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RESEARCH **Open Access**

Effectiveness of Effleurage Massage in Reducing Blood Pressure among Hypertensive Pregnant Women Aged 20–35 Years in Gorontalo

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Abstract
Hypertensive disorders in pregnancy (HDP) remain a major contributor to maternal mortality, particularly due to complications such as preeclampsia and eclampsia. According to the World Health Organization (WHO), approximately 585,000 maternal deaths occur annually, with more than half related to HDP. This study aimed to analyze the effect of effleurage massage on blood pressure in hypertensive pregnant women in Gorontalo City, Indonesia. A pre-experimental design with a one-group pretest–posttest approach was applied. Sixty pregnant women aged 20–39 years, with gestational age 20–36 weeks and systolic blood pressure ≥140 mmHg, were recruited through purposive sampling. Participants received effleurage massage on the upper body for 20 minutes daily over five consecutive days. Blood pressure was measured before and after intervention. Data were analyzed using paired t-tests. The results showed significant reductions in mean systolic blood pressure (from 146.9 ± 3.7 to 132.0 ± 4.0 mmHg; p = 0.000) and diastolic blood pressure (from 88.3 ± 4.0 to 77.6 ± 4.1 mmHg; p = 0.000). Effleurage massage demonstrated a consistent lowering effect across all participants. This non-pharmacological intervention may serve as a safe complementary approach to antenatal care for mild HDP. Future randomized controlled trials are recommended to confirm its efficacy and to explore maternal–fetal outcomes.

Keywords: Effleurage Massage, Hypertensive Disorders in Pregnancy, Complementary Therapy, Maternal Health.

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1. INTRODUCTION

Hypertensive disorders in pregnancy (HDP) remain one of the most significant contributors to maternal and perinatal morbidity and mortality globally (Ekawati, et al., 2021). HDP are a significant global health problem, affecting approximately 10% of pregnancies worldwide (Ramlakhan et al., 2021; Ramlakhan et al., 2022) . HDP is a leading cause of maternal mortality, accounting for a significant proportion of deaths in both developed and developing countries. In Latin America and the Caribbean, HDP is responsible for nearly 26% of maternal deaths, while in Africa and Asia, it contributes to 9% of deaths (Wisner, 2019).

Globally, HDP not only threatens maternal survival but also increases the risk of preterm birth, intrauterine growth restriction, and perinatal death (Tikhonoff & Casiglia, 2020; Wu et al., 2020; Huang et al., 2023). Despite improvements in maternal health programs worldwide, the prevalence of HDP continues to rise in many low- and middle-income countries, reflecting the persistent challenges in early detection and management (Escobar et al., 2024).

In Indonesia, maternal mortality remains a critical public health challenge. The maternal mortality ratio (MMR) is reported at 305 per 100,000 live births, placing Indonesia as the third highest in Southeast Asia (Mahyul et al., 2024). This figure is far from the Sustainable Development Goals (SDGs) target of fewer than 70 maternal deaths per 100,000 live births by 2030. National health statistics indicate that hypertension in pregnancy is among the leading causes of maternal deaths, contributing to over one thousand fatalities annually (Ekawati, Emilia, et al., 2021; Ekawati, et al., 2021; Oktarina et al., 2024). Moreover, the burden has been increasing in recent years, with maternal deaths rising from 4,221 in 2019 to 7,389 in 2021 (Putri et al., 2023). These statistics highlight that despite concerted national efforts, hypertension during pregnancy continues to be inadequately addressed in Indonesia.

Regionally, Gorontalo Province reported an MMR of 189 per 100,000 live births in 2020, with causes of death dominated by hemorrhage, eclampsia, and infection (Dinkes Provinsi Gorontalo, 2024). Although this rate is lower than the national average, the persistence of hypertension-related complications underscores the urgent need for accessible and context-specific interventions. Furthermore, the presence of maternal deaths in nearly all districts of Gorontalo indicates that the problem is widespread and cannot be attributed to isolated cases. Local health services have identified preeclampsia as a recurring contributor to maternal death, reinforcing the importance of preventive and complementary strategies that can be integrated into antenatal care.

Clinically, HDP is defined as blood pressure ≥140/90 mmHg occurring before, during, or after pregnancy and may present asymptomatically, earning its designation as a “silent killer” (Nelson-Piercy, Catherine, & McCarthy, 2020; Ekawati et al., 2021). Uncontrolled hypertension increases the risk of multi-organ failure, seizures, and maternal death, as well as adverse neonatal outcomes such as preterm delivery and low birth weight (Jung et al., 2022; Ishikuro et al., 2024). Conventional management often relies on pharmacological approaches, particularly for severe hypertension, yet these treatments may not always be feasible or accessible in resource-limited settings. Consequently, non-pharmacological interventions are increasingly recognized as valuable complementary measures. Among these, effleurage massage—a technique involving gentle rhythmic stroking—has gained attention for its potential to reduce blood pressure by inducing relaxation, reducing cortisol levels, stimulating the parasympathetic nervous system, and promoting vasodilation (Alvaredo, Yulendasari, & Djamaludin, 2022; Sepdianto, Suprajitno, & Tyas, 2022; Raditya et al., 2023; Sepdianto, Suprajitno, & Tyas, 2024).

Previous studies have shown promising results. Sepdianto, Suprajitno, & Tyas, (2024), reported that effleurage back massage significantly reduced systolic blood pressure by 16.37 mmHg and diastolic blood pressure by 10.39 mmHg in primary hypertension patients aged 45-54 years., while Afni and Ristica (2022) demonstrated its efficacy in lowering blood pressure in women with preeclampsia (Afni and Ristica, 2022; Sepdianto, Suprajitno, & Tyas, 2024).

However, most existing evidence is limited to adult populations or prenatal care settings, with little research focusing on pregnant women during antenatal care. This gap is particularly relevant in Indonesia, where HDP remains highly prevalent and maternal health services are often constrained by limited resources.

Based on these considerations, this study was designed to examine the effect of effleurage massage on blood pressure in hypertensive pregnant women in Gorontalo City. By providing empirical evidence on the effectiveness of a simple, low-cost, and non-invasive intervention, the findings are expected to support the integration of effleurage massage as a complementary therapy in antenatal care. Furthermore, this research seeks to address the knowledge gap regarding the application of massage therapy in community-based maternal health services, thereby contributing to ongoing efforts to reduce maternal mortality related to hypertensive disorders in pregnancy.

2. RESEARCH METHOD

This study employed a quantitative research approach using a quasi-experimental one-group pretest–posttest design. The research was conducted in the working area of Gorontalo City Health Centers from March to October 2024. Although the intervention was delivered over five consecutive days for each participant, the extended eight-month period reflected the recruitment process, which was carried out consecutively in batches according to antenatal visit schedules. This design allowed for comprehensive participant enrollment and ensured adequate sample representation within the study timeframe.

The study population comprised all pregnant women diagnosed with hypertension who sought antenatal care services at Gorontalo City Health Centers during the study period. The final sample included 60 participants who met eligibility criteria and consented to participate. The sample size was based on all eligible women during the recruitment period; no formal power calculation was performed, which is acknowledged as a methodological limitation.

The inclusion criteria were: (1) pregnant women aged 20–39 years, (2) multiparous, (3) gestational age between 20 and <36 weeks, (4) systolic blood pressure ≥140 mmHg and <160 mmHg and diastolic blood pressure ≥90 mmHg and <110 mmHg, (5) not currently taking antihypertensive medication, and (6) no history of kidney disease or diabetes mellitus. Exclusion criteria included: (1) multiple pregnancy, (2) medical complications other than hypertension, and (3) refusal to participate or withdrawal during the intervention.

Intervention Procedure. Effleurage massage was administered once daily for five consecutive days. Each session lasted approximately 20 minutes and was performed by trained health personnel following standardized procedures. The massage focused on the back and upper extremities using gentle, rhythmic, circular strokes with the palms. Participants were instructed to remain in a comfortable position to facilitate relaxation. The procedure was designed to stimulate parasympathetic nervous activity, reduce sympathetic tension, and promote blood pressure regulation.

Three instruments were used for data collection: a Sphygmomanometer, calibrated and validated, to measure systolic and diastolic blood pressure. Measurements were taken in a seated position, at rest, and recorded before the first intervention (pretest) and after the final session (posttest). Observation checklist – to monitor adherence to massage protocol and participant responses during the intervention. Structured questionnaire – to record sociodemographic and clinical characteristics, including age, parity, gestational age, education, occupation, and history of hypertension.

Ethical approval for the study was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Gorontalo (No. DP.04.03/KEPK/124/2024). Written informed consent was obtained from all participants after receiving a clear explanation of the research objectives,

procedures, and potential benefits. Participants were assured of confidentiality and their right to withdraw at any stage without penalty.

Data were processed and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Normality of continuous variables was assessed using both the Shapiro–Wilk and Kolmogorov–Smirnov tests. Univariate analysis was conducted to describe respondent characteristics. Bivariate analysis using paired sample t-tests (for normally distributed data) or Wilcoxon signed-rank tests (for non-normal data) was performed to compare pretest and posttest blood pressure values. Statistical significance was set at $p < 0,05$.

3. RESULTS AND DISCUSSION

A total of 60 hypertensive pregnant women met the inclusion criteria and completed the study. The sociodemographic and clinical characteristics are summarized in Table 1.

Table 1. Sociodemographic and Clinical Characteristics of Respondents (N = 60).

Variable	Category	n	%	Mean ± SD	Range
Age (years)	20–35 (normal reproductive age)	45	75.0		
	<20 or >35 (at risk)	15	25.0		
Education	Primary–Secondary	40	66.7		
	Higher Education	20	33.3		
Occupation	Not working (housewife)	47	78.3		
	Working	13	21.7		
Parity	Multigravida (low risk)	43	71.7		
	Primigravida / Grandemultigravida	17	28.3		
History of Hypertension	Yes	15	25.0		
	No	45	75.0		
Blood Pressure (mmHg)	Pre-intervention (Systolic)			146.98 ± 3.75	140–156
	Pre-intervention (Diastolic)			88.38 ± 4.05	80–98
	Post-intervention (Systolic)			132.02 ± 4.03	124–140
	Post-intervention (Diastolic)			77.57 ± 4.06	70–80

Table 1 shows that the majority of respondents (75%) were aged 20–35 years, within the optimal reproductive age group, while 25% were in the at-risk age categories (<20 or >35 years). Most participants (66.7%) had only primary or secondary education, and 78.3% were housewives. A total of 71.7% were multigravida, whereas 28.3% were in the high-risk parity category. Furthermore, one in four respondents (25%) reported a history of hypertension in previous pregnancies.

Pre-intervention measurements indicated that mean systolic blood pressure was 146.98 mmHg and mean diastolic was 88.38 mmHg, both within the hypertensive range. Following the effleurage massage intervention, mean systolic blood pressure decreased to 132.02 mmHg and mean diastolic to 77.57 mmHg, placing most respondents within the normotensive category.

Table 2. Differences in systolic and diatolic blood pressure of samples before and after treatment.

Variable	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	p-value
Systolic (mmHg)	146.98 ± 3.78	132.02 ± 4.03	14.96	0.000
Diastolic (mmHg)	88.38 ± 4.05	77.57 ± 4.06	10.81	0.000

Table 2 shows that the analysis revealed a significant reduction in both systolic and diastolic blood pressure after five consecutive days of effleurage massage. The mean systolic blood pressure decreased by 14.96 mmHg ($p = 0.000$), while diastolic decreased by 10.81

mmHg (p=0.000). All participants experienced measurable reductions, demonstrating the consistency of the intervention's effect.

DISCUSSION

This study demonstrated that effleurage massage was associated with a significant reduction in both systolic and diastolic blood pressure among hypertensive pregnant women. The findings support the potential of effleurage massage as a safe and complementary non-pharmacological intervention to control mild hypertension during pregnancy.

Physiological Mechanisms

The observed reduction in blood pressure can be explained through several physiological mechanisms. Effleurage massage stimulates cutaneous mechanoreceptors, which in turn activate parasympathetic responses, reduce sympathetic nervous activity, and promote vasodilation (Herlina & Handayani, 2023; Nofintiyani & Jayanti, 2024). The rhythmic stroking of the skin enhances venous return, improves peripheral circulation, and reduces systemic vascular resistance. Moreover, massage therapy is known to decrease circulating stress hormones such as cortisol and norepinephrine, thereby facilitating relaxation and lowering blood pressure (Ahmed & Marinova, 2024). These mechanisms are particularly relevant during pregnancy, a physiological state characterized by increased cardiovascular demands.

Comparison with Previous Studies

The results are consistent with earlier studies. Redho, et al., (2023) reported significant reductions in blood pressure among elderly patients with stage I hypertension after effleurage massage (Redho, Lestari & Safitri, 2023). Similarly, Afni and Ristica (2022) demonstrated that massage interventions effectively reduced blood pressure in women with preeclampsia in the prenatal period (Afni and Ristica, 2022). More recent findings by Ketelhut et al. (2024) and Kumar et al. (2023) further support the role of massage in modulating autonomic function and improving hemodynamic stability (Kumar et al., 2023; Ketelhut et al., 2024). The present study expands this body of evidence by focusing on hypertensive pregnant women in a community-based antenatal care context, an area where empirical data remain limited.

Sociodemographic and Clinical Considerations

Although most participants were within the optimal reproductive age range and multiparous, they still experienced hypertension. This finding underscores that sociodemographic characteristics alone do not fully predict the occurrence of HDP. Factors such as psychological stress, dietary habits, limited physical activity, and hereditary predisposition likely contributed to elevated blood pressure. The high proportion of housewives (78.3%) suggests that sedentary lifestyle and domestic stressors may also play a role, a finding that aligns with previous research highlighting the impact of psychosocial stress on gestational (Sinclair et al., 2019; Marwaha, 2022; Boyer et al., 2023).

Alternative Explanations

While the reductions in blood pressure observed in this study are attributed to effleurage massage, alternative explanations must be considered. Resting in a calm environment prior to and during the intervention may itself have contributed to lowering blood pressure. The possibility of placebo effects or psychological expectations influencing outcomes cannot be excluded. Nevertheless, the magnitude and consistency of blood pressure reduction across participants suggest that the intervention exerted a genuine physiological effect beyond these alternative explanations.

Practical Implications. The results indicate that effleurage massage may be integrated into antenatal care as a low-cost, non-invasive, and culturally acceptable complementary therapy. It could be taught to midwives, health workers, and even family members to provide continuous support at home. This approach may be particularly valuable in resource-limited settings, where pharmacological interventions are not always readily accessible. Importantly, effleurage massage should not be interpreted as a substitute for medication in moderate-to-severe hypertension, but rather as a supportive therapy for mild cases.

This study is subject to several limitations. First, the absence of a control group prevents definitive conclusions regarding causality. Second, the sample size was relatively small and determined by the number of eligible participants during the study period without a priori power analysis. Third, blinding was not implemented, which may have introduced bias. Finally, fetal outcomes were not assessed, although they represent an important aspect of maternal hypertension management.

Future studies should adopt randomized controlled trial (RCT) designs with larger and more diverse samples to strengthen causal inferences. Incorporating multivariate analyses would help clarify the relative contributions of sociodemographic and clinical factors. Moreover, future research should explore the long-term sustainability of blood pressure reduction and examine maternal–fetal outcomes to provide a more comprehensive understanding of the benefits and limitations of effleurage massage.

4. CONCLUSION

This study confirms that effleurage massage is effective in reducing both systolic and diastolic blood pressure among hypertensive pregnant women in Gorontalo City. As a simple, non-invasive, and low-cost intervention, effleurage massage has the potential to be integrated as a complementary practice within routine antenatal care, particularly for cases of mild hypertension. The findings highlight its practical value for midwives and health workers in supporting maternal health through non-pharmacological approaches.

Nevertheless, these results should be interpreted with caution, given the absence of a control group, the relatively small sample size, and the short follow-up period. Effleurage massage should not be considered a substitute for pharmacological therapy in moderate-to-severe cases, but rather as an adjunct to standard care. Future research is recommended to employ randomized controlled trial designs with larger populations and to investigate maternal–fetal outcomes in order to provide stronger evidence for the broader application of effleurage massage in pregnancy care.

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