(10.50)	12.08	(10.21)	9.37	(7.24)						
BAI	MSM (n = 26)	11.96	(8.06)	9.73	(6.17)	7.15	(6.47)	0.62 (-2.23, 2.35)	.957	-1.61 (-3.60, 0.38)	.111	3.428	.036
	SME (n = 26)	8.53	(7.41)	7.38	(6.84)	6.96	(5.69)						
PSS	MSM (n = 26)	17.15	(4.58)	16.19	(4.20)	12.19	(5.08)	0.46 (-2.02, 2.11)	.964	-3.05 (-5.00, -1.10)	.003	5.220	.009
	SME (n = 26)	15.88	(6.06)	15.31	(5.84)	14.58	(5.25)						
FACT-B	MSM (n = 26)	85.88	(15.71)	92.92	(15.53)	106.69	(16.86)	1.74 (-4.09, 7.57)	.359	12.12 (6.74, 17.50)	<.001	9.149	<.001
	SME (n = 26)	89.54	(20.49)	94.08	(19.73)	95.38	(14.41)						
SWLS	MSM (n = 26)	18.38	(6.09)	20.15	(4.96)	25.23	(4.89)	1.52 (-0.27, 3.31)	.096	5.46 (3.27, 7.65)	<.001	11.646	<.001
	SME (n = 26)	19.38	(4.21)	19.38	(5.12)	19.27	(5.25)						
PTGI	MSM (n = 26)	62.65	(17.41)	63.65	(20.01)	75.31	(18.30)	-0.72 (-7.03, 5.59)	.819	11.16 (4.12, 18.20)	.003	5.251	.007
	SME (n = 26)	59.57	(20.68)	61.92	(17.69)	62.77	(20.75)						

BAI, Beck's Anxiety Inventory; CES-D, Center for Epidemiologic Studies Depression Scale; FACT-B, Functional Assessment of Cancer Therapy-Breast; MSM, Mind Subtraction Meditation; PSS, Perceived Stress Scale; PTGI, Post Traumatic Growth Index; SME, Self-Management Education; SWLS, Satisfaction with Life Scale.

^a *P* values for group differences in means from baseline to 4 weeks; ^b *P* values for group differences in means from 4 weeks to 8 weeks; ^c *P* values for the group × time interaction from the repeated measures ANOVA

TABLE 3. Comparison of changes in PSQI Scores from Baseline to Week 8 between the Mind Subtraction Meditation and Self-Management Education Groups

Change in Sleep Quality			MSM		SME		Total		χ^2	<i>p</i>
Baseline	→	8 weeks	N	%	N	%	N	%		
Bad	→	Good	8	(36.4)	1	(4.2)	9	(19.6)		
Bad	→	Bad	12	(54.5)	16	(66.7)	28	(60.9)		
Good	→	Good	2	(9.1)	3	(12.5)	5	(10.9)	*9.887	0.010
Good	→	Bad	0	(0)	4	(16.7)	4	(8.7)		
Total			22	(100)	24	(100)	46	(100)		

MSM, Mind Subtraction Meditation; PSQI, Pittsburgh Sleep Quality Index; SME, Self-Management Education.

* Fisher's exact test; Bad = PSQI ≥5; Good = PSQI <5.

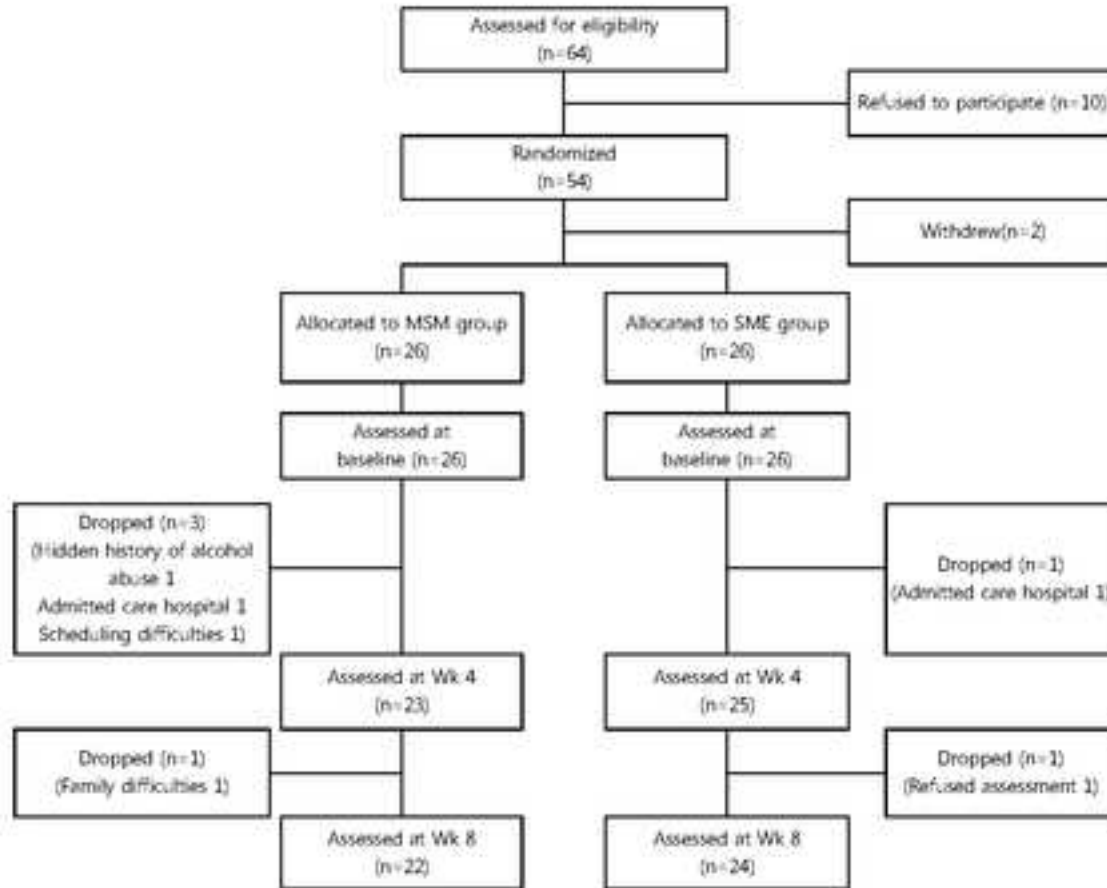


Figure 1. CONSORT flow diagram

Figure 2.

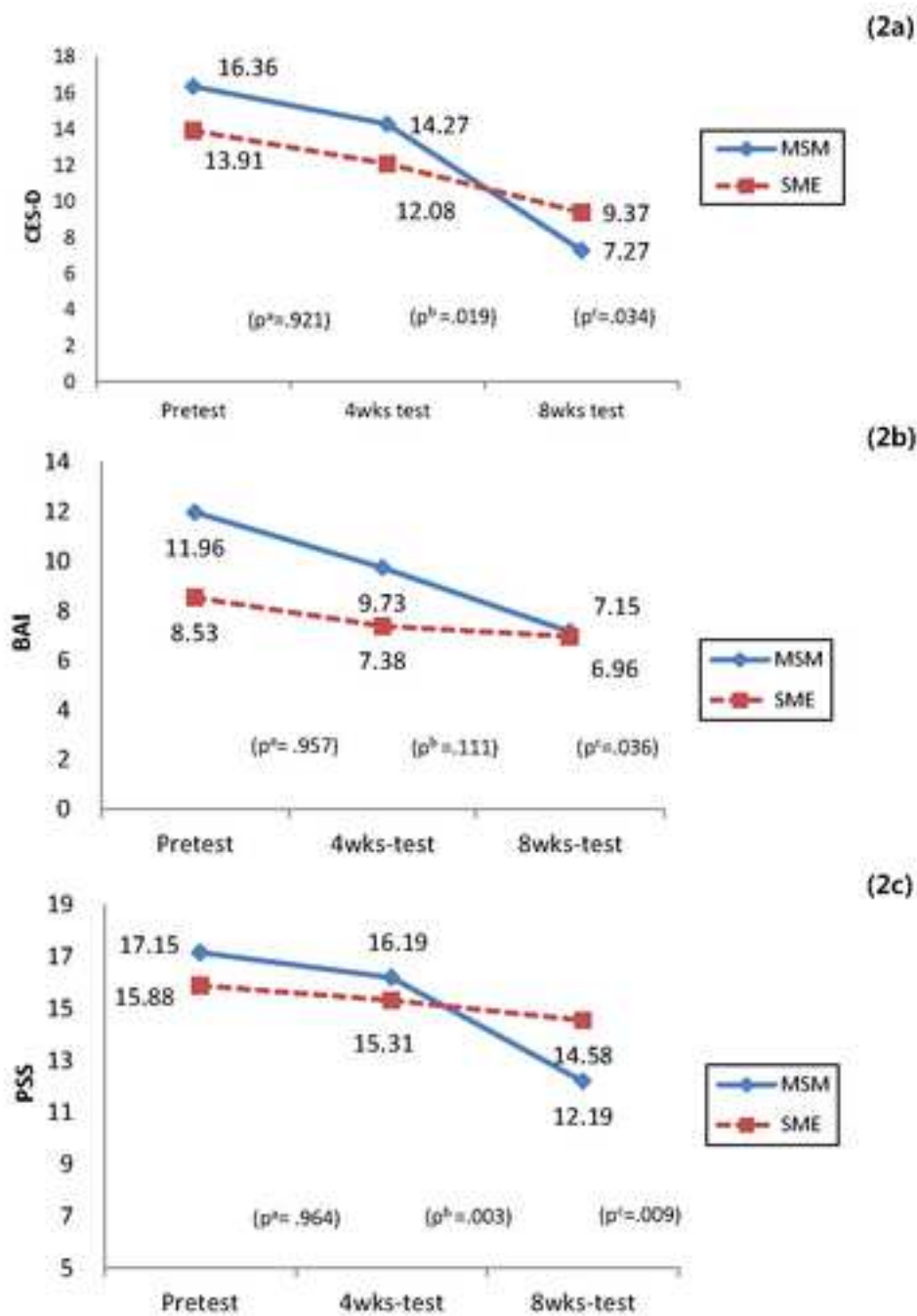


Figure 3.

