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The effect of mindfulness-based stress reduction on stress levels in menopausal women: A community-based study

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Abstract
This study investigated the effectiveness of a Mindfulness-Based Stress Reduction (MBSR) program in reducing stress levels among menopausal women. Conducted in selected community settings, the research employed a quasi-experimental design with 60 participants (30 in the MBSR group and 30 in a control group). Stress levels were measured using the Perceived Stress Scale (PSS) at baseline and after a 30-day MBSR intervention for the experimental group, while the control group received no intervention. Statistical analysis revealed a statistically significant reduction in perceived stress levels in the MBSR group compared to the control group ($p < 0.001$). The mean change in PSS scores was significantly larger in the MBSR group, indicating that the intervention was effective in reducing stress. These findings suggest that MBSR can be a valuable and effective non-pharmacological intervention for managing stress during the menopausal transition, offering a promising approach to enhance the emotional well-being of women in this life stage.

Keywords: Mindfulness-based stress reduction, stress, menopausal women, perceived stress scale, community health

Introduction

The menopausal transition, a natural and inevitable stage in a woman's life, is characterized by significant hormonal fluctuations, primarily a decline in estrogen and progesterone levels. This physiological shift can manifest in a wide array of physical and psychological symptoms, collectively impacting a woman's overall well-being and quality of life (Lobo, 2017; Santoro *et al*., 2015) [16, 22]. While the cessation of menstruation is the defining feature, the menopausal experience is far more multifaceted, encompassing vasomotor symptoms like hot flashes and night sweats, sleep disturbances, vaginal dryness, mood swings, anxiety, and cognitive changes (Avis *et al*., 2018; Nelson, 2008) [2, 17]. These symptoms, often unpredictable and varying in severity, can significantly disrupt daily life, impacting work, social interactions, and personal relationships. A particularly salient aspect of the menopausal transition is the frequently observed increase in stress levels (Freeman, 2010) [10]. The interplay between hormonal changes and the physiological and psychological symptoms of menopause can create a vicious cycle, where elevated stress exacerbates symptoms, and heightened symptoms contribute to further stress (Bromberger *et al*., 2011) [4]. For instance, chronic sleep deprivation, a common menopausal symptom, is a well-established contributor to increased stress and anxiety (Ohayon, 2006) [18]. Similarly, the unpredictable nature of hot flashes can lead to anticipatory anxiety and social avoidance, further amplifying stress levels (Avis *et al*., 2001) [1]. Beyond the direct physiological effects of hormonal changes, the menopausal transition often coincides with other significant life events, such as children leaving home, caring for aging parents, and navigating career changes, all of which can add to a woman's overall stress burden (Woods *et al*., 2005) [26]. Understanding and effectively addressing these stressors is paramount for improving women's health and well-being during this critical life stage. Historically, hormone replacement therapy (HRT) has been a primary medical intervention for managing menopausal symptoms, including those contributing to stress (Lobo, 2017) [16]. HRT involves supplementing declining hormone levels with exogenous estrogen and sometimes progesterone, effectively mitigating many of the physical discomforts associated with menopause. While effective for many women, HRT is not without its limitations and potential risks. Concerns regarding increased risk of breast cancer, cardiovascular disease, and stroke have led to a more cautious approach to HRT prescription and a greater emphasis on individual risk-benefit assessment (Rossouw *et al*., 2002; Writing Group for the Women's Health Initiative Investigators, 2002) [20]. These concerns, coupled with individual preferences for non-pharmacological approaches, have fueled a growing interest in alternative and holistic strategies for managing menopausal symptoms and associated stress.

This growing interest in alternative approaches has led to the exploration of mind-body interventions, which focus on the interconnectedness of psychological and physiological processes. Among these, Mindfulness-Based Stress Reduction (MBSR) has emerged as a promising intervention for stress management and enhancing emotional resilience (Grossman *et al*., 2004; Kabat-Zinn, 1982) [11, 13]. Developed by Jon Kabat-Zinn at the University of Massachusetts Medical School, MBSR is an intensive, structured program that teaches participants to cultivate mindfulness – a state of non-judgmental awareness of the present moment (Kabat-Zinn, 1990) [14]. Through guided meditations, body scans, gentle yoga, and group discussions, participants learn to observe their thoughts, feelings, and bodily sensations without getting caught up in them. This process of observing with curiosity and acceptance can help individuals develop a greater capacity to respond to stress more effectively, rather than reacting habitually. The theoretical underpinnings of MBSR suggest that stress is not solely a product of external circumstances but also arises from our internal responses to those circumstances (Segal *et al*., 2013) [23]. By cultivating mindfulness, individuals can

become more aware of their habitual thought patterns and emotional reactions to stressors. This awareness can create a space between the stimulus and the response, allowing for a more conscious and deliberate choice in how to react. For individuals experiencing the myriad symptoms of menopause, this ability to observe physical discomfort or emotional volatility without judgment can be particularly beneficial. Instead of being overwhelmed by hot flashes or mood swings, mindfulness can help women acknowledge these experiences as temporary phenomena, reducing the tendency to ruminate or catastrophize. Research on the effects of MBSR across various populations has demonstrated its efficacy in reducing stress, anxiety, and depression (Grossman *et al*., 2004; Khoury *et al*., 2013) [11, 15]. Studies have shown that MBSR can lead to physiological changes associated with stress reduction, such as decreased cortisol levels and increased activity in brain regions associated with emotional regulation (Hölzel *et al*., 2011; Tang *et al*., 2015) [12, 25]. Furthermore, MBSR has been shown to improve psychological well-being, including increased self-compassion, emotional regulation, and overall life satisfaction (Baer *et al*., 2006) [3]. While the evidence for MBSR's effectiveness in general stress reduction is robust, its specific impact on stress levels in menopausal women requires further investigation within a community-based setting.

Existing research specifically examining the impact of MBSR on menopausal symptoms has shown promising results, though the focus has often been on reducing the severity of hot flashes or improving sleep quality (Carmody *et al*., 2007; Rothenberg *et al*., 2007) [5, 21]. While these studies indirectly address stress by mitigating its contributing factors, a direct examination of MBSR's effect on perceived stress levels in this population is crucial. Menopausal women experience stress not only due to physical symptoms but also from the psychological and social adjustments associated with this life stage. Therefore, a study that specifically targets and measures stress as an outcome variable is warranted. Community-based studies offer a valuable approach to understanding the practical applicability and effectiveness of interventions in real-world settings. Conducting this study within a community context allows for the recruitment of a diverse group of menopausal women who are not necessarily seeking care in a clinical setting. This approach enhances the generalizability of the findings to the broader population of menopausal women experiencing stress. Furthermore, delivering MBSR in a community setting can increase accessibility and affordability, making this intervention a more viable option for a wider range of women. The current study aims to investigate the efficacy of an 8-week MBSR program in reducing stress levels among menopausal women in a community setting. Building upon the existing literature demonstrating the benefits of MBSR for stress reduction in various populations and the known association between menopause and increased stress, this research seeks to provide empirical evidence for the utility of MBSR as a non-pharmacological intervention for managing stress during the menopausal transition. The study will utilize a quantitative approach to measure changes in perceived stress levels before and after the MBSR intervention. The primary objective of this study is to determine if participation in an 8-week MBSR program leads to a statistically significant reduction in perceived stress levels in a sample of community-dwelling menopausal women. Secondary objectives include exploring potential correlations between changes in stress levels and other relevant factors, such as age, menopausal stage, and baseline symptom severity, although the primary focus remains on stress reduction.

The significance of this research lies in its potential to contribute to the growing body of evidence supporting the use of holistic and mind-body interventions for managing menopausal symptoms. If MBSR is found to be effective in reducing stress in this population, it could offer a valuable alternative or complementary approach to conventional treatments, providing women with a non-pharmacological tool to navigate the challenges of menopause with greater ease and resilience. Furthermore, demonstrating the effectiveness of MBSR in a community setting could inform the development and implementation of accessible and affordable stress management programs for menopausal women. The menopausal transition is a complex period often accompanied by increased stress levels, significantly impacting women's health and well-being. While conventional treatments exist, the search for effective and holistic approaches continues. Mindfulness-Based Stress Reduction, with its proven track record in stress reduction across various populations, holds significant promise as an intervention for managing stress in menopausal women. This community-based study seeks to rigorously examine the efficacy of an 8-week MBSR program in reducing perceived stress levels in this specific population, contributing valuable insights into the potential of mindfulness as a tool for navigating the menopausal transition with greater resilience and improved quality of life.

Methodology

This study employed a comprehensive methodology to investigate the impact of a Mindfulness-Based Stress Reduction (MBSR) program on stress levels in menopausal women within a community setting. The design, sample, setting, and instruments used were carefully selected to provide a robust framework for examining the research question.

Research Design

A quasi-experimental design with non-equivalent control groups was utilized for this study. This design was chosen as it allowed for the evaluation of the MBSR intervention's effectiveness in a real-world community setting where true random assignment to a control group receiving no intervention might be ethically or practically challenging. In a quasi-experimental design, participants are not randomly assigned to groups, which can introduce potential biases (Shadish *et al*., 2002) [24]. However, by utilizing a control group, we aimed to minimize the impact of extraneous variables and provide a point of comparison for the changes observed in the intervention group. The intervention group participated in the 8-week MBSR program, while the control group did not receive the MBSR training during the study period. Both groups were assessed at the same time points (pre-intervention and post-intervention) to measure changes in stress levels. While a randomized controlled trial (RCT) is considered the gold standard for establishing causality, a quasi-experimental design was deemed appropriate for this community-based study, allowing for

the assessment of the intervention's effects in a more naturalistic environment (Cook & Campbell, 1979) [8]. Efforts were made to ensure the two groups were as comparable as possible on key demographic variables to mitigate potential confounding factors, although complete equivalence cannot be guaranteed in a non-equivalent control group design.

Sample and Setting

The study sample consisted of 60 menopausal women aged 42 to 55 years. This age range was selected to capture women experiencing the perimenopausal and early postmenopausal stages, periods often associated with significant hormonal fluctuations and symptom onset (Santoro *et al*., 2015) [22]. Participants were recruited through various community channels, including local community centers, women's health clinics, and online forums catering to women in this age group. Inclusion criteria included: being between the ages of 42 and 55, self-identifying as experiencing menopausal symptoms (e.g., irregular periods, hot flashes, mood changes), and being able to attend the scheduled MBSR sessions. Exclusion criteria included: having a formal diagnosis of a severe mental health disorder requiring active psychiatric treatment (e.g., major depressive disorder with psychotic features, bipolar disorder), currently participating in another mindfulness-based intervention, or having a medical condition that would significantly hinder participation in the MBSR program (e.g., severe mobility issues preventing gentle yoga).

Participants were randomly assigned to either the MBSR intervention group (n=30) or the control group (n=30). The randomization process involved using a computer-generated random number sequence to allocate participants to each group after they met the inclusion criteria and provided informed consent. While the design is quasi-experimental due to the community setting, the random assignment within the recruited sample aimed to reduce selection bias within this specific group of participants.

The study was conducted within community settings, specifically at easily accessible locations such as community centers or rented spaces suitable for group sessions. This approach aimed to enhance accessibility and convenience for participants, reflecting the real-world context where women might seek such interventions. Conducting the study in a community setting also allowed for the recruitment of a more diverse sample compared to a single clinical site, potentially increasing the generalizability of the findings to a broader population of menopausal women.

Instruments Used

Stress levels were assessed using the Perceived Stress Scale (PSS). The PSS is a widely used and well-validated self-report questionnaire designed to measure the degree to which individuals appraise situations in their lives as stressful (Cohen *et al*., 1983) [7]. The PSS consists of 14 items that ask respondents about their feelings and thoughts during the past month. Examples of items include: "In the last month, how often have you been upset because of something that happened unexpectedly?" and "In the last month, how often have you felt that you were unable to control the important things in your life?" Responses are rated on a 5-point Likert scale ranging from 0 (never) to 4 (very often). Higher scores on the PSS indicate higher levels of perceived stress. The PSS has demonstrated good psychometric properties, including reliability and validity, across various populations, including women (Cohen *et al*., 1983) [7]. The PSS was administered to both the intervention and control groups at two time points: baseline (prior to the start of the MBSR program) and post-intervention (immediately following the completion of the 8-week MBSR program). This pre-post design allowed for the measurement of changes in perceived stress within each group and a comparison of these changes between the two groups.

In addition to the PSS, basic demographic information, including age and menopausal stage (e.g., perimenopausal, postmenopausal based on self-report of menstrual cycle regularity), was collected from all participants at baseline. While not the primary outcome, this information allowed for a description of the sample and potential exploration of how these factors might relate to stress levels and the effectiveness of the intervention.

Intervention

The MBSR intervention was delivered as an 8-week program, following the standard curriculum developed by Jon Kabat-Zinn (Kabat-Zinn, 1990) [14]. Each weekly session was 2.5 hours in duration and was led by a certified MBSR instructor with extensive experience in delivering the program. The curriculum included guided mindfulness meditation practices (e.g., body scan, sitting meditation, mindful movement/gentle yoga), didactic presentations on the principles of mindfulness and stress, group discussions, and homework assignments involving daily home practice. Participants were encouraged to engage in daily formal and informal mindfulness practices throughout the 8 weeks. The program also included a full-day mindfulness retreat between weeks 6 and 7, providing an extended period for intensive practice. The control group received no active intervention during the study period but was offered information about stress management resources available in the community after the study concluded.

Data Collection and Analysis

Data were collected at two time points: baseline and post-intervention. Participants completed the PSS questionnaire at both time points. Demographic data were collected at baseline. Data were entered into a secure database for analysis. Descriptive statistics were used to summarize the demographic characteristics of the sample and the baseline stress levels in both groups. To assess the effectiveness of the MBSR intervention, an independent samples t-test was conducted to compare the mean change in PSS scores from baseline to post-intervention between the MBSR group and the control group (Field, 2013) [9]. Paired samples t-tests were also conducted within each group to examine changes in PSS scores from baseline to post-intervention (Pallant, 2020) [19]. The level of statistical significance was set at $p < 0.05$. All statistical analyses were performed using statistical software.

Limitations

It is important to acknowledge the limitations of this study. The quasi-experimental design, while appropriate for a community setting, means that causality cannot be definitively established due to the lack of true random assignment. While efforts were made to ensure group

comparability, unmeasured confounding variables may exist. The sample size of 60 participants, while sufficient for the planned statistical analyses, may limit the power to detect smaller effects. The study relied on self-report measures of stress, which can be subject to social desirability bias. Future research could benefit from incorporating objective measures of stress, such as physiological markers (e.g., cortisol levels). The study was conducted in a specific community setting, which may limit the generalizability of the findings to other populations or settings. Finally, the long-term effects of the MBSR intervention were not assessed in this study; future research could include follow-up assessments to examine sustained changes in stress levels. Despite these limitations, this study provides valuable insights into the potential of MBSR for stress reduction in menopausal women within a community setting. The findings will contribute to the understanding of non-pharmacological approaches to managing stress during this significant life transition.

Results and Discussion

This section presents the findings of the statistical analysis examining the effect of the 8-week Mindfulness-Based Stress Reduction (MBSR) program on stress levels in menopausal women. The results are presented with descriptive statistics and tables, followed by a comprehensive discussion interpreting these findings in the context of existing literature and their implications for women's health during menopause.

A total of 60 menopausal women (30 in the MBSR group and 30 in the control group) completed the study. Table 1 presents the demographic characteristics of the participants in both groups at baseline.

Table 1: Baseline Demographic Characteristics of Participants

Characteristic	MBSR Group (n=30)	Control Group (n=30)
Age (Mean ± SD)	49.8 ± 3.5	50.2 ± 3.1
Menopausal Stage (%)		
Perimenopausal	60.0	56.7
Postmenopausal	40.0	43.3

As shown in Table 1, the two groups were comparable in terms of age and menopausal stage at baseline, suggesting that the random assignment within the recruited sample resulted in relatively balanced groups on these key demographic variables.

Table 2 presents the mean Perceived Stress Scale (PSS) scores for both the MBSR and control groups at baseline and post-intervention, along with the mean change in scores.

Table 2: Mean Perceived Stress Scale (PSS) Scores at Baseline and Post-Intervention

Group	Baseline PSS (Mean ± SD)	Post-Intervention PSS (Mean ± SD)	Mean Change in PSS (Mean ± SD)
MBSR Group (n=30)	21.5 ± 4.2	14.8 ± 3.8	-6.7 ± 2.9
Control Group (n=30)	20.9 ± 4.0	20.5 ± 3.9	-0.4 ± 1.5

Visual inspection of Table 2 suggests a notable decrease in perceived stress levels in the MBSR group following the intervention, while the control group showed minimal change.

To statistically evaluate the difference in stress reduction between the two groups, an independent samples t-test was conducted on the mean change in PSS scores from baseline to post-intervention. The results of this analysis are presented in Table 3.

Table 3: Independent Samples t-test Comparing Mean Change in PSS Scores

Comparison	Mean Difference	Standard Error	t-statistic	p-value
MBSR Change vs. Control Change	-6.3	0.6	-10.50	< 0.001

The independent samples t-test revealed a statistically significant difference in the mean change in PSS scores between the MBSR group and the control group ($t(58) = -10.50$, $p < 0.001$). The mean reduction in PSS scores was significantly larger in the MBSR group (-6.7) compared to the control group (-0.4).

Further analysis using paired samples t-tests was conducted to examine the within-group changes in PSS scores from baseline to post-intervention. The results are presented in Table 4.

Table 4: Paired Samples t-tests for Within-Group Changes in PSS Scores

Group	t-statistic	p-value
MBSR Group	12.60	< 0.001
Control Group	1.47	0.148

The paired samples t-test for the MBSR group showed a statistically significant decrease in PSS scores from baseline to post-intervention ($t(29) = 12.60$, $p < 0.001$). In contrast, the paired samples t-test for the control group did not show a statistically significant change in PSS scores from baseline to post-intervention ($t(29) = 1.47$, $p = 0.148$). To further illustrate the magnitude of the effect, Cohen's d was calculated for the difference in mean change in PSS scores between the groups. Cohen's d was found to be 2.73, indicating a very large effect size (Cohen, 1988) [6].

The results of this community-based study provide strong evidence for the effectiveness of an 8-week MBSR program in significantly reducing perceived stress levels in menopausal women. The statistically significant reduction in PSS scores observed in the MBSR group, coupled with the minimal change in the control group and the large effect size, strongly supports the notion that mindfulness practices can play a crucial role in stress management during the menopausal transition. The findings align with and extend the existing literature on the benefits of MBSR for stress reduction in various populations (Grossman *et al.*, 2004; Khoury *et al.*, 2013) [11, 15]. Specifically, these results contribute to the growing body of evidence suggesting that mindfulness-based interventions are beneficial for women experiencing the challenges of menopause (Carmody *et al.*, 2007; Rothenberg *et al.*, 2007) [5, 21]. While previous studies have often focused on the impact of mindfulness on specific menopausal symptoms like hot flashes or sleep disturbances, this study directly targeted and measured perceived stress as the primary outcome, highlighting the program's direct impact on a key psychological challenge of this life stage. The observed reduction in stress levels in the

MBSR group can be attributed to the core principles and practices of mindfulness. The MBSR program teaches participants to cultivate non-judgmental awareness of the present moment, including their thoughts, feelings, and bodily sensations (Kabat-Zinn, 1990) [14]. For menopausal women, who may experience unpredictable and sometimes distressing physical and emotional symptoms, this practice can be particularly powerful. Instead of reacting with frustration, anxiety, or fear to a hot flash or a sudden mood swing, mindfulness encourages observing these experiences with curiosity and acceptance, recognizing them as temporary phenomena (Segal *et al*., 2013) [23]. This shift in perspective can reduce the tendency to ruminate on negative experiences or catastrophize about future symptoms, thereby lowering overall perceived stress. Furthermore, the regular practice of mindfulness meditation, a cornerstone of MBSR, has been shown to have a calming effect on the nervous system, reducing physiological markers of stress such as heart rate and cortisol levels (Hölzel *et al*., 2011; Tang *et al*., 2015) [12, 25]. The gentle yoga component of MBSR also promotes body awareness and can help release physical tension often associated with stress. The group setting of the MBSR program provides a supportive environment where women can share their experiences and learn from each other, fostering a sense of community and reducing feelings of isolation, which can also contribute to stress reduction (Grossman *et al*., 2004) [11].

The minimal change in stress levels observed in the control group reinforces the conclusion that the reduction in the MBSR group was likely due to the intervention itself rather than other external factors or the natural progression of stress levels over the study period. While it is possible that some participants in the control group engaged in other forms of stress management outside the study, the lack of significant change suggests that these activities, if present, were not as effective as the structured MBSR program in reducing perceived stress. The findings of this study underscore the importance of incorporating non-pharmacological interventions into women's health care, particularly during the menopausal transition. While HRT remains a valid option for managing certain menopausal symptoms, the potential risks and individual preferences necessitate a broader range of treatment options (Lobo, 2017; Rossouw *et al*., 2002) [16, 20]. MBSR offers a safe, accessible, and empowering approach that addresses the psychological and emotional aspects of menopause, which are significant contributors to stress. By providing women with tools to manage stress effectively, MBSR can potentially improve their overall quality of life, enhance their emotional well-being, and empower them to navigate this life stage with greater resilience. Comparing these findings to other studies on mindfulness and menopausal symptoms further highlights the value of this research. While studies like Carmody *et al*. (2007) and Rothenberg *et al*. (2007) [21] focused on reducing hot flashes, our study specifically targeted perceived stress, demonstrating that MBSR can directly impact the psychological burden of menopause. This is crucial as stress is a significant factor contributing to the overall distress experienced by many women during this time (Freeman, 2010) [10].

The community-based nature of this study is a significant strength. By conducting the intervention in community settings, we demonstrated the feasibility and effectiveness of delivering MBSR in accessible locations, making it a more practical option for a wider range of women compared to clinic-based programs. This approach is particularly relevant for promoting health equity and ensuring that effective stress management strategies are available to women in their local communities. Despite the significant findings, it is important to consider the limitations of the study, as outlined in the methodology section. The quasi-experimental design, while practical for a community setting, prevents definitive causal claims. Future research could benefit from a randomized controlled trial design to further strengthen the evidence. The reliance on self-report measures of stress is another limitation, and future studies could incorporate objective measures. Additionally, assessing the long-term sustainability of the stress reduction benefits would be valuable. This community-based study provides compelling evidence that an 8-week MBSR program is effective in significantly reducing perceived stress levels among menopausal women. The findings support the integration of mindfulness-based interventions into women's health care as a valuable non-pharmacological approach to managing the psychological challenges of menopause. By equipping women with mindfulness skills, healthcare providers and community organizations can empower them to navigate this transition with greater resilience, improved emotional well-being, and a higher quality of life. Future research should explore the long-term effects of MBSR and investigate its impact on other menopausal symptoms and overall well-being in diverse populations of menopausal women.

Conclusion

This community-based study provides compelling evidence that an 8-week Mindfulness-Based Stress Reduction (MBSR) program is a highly effective intervention for significantly reducing perceived stress levels among menopausal women. The significant decrease in Perceived Stress Scale (PSS) scores in the MBSR group compared to the control group, coupled with a large effect size, strongly supports the integration of mindfulness practices into women's health care as a valuable non-pharmacological approach to managing the psychological challenges of menopause. These findings align with and expand upon existing literature demonstrating the benefits of mindfulness for stress reduction and emotional well-being in various populations. Looking ahead, future research should aim to replicate these findings with a larger, more diverse sample using a randomized controlled trial design to strengthen causal inferences. Investigating the long-term sustainability of the stress reduction benefits through follow-up assessments is crucial. Furthermore, exploring the impact of MBSR on other common menopausal symptoms, such as hot flashes, sleep disturbances, and mood swings, would provide a more comprehensive understanding of its benefits. Research could also examine the mechanisms through which MBSR exerts its effects, potentially incorporating physiological measures of stress and neuroimaging techniques. Finally, exploring the adaptability of MBSR for different delivery formats (e.g., online programs, shorter interventions) and its cost-effectiveness in community settings would be valuable for expanding access to this beneficial intervention for menopausal women.

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