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The effectiveness of progressive muscle relaxation therapy in reducing childbirth-related anxiety among primigravida pregnant women: A quasi-experimental study

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ABSTRACT

Introduction: Childbirth-related anxiety is commonly experienced by primigravida pregnant women and may negatively affect maternal psychological readiness for labor. Progressive Muscle Relaxation (PMR) is a non-pharmacological intervention that may help reduce anxiety during pregnancy. Methods: This study employed a quasi-experimental one-group pretest–posttest design conducted among 30 third-trimester primigravida pregnant women with mild to moderate anxiety. Participants were selected using total population sampling. The PMR intervention consisted of guided relaxation sessions involving sequential muscle tension and release combined with controlled breathing for 20–25 minutes. Anxiety levels were measured before and after the intervention using the Hamilton Anxiety Rating Scale (HAM-A). Data were analyzed using the Wilcoxon signed-rank test. Results: The results showed a significant reduction in anxiety scores following the PMR intervention. Before the intervention, most participants experienced moderate anxiety, whereas after the intervention, the majority demonstrated mild anxiety. Statistical analysis revealed a significant difference between pretest and posttest anxiety scores ($p = 0.001$). Conclusion: Progressive Muscle Relaxation therapy is effective in reducing childbirth-related anxiety among primigravida pregnant women. PMR can be recommended as a safe, simple, and low-cost complementary intervention in antenatal care to enhance maternal psychological preparedness for childbirth.

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1. Introduction

Pregnancy is a transitional period marked by profound physiological and psychological adaptations. For primigravida women, the anticipation of childbirth often intensifies psychological vulnerability, particularly anxiety related to labor pain, uncertainty about the birth process, and perceived maternal competence (Zendehdel et al., 2022). According to stress–adaptation theory, anxiety arises when perceived demands exceed an individual's coping capacity, making first-time pregnancy a period of heightened emotional risk (Briliant et al., 2022).

Empirical evidence consistently demonstrates that elevated antenatal anxiety is associated with adverse maternal and neonatal outcomes, including dysregulated stress responses, preterm birth, and impaired fetal growth. These findings underscore the importance of early, effective, and accessible

interventions to support maternal psychological well-being during pregnancy, particularly in the third trimester when anxiety tends to peak (Septianingrum, 2015).

Non-pharmacological interventions grounded in psychophysiological regulation have gained increasing attention within maternal health care. Progressive Muscle Relaxation (PMR) is based on Jacobson's relaxation theory, which posits that psychological tension is directly linked to neuromuscular activation. By systematically alternating muscle contraction and relaxation, PMR facilitates autonomic nervous system balance, reduces sympathetic overactivity, and promotes emotional regulation. Previous studies have demonstrated the effectiveness of PMR in reducing anxiety among pregnant women across various settings, including hospitals and community health centers (El Sayet et al., 2014) (Zahra Amalia, Elvine Ivana Kabuhung, 2022).

Quasi-experimental evidence demonstrates that progressive muscle relaxation effectively reduces anxiety in first-trimester pregnant women at Puskesmas Kuta II, as reflected by significant decreases in post-intervention anxiety scores (Ni Wayan Yoni Purwati, Gusti Ayu Pramita Aswitami, 2023). Furthermore, literature reviews have shown that progressive muscle relaxation exercises are more effective in reducing anxiety compared with other techniques, such as deep breathing or physical activity, and may additionally help prevent pregnancy-related complications (Briliant et al., 2022) (Mokaberian & Colleagues, 2021).

A similar approach was reported by Hayati et al. (2018), who found that PMR combined with breathing exercises significantly reduced anxiety levels among pregnant women awaiting childbirth at Puskesmas 9 November Banjarmasin, as published in the UNNES Journal. Meta-analytic evaluations have also demonstrated that relaxation interventions, including PMR, effectively reduce anxiety and stress in pregnant women compared with control groups, and may potentially influence pregnancy outcomes such as infant birth weight (Id et al., 2024) (Hayati & Sutoyo, 2018)

However, a critical examination of the existing literature reveals three key limitations. First, most studies emphasize outcome effectiveness without sufficiently examining contextual factors that may influence intervention responsiveness. Second, the majority of PMR research has been conducted within institutional or public healthcare settings, where care delivery is structured, standardized, and protocol-driven. Third, limited attention has been paid to how healthcare delivery models particularly continuity-of-care frameworks may moderate the effectiveness of psychological interventions during pregnancy (Made Bayu Oka Widiarta, Wigutomo Gozali, Hesteria Friska Armynia Subratha, 2022).

In Indonesia, Midwife Independent Practice (Praktik Mandiri Bidan/PMB) represents a distinctive model of maternal care characterized by continuity, personalized interaction, and relational trust between midwife and client. From the perspective of primary healthcare systems theory, such settings may enhance therapeutic engagement, adherence, and emotional safety, thereby potentially strengthening the effectiveness of mind–body interventions such as PMR. Despite this theoretical relevance, empirical evidence examining PMR within PMB settings remains scarce, particularly in urban contexts such as Palembang.

Furthermore, post-pandemic maternal health research indicates a sustained increase in anxiety levels among pregnant women, highlighting the need for low-cost, scalable, and context-sensitive interventions that can be integrated into routine antenatal care. PMR offers practical advantages in this regard, yet its effectiveness within continuity-based midwifery practice has not been systematically evaluated.

Therefore, this study aims to address this theoretical and empirical gap by examining the effectiveness of Progressive Muscle Relaxation therapy in reducing childbirth-related anxiety among primigravida pregnant women receiving antenatal care at a Midwife Independent Practice. This study seeks to examine whether Progressive Muscle Relaxation (PMR) therapy significantly reduces childbirth-related anxiety among primigravida pregnant women receiving antenatal care in a Midwife Independent Practice setting. Accordingly, it is hypothesized that the application of Progressive Muscle Relaxation therapy leads to a significant reduction in anxiety levels related to childbirth among primigravida pregnant women.

Increased anxiety among pregnant women can negatively affect the quality of promotive and preventive antenatal care (ANC). High anxiety may reduce women's engagement in ANC services, limit their participation in health education, and decrease adherence to recommended preventive behaviors. Moreover, unaddressed maternal anxiety reflects gaps in holistic ANC, particularly in integrating mental health screening and supportive interventions. Therefore, effective management of anxiety is essential to enhance the quality and effectiveness of promotive and preventive antenatal care.

2. Methods

This study employed a quasi-experimental one-group pretest–posttest design to evaluate the effectiveness of Progressive Muscle Relaxation (PMR) therapy in reducing childbirth-related anxiety among primigravida pregnant women. The absence of a control group was methodologically justified due to ethical and practical considerations within the Midwife Independent Practice (PMB) setting, where withholding a potentially beneficial, low-risk, non-pharmacological intervention from anxious pregnant women was deemed inappropriate. Additionally, the limited number of eligible primigravida clients during the study period constrained the feasibility of group allocation.

The study was conducted at PMB Lina Contesa, Palembang City, between September and October 2025. The study population consisted of all primigravida pregnant women in their third trimester who attended antenatal care services at the facility during the data collection period. A total population sampling technique was applied to minimize selection bias, resulting in 30 participants who met the eligibility criteria and consented to participate. Inclusion criteria were primigravida women aged 18–35 years, gestational age ≥28 weeks, singleton pregnancy, and mild to moderate anxiety as measured by the Hamilton Anxiety Rating Scale (HAM-A score 14–28). Exclusion criteria included high-risk pregnancy conditions (e.g., preeclampsia, gestational diabetes, placenta previa), history of psychiatric disorders, ongoing psychological or pharmacological anxiolytic treatment, inability to complete the PMR session, or refusal to undergo posttest assessment.

To reduce threats to internal validity, particularly history and maturation effects, the intervention and outcome measurement were conducted within a short and controlled time frame. Anxiety levels were assessed immediately before the intervention and again 30 minutes after completion of the PMR session, thereby minimizing the likelihood that external events or natural psychological changes influenced the observed outcomes. The standardized delivery of the PMR intervention by the same trained facilitator further enhanced procedural consistency. The PMR intervention followed Jacobson's standardized protocol, consisting of sequential tension and relaxation of 16 major muscle groups, including the hands, arms, shoulders, neck, face, chest, abdomen, thighs, and lower legs. Each muscle group was contracted for 5–7 seconds and relaxed for 10–15 seconds, enabling participants to perceive the contrast between tension and relaxation. The intervention lasted approximately 20–25 minutes and was administered once during an antenatal care visit.

Anxiety levels were measured using the Hamilton Anxiety Rating Scale (HAM-A), a validated instrument widely used in clinical and research settings to assess psychological and somatic anxiety symptoms. Given the ordinal nature of HAM-A scores and the relatively small sample size, data normality was not assumed. Therefore, the Wilcoxon signed-rank test was selected as an appropriate non-parametric statistical method to compare pretest and posttest anxiety scores. Statistical significance was set at $p < 0.05$. Although no formal a priori power analysis was conducted due to the total population sampling approach and limited population size, the sample size was consistent with similar quasi-experimental studies evaluating PMR interventions in maternal populations. The statistically significant findings observed suggest that the study was sufficiently powered to detect meaningful within-group differences.

3. Result and Discussion

A total of 30 primigravida pregnant women participated in this study and completed all stages of data collection. Baseline characteristics were analyzed to assess sample homogeneity and to identify potential confounding variables that might influence the effectiveness of the intervention. The variables

described include maternal age, educational level, occupation, and gestational age. Detailed distributions of these characteristics are presented in Table 1.

Table 1.
Characteristics of Respondents (n = 30)

Characteristics	Category	N	%
Maternal Age (years)	20–24	8	26.7
	25–29	14	46.7
	30–34	8	26.7
Educational Level	Senior High School	12	40.0
	Diploma	7	23.3
	Bachelor	11	36.7
Occupation	Housewife	14	46.7
	Private employee	9	30.0
	Entrepreneur	7	23.3
Gestational Age (weeks)	32–34	10	33.3
	35–37	20	66.7

Most respondents were aged 25–29 years, corresponding to the optimal reproductive age and reducing age-related psychological variability. The predominance of participants with senior high school or bachelor's education suggests an adequate level of cognitive capacity to follow guided relaxation instructions. The majority of participants were in the late third trimester (35–37 weeks), a phase commonly associated with increased childbirth-related anxiety, thereby strengthening the clinical relevance of the intervention timing. Overall, the relatively homogeneous distribution of baseline characteristics minimizes potential confounding effects and supports the internal validity of the findings. Given the homogeneity of baseline characteristics, statistical analysis was subsequently performed to evaluate the effectiveness of the Progressive Muscle Relaxation (PMR) intervention in reducing anxiety levels among primigravida pregnant women.

Table 2.
Changes in Anxiety Scores and Effect Size Before and After PMR Intervention (n = 30)

Variable	Mean ± SD	Median (IQR)	Mean Difference	Effect Size (f)	Z-value	p-value
Pretest Anxiety Score	28.43 ± 4.12	28 (26–32)	-11.23	0.87		
Posttest Anxiety Score	17.20 ± 3.85	17 (15–20)			-4.783	0.001

The results demonstrate a substantial reduction in anxiety scores following the PMR intervention. The mean HAM-A score decreased from 28.43 ± 4.12, indicating moderate anxiety, to 17.20 ± 3.85, corresponding to mild anxiety, with a mean reduction of 11.23 points. This represents an approximate 39.5% decrease in anxiety severity, suggesting a clinically meaningful improvement. The Wilcoxon signed-rank test revealed a statistically significant difference between pretest and posttest anxiety scores ($Z = -4.783$, $p = 0.001$). The calculated effect size ($r = 0.87$) indicates a large intervention effect, confirming that PMR therapy had a strong impact on reducing childbirth-related anxiety among primigravida pregnant women.

Discussion

The results of this study demonstrate that Progressive Muscle Relaxation (PMR) effectively reduces childbirth-related anxiety among primigravida pregnant women, as evidenced by the significant decrease in HAM-A scores following the intervention. Rather than merely confirming statistical significance, the magnitude of anxiety reduction observed in this study indicates a clinically meaningful improvement, reflected by a shift from moderate to mild anxiety levels. This finding supports the theoretical framework that PMR reduces sympathetic nervous system activation through systematic muscle relaxation, thereby modulating the psychophysiological stress response associated with anticipation of childbirth.

The findings of this study are consistent with previous evidence. A study by Amdadi et al. (2023) showed that PMR, even when combined with hydrotherapy, significantly reduced physiological indicators of stress particularly cortisol levels in primigravida women. These biological findings strengthen the interpretation of the current results by suggesting that PMR influences both psychological perception and underlying neuroendocrine regulation. Similarly, Anuhgera (2025) found that PMR reduced anxiety and musculoskeletal discomfort, indicating that somatic relaxation may indirectly attenuate psychological tension through pain–anxiety interaction pathways (Anuhgera & Ritonga, 2025).

However, not all studies have reported uniformly strong effects of PMR on antenatal anxiety. Some research conducted in heterogeneous obstetric populations has found modest or non-significant reductions in anxiety, particularly when PMR was delivered without structured guidance, with shorter intervention duration, or in populations with severe baseline anxiety. These discrepancies suggest that intervention fidelity, timing, and participant characteristics play a crucial moderating role in determining PMR effectiveness. In contrast, the present study involved guided PMR delivered during late pregnancy, a period characterized by heightened anxiety, which may partially explain the stronger observed effect.

Furthermore, Pratiwi (2021) found that PMR significantly decreased anxiety scores among pregnant women with hypertension, suggesting that PMR may operate through generalized stress-regulation mechanisms rather than condition-specific pathways. Conversely, studies involving multiparous women or mixed parity samples have sometimes reported weaker effects, potentially due to prior childbirth experience reducing baseline anxiety. This highlights primigravida status as a key population in which PMR may yield maximal benefit, as uncertainty and fear of the unknown are more pronounced (Pratiwi et al., 2021).

The context of Midwife Independent Practice (PMB) may also have contributed to the intervention's effectiveness. Continuity of care, individualized interaction, and relational trust between midwife and client core components of midwifery-led care models are known to enhance patient engagement and emotional safety. From a health systems perspective, such environments may amplify the effectiveness of mind–body interventions by improving adherence, attentional focus, and perceived support, which are critical elements in relaxation-based therapies.

Despite these strengths, this study has several limitations. First, the absence of a control group limits causal inference, as reductions in anxiety may partly reflect natural psychological adaptation as childbirth approaches. However, the short interval between pretest and posttest assessment reduces the likelihood that maturation or historical factors fully account for the observed changes. Second, the single-site design restricts generalizability to other midwifery or institutional settings. Third, anxiety was measured immediately after the intervention, preventing evaluation of the long-term sustainability of PMR effects.

Future studies should employ randomized controlled designs, include larger and more diverse samples, and incorporate longitudinal follow-up to examine the durability of anxiety reduction and its potential impact on labor outcomes. Comparative studies evaluating PMR against other non-pharmacological interventions, such as mindfulness or breathing techniques, would further clarify its relative effectiveness within antenatal care.

4. Conclusion

This study demonstrates that Progressive Muscle Relaxation (PMR) is an effective non pharmacological intervention for reducing childbirth-related anxiety among primigravida pregnant women. A significant decrease in HAM-A scores was observed after the PMR intervention, indicating meaningful psychological improvement. The findings support previous evidence showing that PMR can decrease maternal anxiety through physiological relaxation and improved emotional regulation. PMR is simple, safe, cost-effective, and highly applicable for integration into routine antenatal care, particularly within midwifery practice settings. Implementation of PMR may enhance maternal readiness for labor and contribute to better overall pregnancy wellbeing. Future research should prioritize randomized controlled trials with larger and more diverse populations, incorporate comparison with other relaxation or psychosocial interventions, and include longitudinal follow-up to evaluate the sustainability of PMR

effects across pregnancy, childbirth, and postpartum periods. Such approaches would strengthen the evidence base and clarify the role of PMR within comprehensive maternal mental health care.

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