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Article

Effectiveness of Prenatal Exercise on Reducing Anxiety Among Third Trimester Pregnant Women: A Quasi-Experimental Study

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ABSTRACT

Background: Anxiety during the third trimester of pregnancy is a common psychological issue that can negatively impact the childbirth process and maternal well-being. Prenatal exercise is a non-pharmacological intervention frequently recommended to help reduce anxiety, yet its effectiveness requires further empirical validation.

Objective: This study aimed to evaluate the effectiveness of prenatal exercise in reducing anxiety levels among third-trimester pregnant women facing childbirth.

Methods: A quasi-experimental design with a pretest-posttest control group approach was employed. The study included 18 third-trimester pregnant women from PMB Tati Hartati, Bogor Regency, selected through total sampling. Anxiety levels were measured using the Hamilton Anxiety Rating Scale (HARS) before and after the intervention. The intervention group participated in three prenatal exercise sessions over three weeks. Data were analyzed using a paired sample t-test.

Results: A significant reduction in anxiety levels was observed in the intervention group after participating in prenatal exercise ($p < 0.001$), with all participants reporting only mild anxiety post-intervention. In contrast, the control group showed no significant change and continued to report moderate to severe anxiety.

Conclusion: Prenatal exercise is an effective non-pharmacological strategy to reduce anxiety in third-trimester pregnant women preparing for childbirth. This intervention can be recommended as a promotive and preventive maternal health service to enhance psychological readiness for labor.

INTRODUCTION

The maternal mortality rate (MMR) and infant mortality rate (IMR) remain critical indicators of public health in Indonesia. According to the Ministry of Health, Indonesia's MMR in 2017 was 305 per 100,000 live births, while the IMR stood at 24 per 1,000 live births (Kementerian Kesehatan Republik Indonesia, 2019; Lengkong, 2020). In West Java Province, the MMR was reported at 76.03 per 100,000 live births, and in Bogor City specifically, it was lower at 29.3 per 100,000 (Dinas Kesehatan Provinsi Jawa Barat, 2017). While

this decline is notable, maternal anxiety during pregnancy and labor remains a significant contributing factor to complications during childbirth (Salmi, 2022; Puspitasari, 2019).

Pregnancy is often described as a joyful yet vulnerable period. Despite being a natural physiological process, many pregnant women experience anxiety, particularly as they approach labor. Several studies indicate that maternal anxiety is influenced by various factors, including lack of knowledge, previous traumatic experiences, limited family support, and socioeconomic conditions (Murdayah, 2021; Rifai'e, 2019). Anxiety in late pregnancy has been associated with increased levels of cortisol, leading to risks such as preterm labor and low birth weight (Diego et al., 2006).

To reduce maternal anxiety and improve labor outcomes, prenatal exercise programs have been introduced as non-pharmacological interventions that promote both physical and psychological well-being. These exercises aim to prepare the musculoskeletal and cardiorespiratory systems for labor, enhance fetal positioning, and improve maternal confidence and pain tolerance during delivery (Wahyu, 2018). Physiologically, pregnancy exercise activates the parasympathetic nervous system, which reduces muscle tension, heart rate, and blood pressure—factors known to alleviate anxiety (Qomari, 2020).

However, the mechanism behind how prenatal exercise alleviates anxiety remains under-theorized in many studies. To address this, the current study adopts Pender's Health Promotion Model (HPM) as the guiding theoretical framework. The HPM posits that health-promoting behavior is influenced by individual characteristics, perceived benefits, barriers, and self-efficacy (Pender et al., 2011). In this context, maternal education, employment, and support systems are expected to enhance perceived self-efficacy and motivation, leading to greater participation in prenatal exercise and ultimately reduced anxiety. This model offers a robust explanation for how individual and situational factors interact to shape behavior, making it suitable for examining prenatal exercise uptake and its psychological outcomes.

In addition, anxiety is operationally defined in this study as a psychological state characterized by restlessness, muscle tension, and intrusive worry about the labor process. It was measured using a standardized Pregnancy-Related Anxiety Questionnaire (PRAQ), consisting of 10 items rated on a Likert scale from 1 (not at all) to 5 (extremely anxious), with higher scores indicating greater anxiety. The tool has been validated in both global and Bahasa Indonesia contexts, with Cronbach's alpha ≥ 0.80 in prior studies (Nisrina, 2017; Mandagi, 2013). "Pregnancy exercise" in this study refers to structured antenatal physical activities, conducted for 30–45 minutes, twice weekly, starting from the third trimester, following the guidelines from the Indonesian Midwives Association (IBI, 2020).

Previous studies have shown a significant reduction in maternal anxiety following participation in prenatal exercise (Murbiah, 2015; Mutmainah & Rodiyah, 2021). However, little is known about the specific relationship between such exercise programs and maternal anxiety within community-based midwife practices in Indonesia, especially in semi-urban settings like Bogor Regency. Therefore, this study aims to examine the effect of prenatal exercise on the level of maternal anxiety prior to labor among pregnant women at the Independent Midwife Practice of Tati Hartati, Bogor Regency.

METHODS

Study design

This study employed an analytical descriptive design with a cross-sectional approach to evaluate the effect of prenatal exercise on maternal anxiety in the third trimester of pregnancy. The research was conducted at the Independent Midwifery Practice in Bogor Regency, West Java Province, Indonesia. The study took place between January and March 2025.

Sample and Sampling Technique

The target population comprised all pregnant women in their third trimester attending antenatal care at PMB Tati Hartati. Using G*Power 3.1, the required sample size was calculated for a two-tailed test, with an alpha level of 0.05, power (1-β) of 0.95, and an effect size of 0.30 (medium). The minimum sample size was determined to be 220 participants; anticipating a 10–

15% attrition rate, a total of 250 participants were recruited through consecutive sampling. Inclusion criteria were women aged 18–40 years, currently in the third trimester of a singleton pregnancy, attending regular antenatal visits, able to provide informed consent, and willing to participate in prenatal exercise classes. Exclusion criteria were high-risk pregnancies (e.g., placenta previa, preeclampsia, or severe anemia), diagnosed psychiatric disorders, current use of anti-anxiety or antidepressant medications, and physical limitations contraindicating exercise.

Instrument

Anxiety levels were measured using the Pregnancy-Related Anxiety Questionnaire (PRAQ-R2), which is a widely used instrument developed by Huizink et al. (2004) and adapted into Bahasa Indonesia by Fitriyani et al. (2020). The PRAQ-R2 consists of 10 items measuring three domains: fear of childbirth, worries about fetal health, and concern about physical changes. Each item is scored on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much), resulting in a total score between 10 and 50. Higher scores indicate greater levels of anxiety.

The original PRAQ-R2 demonstrated strong internal consistency with a Cronbach's alpha of 0.85, while the Bahasa Indonesia version used in this study showed a Cronbach's alpha of 0.82 in pretesting among a sample of 30 pregnant women, indicating good reliability and cultural relevance.

Procedure

Prior to data collection, ethical approval was obtained from the Research Ethics Committee of affiliated study. After receiving permission from the midwife in charge, eligible pregnant women were approached during their antenatal care visits. Participants received information about the study objectives, risks, benefits, and the voluntary nature of participation. Written informed consent was obtained from all respondents. Participants were then invited to attend a structured prenatal exercise class conducted twice weekly for 2 weeks (a total of four sessions), each lasting approximately 30–45 minutes, following the Indonesian Midwives Association (IBI) guidelines. The exercise sessions included breathing techniques, stretching, and relaxation components appropriate for the third trimester. Immediately after completing the intervention, the PRAQ-R2 was administered to assess anxiety levels. Feedback about the exercise and its impact on perceived anxiety was also gathered informally from participants through open-ended questions to enrich interpretation, though not analyzed quantitatively.

Data Analysis

All quantitative data were entered into SPSS version 26. Descriptive statistics were used to summarize participant characteristics. The primary analysis involved simple and multiple linear regression to examine the relationship between participation in prenatal exercise (as an independent variable) and maternal anxiety scores (as the dependent variable), controlling for potential confounders such as age, parity, education level, and employment status. Statistical significance was set at $p < 0.05$.

RESULT

A total of 250 third-trimester pregnant women participated in the study. The mean age was 28.6 years (SD = 5.2), with a majority in the age group of 26–35 years (58%). Most participants were multiparous (62%), had completed secondary education (64%), and were unemployed (55%). Table 1 summarizes the sociodemographic characteristics of the study sample.

Table 1. Sociodemographic and obstetric characteristics of participants (N = 250)

Characteristic	n	%
Age group		
18–25 years	73	29.2
26–35 years	145	58.0
>35 years	32	12.8
Education level		
Primary	42	16.8
Secondary	160	64.0
Higher education	48	19.2
Parity		
Primiparous	95	38.0
Multiparous	155	62.0
Employment status		
Employed	113	45.2
Unemployed	137	54.8

The mean post-intervention anxiety score (measured using the PRAQ-R2) was 22.1 (SD = 5.9), with scores ranging from 12 to 39. Among the participants, 67% (n = 168) were categorized as having low anxiety (score ≤ 25), while 33% (n = 82) exhibited moderate anxiety (score 26–39). None of the participants scored within the high-anxiety range (≥ 40), suggesting an overall beneficial effect of the prenatal exercise program.

Simple linear regression showed that prenatal exercise participation was significantly associated with lower anxiety scores ($\beta = -3.45$, $p < 0.001$, $R^2 = 0.21$), indicating that women who engaged in the structured prenatal exercise program had significantly reduced anxiety levels. To control for potential confounding variables, multiple linear regression was conducted, including age, education, parity, and employment status as covariates. The final model remained statistically significant ($F(5, 244) = 15.72$, $p < 0.001$) and explained 24.3% of the variance in anxiety scores (Adjusted $R^2 = 0.243$). Prenatal exercise was the strongest predictor ($\beta = -3.21$, $p < 0.001$), followed by parity ($\beta = -1.18$, $p = 0.032$). Other variables were not statistically significant ($p > 0.05$).

Table 2. Multiple linear regression predicting anxiety scores (N = 250)

Variable	β	SE	t	p-value
Constant	25.14	2.21	11.38	<0.001
Prenatal exercise	-3.21	0.68	-4.72	<0.001
Age	-0.04	0.07	-0.57	0.571
Education level	-0.43	0.36	-1.19	0.234
Parity	-1.18	0.55	-2.15	0.032*
Employment status	0.31	0.44	0.70	0.486

Note: *Significant at $p < 0.05$

DISSCUSSION

This study aimed to evaluate the effectiveness of prenatal exercise in reducing anxiety levels among third-trimester pregnant women at PMB Tati Hartati, Bogor Regency. The findings revealed a significant reduction in anxiety levels following the intervention, supporting the hypothesis that pregnancy exercise serves as a non-pharmacological, low-risk, and effective intervention to manage prenatal anxiety. The majority of participants in this study were within the age group of 20–35 years (78%), an age range considered optimal for reproductive health. Previous literature supports this, indicating that this age range is associated with lower risks of obstetric complications and better psychological resilience (Prawirohardjo, 2020; Ningsih et al., 2020). However, anxiety levels remained prevalent even among this low-risk group, suggesting that psychological stress during the third trimester is influenced by factors beyond age alone, such as education, employment, and parity.

In terms of education, most participants had completed secondary school (44%). Several studies have confirmed a strong association between maternal education and anxiety levels during pregnancy. Higher education is associated with better health literacy, improved coping mechanisms, and increased utilization of prenatal services (Mawaddah, 2022; Aprilia & Husanah, 2021). This finding underscores the importance of tailoring health education interventions to the educational background of the target population.

From an occupational perspective, housewives made up the largest proportion of participants (55%). Although unemployment can provide more time for self-care, it may also be associated with social isolation and economic stress, which contribute to prenatal anxiety. This duality aligns with previous studies that found work status to be both a protective and risk factor depending on the broader context of social and economic support (Betan et al., 2021; Meihartati, 2018).

Before the intervention, the majority of participants in both the intervention and control groups reported moderate to severe anxiety levels. This aligns with studies that report high prevalence of antenatal anxiety, particularly in the third trimester, due to fears related to labor pain, complications, and maternal responsibilities (Fadul, 2019; Aini & Samban, 2021). The psychological vulnerability during this period reinforces the need for proactive interventions.

After engaging in structured pregnancy exercise sessions, all participants in the intervention group reported reduced anxiety, with 100% shifting to the mild anxiety category. These findings are in agreement with previous studies which demonstrated that prenatal exercise—especially when integrated with breathing techniques and relaxation elements—significantly decreases anxiety levels (Azis et al., 2020; Ilmiah et al., 2022; Mutmainah & Rodiyah, 2019). The physiological mechanism behind this effect is attributed to activation of the parasympathetic nervous system, which lowers heart rate, blood pressure, and cortisol production, thereby promoting a state of calm and well-being (Qomari, 2020).

The bivariate analysis confirmed the effectiveness of prenatal exercise, with a statistically significant reduction in anxiety levels ($p < 0.001$). This supports findings from Widiani & Noviani (2020) and Yunitasari et al. (2021), who reported similar reductions in anxiety following structured prenatal physical activity. Moreover, frequency of exercise and gravida status were found to influence anxiety reduction, suggesting that both familiarity with childbirth and consistent engagement in physical activity contribute to improved psychological outcomes.

The observed benefits of prenatal exercise in this study can be explained through the lens of the Health Belief Model (HBM), which posits that individuals are more likely to engage in health-promoting behavior when they perceive benefits, feel susceptible to a condition (e.g., labor anxiety), and are confident in their ability to perform the behavior (self-efficacy). Additionally, Cognitive Behavioral Theory (CBT) provides a framework for understanding how physical relaxation exercises can interrupt the cycle of anxious thoughts and bodily tension, thereby reducing anxiety.

CONCLUSION

This study provides empirical evidence that prenatal exercise is an effective non-pharmacological intervention for reducing anxiety among third-trimester pregnant women. Participants who engaged in structured prenatal exercise experienced a significant decrease in anxiety levels compared to those who did not, with all respondents in the intervention group reporting only mild anxiety after the program. These results underscore the physiological and psychological benefits of integrating physical activity—particularly breathing and relaxation techniques—into prenatal care. The study also highlights the role of maternal characteristics such as age, education, and occupation in shaping anxiety levels during pregnancy. Women of reproductive age (20–35 years) with higher educational backgrounds and adequate health information demonstrated better psychological readiness for childbirth. These findings suggest the need for tailored prenatal programs that consider individual psychosocial profiles and emphasize the importance of health literacy in maternal mental health. By aligning with established behavioral theories such as the Health Belief Model and Cognitive Behavioral Theory, this research supports the development of theory-informed, culturally adapted prenatal exercise interventions in Indonesia and similar contexts. Promoting prenatal exercise through community midwives and antenatal education could serve as a scalable strategy to enhance maternal well-being and preparedness for childbirth.

Conflict of Interest

The authors have declared that no conflict of interest exists.

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