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# Randomized Controlled Trial of Mindfulness-Based Therapy on Psychological Distress and Clinical Outcomes in Preeclampsia

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**ABSTRACT**

Preeclampsia is one of the leading causes of maternal morbidity and mortality worldwide, often associated with psychological distress that worsens clinical outcomes. This study aimed to examine the effectiveness of Mindfulness-Based Therapy (MBT) on psychological distress and clinical outcomes in women with preeclampsia. A randomized controlled trial was conducted among 60 pregnant women diagnosed with preeclampsia who were randomly assigned into two groups: intervention (MBT + standard care) and control (standard care only). MBT was delivered in six sessions over three weeks, focusing on mindfulness breathing, body scanning, and acceptance strategies. Psychological distress was measured using the Depression Anxiety Stress Scale (DASS-21), while clinical parameters included systolic and diastolic blood pressure, and proteinuria level. The results showed a significant reduction in stress, anxiety, and depression scores ($p < 0.05$) in the intervention group compared to the control group. Clinically, the intervention group demonstrated better blood pressure control and reduced proteinuria. Mindfulness-Based Therapy effectively reduces psychological distress and improves clinical outcomes in preeclampsia. Integrating mindfulness interventions into antenatal care could enhance maternal well-being and pregnancy outcomes.

**Keywords:** Mindfulness; preeclampsia; psychological distress; randomized controlled trial; clinical outcomes

## INTRODUCTION

Preeclampsia remains one of the most critical health challenges in obstetrics, particularly in developing countries. According to WHO (2022), this condition accounts for more than 15% of global maternal deaths, with a prevalence of 5–8% of all pregnancies.[1] As a hypertensive disorder of pregnancy characterized by blood pressure ≥140/90 mmHg and proteinuria after 20 weeks of gestation, preeclampsia may progress rapidly and lead to severe complications such as eclampsia, HELLP syndrome, and multi-organ failure.[2]

Beyond its physiological impact, women with preeclampsia also experience substantial psychological burden.[3] Stress, anxiety, and uncertainty regarding the pregnancy can trigger excessive sympathetic nervous system activation and elevate stress hormones such as cortisol.[4] These physiological responses have been shown to worsen endothelial dysfunction, increase vasoconstriction, and contribute to elevated blood pressure that becomes more difficult to control.[5] Thus, psychological factors play an integral role in the clinical progression of preeclampsia and should not be overlooked.

In clinical practice, the management of preeclampsia is predominantly focused on pharmacological measures such as antihypertensive therapy and close monitoring. However, non-pharmacological interventions that aim to reduce psychological stress and promote hemodynamic stability have gained increasing attention. One such approach is Mindfulness-Based Therapy (MBT), a technique that cultivates full awareness of present-moment experiences in an open, non-judgmental manner.[6] MBT has demonstrated effectiveness in reducing stress, anxiety, and depression, as well as improving neuroendocrine and autonomic regulation, which may contribute to better blood pressure control.[7]

Despite its potential benefits, research evaluating the effectiveness of MBT among patients with preeclampsia in Indonesia remains scarce. Considering the high burden of preeclampsia cases, the significant psychological distress experienced by pregnant women, and the need for safe, non-invasive interventions that can be integrated into antenatal care, this study holds strong clinical urgency. Therefore, the present research

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aims to evaluate the impact of MBT on stress reduction and clinical outcomes in preeclamptic patients at Makassar Regional General Hospital.

## MATERIALS AND METHODS

This study employed a randomized controlled trial with a pretest–posttest control group design. A total of 60 pregnant women diagnosed with mild to moderate preeclampsia were recruited between May and August 2025 in the obstetric ward of RSUD Makassar. After eligibility screening, all qualified participants were allocated into the intervention and control groups through random assignment using a table of random numbers generated by a computer (computer-generated random numbers). This randomization method was selected to ensure that every participant had an equal chance of being placed in either group, thereby minimizing selection bias and maintaining baseline comparability between groups. The intervention group received six sessions of Mindfulness-Based Therapy (MBT) over a three-week period, whereas the control group received standard preeclampsia care without any additional psychological intervention. Research instruments included the DASS-21 to assess stress, anxiety, and depression levels; a sphygmomanometer to measure blood pressure; and urine dipstick testing to evaluate proteinuria. Data analysis was conducted using paired t-tests, independent t-tests, and linear regression with a significance level of 0.05. Ethical approval for this study was obtained from the Health Research Ethics Committee of STIKES Nani Hasanuddin Makassar.

## RESULT

Table 1. Changes in Psychological Distress Before and After Intervention

| Variable | Group | Pretest (Mean ± SD) | Posttest (Mean ± SD) | p-value |
|---|---|---|---|---|
| Stres | Intervention | 28.3 ± 6.5 | 17.1 ± 5.2 | 0.001 |
| Stres | Control | 27.9 ± 5.8 | 26.2 ± 6.0 | 0.217 |
| Anxiety | Intervention | 26.5 ± 5.9 | 15.6 ± 4.7 | 0.001 |
| Depression | Intervention | 24.8 ± 5.2 | 14.9 ± 3.8 | 0.001 |

**Source:** Primary Data 2025

The results demonstrated a **significant reduction** in stress, anxiety, and depression scores following the six sessions of mindfulness therapy. *p value* < 0.05 indicates a statistically significant difference between the pre-intervention and post-intervention measurements within the treatment group. Conversely, the control group exhibited no significant changes ($p > 0.05$).

These findings confirm that Mindfulness-Based Therapy (MBT) is effective in reducing psychological distress among mothers with preeclampsia. An average reduction of more than 10 points on the DASS-21 scale indicates a clinically and functionally significant change in the patients' emotional well-being.

Table 2. Changes in Systolic and Diastolic Blood Pressure Before and After Therapy

| Blood Pressure | Group | Pretest (Mean ± SD) | Posttest (Mean ± SD) | p-value |
|---|---|---|---|---|
| Systolic (mmHg) | Intervention | 153.4 ± 11.6 | 137.8 ± 9.4 | 0.001 |
| Systolic (mmHg) | Control | 152.7 ± 10.9 | 150.2 ± 10.7 | 0.198 |
| Diastolic(mmHg) | Intervention | 99.6 ± 7.8 | 88.3 ± 6.9 | 0.001 |
| Diastolic(mmHg) | Control | 98.9 ± 7.5 | 96.7 ± 7.4 | 0.271 |

**Source:** Primary Data 2025


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A significant decrease in both systolic and diastolic blood pressure was observed in the intervention group following mindfulness therapy. The average reduction of 15.6 mmHg (systolic) and 11.3 mmHg (diastolic) reflects a clinically important effect on hypertension control in preeclampsia.

In contrast, the control group showed no significant change. This suggests that non-pharmacological interventions, such as MBT, can serve as an effective adjunct to medical therapy in lowering blood pressure without pharmacological side effects.

Table 3. Relationship between Stress Score and Blood Pressure After Intervention (Linear Regression Analysis)

| Group | Independent Variable | Dependent Variable | *Coefficient (β)* | *p-value* | $R^2$ |
|---|---|---|---|---|---|
| Intervention | Stress Score | Systolic Blood Pressure | 0.542 | 0.001 | 0.46 |
| Intervention | Stress Score | Diastolic Blood Pressure | 0.511 | 0.003 | 0.42 |
| Control | Stress Score | Systolic Blood Pressure | 0.118 | 0.284 | 0.07 |
| Control | Stress Score | Diastolic Blood Pressure | 0.095 | 0.317 | 0.05 |

**Source:** Primary Data 2025

The linear regression analysis demonstrated that in the intervention group, stress was strongly and significantly associated with both systolic and diastolic blood pressure, as reflected by $R^2$ values ranging from 0.42 to 0.46. These findings indicate that reductions in stress following the mindfulness intervention contributed substantially to the improvement in blood pressure parameters. In other words, lower stress levels were closely related to better blood pressure regulation among participants.

Conversely, in the control group, the association between stress and blood pressure was weak and statistically non-significant, with $R^2$ values below 0.10. This suggests that without mindfulness intervention, stress did not play a meaningful role in influencing blood pressure changes. Overall, these results emphasize that mindfulness acts as an important mediating factor that strengthens the relationship between psychological stress and blood pressure regulation in pregnant women with preeclampsia.

Table 4. Mean Proteinuria Levels in Pretest–Posttest Measurements

| Group | Pretest (Mean ± SD) | Posttest (Mean ± SD) | *Δ Change* | *p-value (within group)* |
|---|---|---|---|---|
| Intervention (n = 30) | 1.25 ± 0.43 | 0.78 ± 0.39 | −0.47 | 0.001 |
| Control (n = 30) | 1.21 ± 0.40 | 1.18 ± 0.42 | −0.03 | 0.412 |

The analysis of proteinuria levels demonstrated a significant improvement in the intervention group following the mindfulness-based therapy program. The mean proteinuria decreased notably from 1.25 ± 0.43 at pretest to 0.78 ± 0.39 at posttest, with a mean reduction of −0.47 and a statistically significant p-value of 0.001. This finding indicates that mindfulness therapy may contribute to improved renal function or reduced endothelial stress among women with preeclampsia.

Conversely, the control group showed only a minimal and non-significant change in proteinuria levels, decreasing slightly from 1.21 ± 0.40 to 1.18 ± 0.42 ($\Delta = -0.03$; $p = 0.412$). These insignificant changes suggest that routine care alone did not substantially influence proteinuria outcomes during the study period. Overall, the results highlight that mindfulness-based therapy appears to have a beneficial effect not only on psychological parameters but also on a key clinical indicator of preeclampsia severity proteinuria.


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**DISCUSSION**

The results of this study demonstrate that mindfulness-based therapy exerts a significant influence on the reduction of psychological distress and the improvement of clinical outcomes in patients with preeclampsia. This finding is consistent with various international studies that have shown that mindfulness-based interventions are capable of reducing stress, anxiety, and depression, and also impacting physiological functions, including blood pressure.[3],[5],[6]

The decrease in stress and anxiety within the intervention group can be explained by the neurobiological processes that occur during mindfulness training. Activation of the prefrontal cortex, anterior cingulate cortex, and a reduction in amygdala hyperactivity are mechanisms that account for the body's adaptive response to stress.[10–12] Activation of these areas enhances emotional regulation capacity, enabling respondents to better control their perception of threats, including worries about their preeclamptic condition.[11]

Furthermore, mindfulness is known to increase parasympathetic nervous system activity through an elevation of vagal nerve tone.[13] This increased parasympathetic activity triggers a reduction in the sympathetic nervous system activity, which is commonly hyperactive in preeclampsia patients. This condition results in a decrease in blood pressure via peripheral vasodilation, a reduction in vascular resistance, and diminished secretion of stress hormones such as cortisol and norepinephrine.[35],[17]

The reduction in systolic blood pressure by 15 mmHg and diastolic blood pressure by 11 mmHg in this study demonstrates clinically meaningful results. This reduction is estimated to lower the risk of complications such as eclampsia, HELLP syndrome, and preterm birth.[1],[2],[8] A study by Shishehgar et al. (2019) reported that psychological stress is a trigger for the exacerbation of hypertension through the activation of the renin-angiotensin system and impaired endothelial function.[8] The linear regression results of this study, which show a strong correlation between stress and blood pressure, support this psychoneuroimmunological theory.

This finding is further supported by studies by Creswell (2017), Guardino & Schetter (2019), and Bowen et al. (2019), which demonstrate the significant effects of MBSR and MBT in reducing prenatal anxiety and improving blood pressure regulation.[5],[6],[7] Other studies have also found that respiration-based mindfulness practices can reduce plasma cortisol levels by up to 25% after 4 weeks of intervention.[14],[15]
In the context of maternity nursing, the role of nurses is central to the implementation of mindfulness interventions. Nurses can function as educators, facilitators for conscious breathing exercises, body scan meditation, and assist mothers in developing self-acceptance strategies. This aligns with the principles of antenatal care, which focuses on a holistic and biopsychosocial approach.[20]

From a psychological perspective, this study emphasizes the importance of managing stress in preeclampsia not only through pharmacological but also non-pharmacological approaches. For example, a study by O'Neill et al. (2020) showed that the combination of standard therapy with psychological intervention was more effective in reducing prenatal anxiety than monotherapy.[21] Interventions such as MBT have also been shown to improve sleep quality, emotional stability, and self-control perception during pregnancy.[22],[23]

This research also provides significant implications for clinical practice. Given that MBT is low-cost, non-invasive, safe for patients, and can be conducted without specialized equipment, this intervention is highly feasible for implementation in obstetrics inpatient wards. Local research in Indonesia concerning mindfulness in preeclampsia patients remains highly limited, thus these findings provide a foundation for broader future research. The short duration of the intervention (3 weeks) is a limitation that can be addressed in subsequent studies, for example, by utilizing 6–8 weeks of intervention which has proven more effective in international studies.[17],[23]

From a physiological standpoint, the regression analysis results indicate that stress contributes almost 46% to the increase in systolic blood pressure and 42% to diastolic blood pressure. This is consistent with research on pregnant populations reporting that stress contributes to endothelial dysfunction, increased free radicals, and placental inflammation, all of which play a role in the pathogenesis of preeclampsia.[2],[18],[19]
Therefore, the implementation of Mindfulness-Based Therapy not only improves the mother's mental status but also provides a direct therapeutic effect on blood pressure stabilization, making it a viable component of complementary standard practice for patients with preeclampsia.


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## CONCLUSION AND RECOMMENDATIONS

This study concludes that Mindfulness-Based Therapy (MBT) is effective in reducing psychological distress, including stress, anxiety, and depression, and improving clinical outcomes such as systolic and diastolic blood pressure in mothers with preeclampsia. This intervention also contributed to lowering proteinuria levels, thereby helping to stabilize the patients' clinical condition.

It is recommended that mindfulness therapy be integrated into antenatal care programs as a supportive strategy to enhance the physical and psychological well-being of pregnant women with preeclampsia. Further research involving a larger sample size, a longer intervention duration, and the assessment of stress biomarkers such as cortisol is highly necessary to strengthen the evidence base for the effectiveness of Mindfulness-Based Therapy.

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