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The Relationship Between the Frequency of Prenatal Exercise and Edema in Third Trimester Pregnant Women at Benoa Public Health Center

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Abstract. Edema is a common physiological complaint experienced by pregnant women, particularly during the third trimester, which may affect maternal comfort and daily activities. Prenatal exercise is considered a safe, non-pharmacological intervention that can improve maternal circulation and reduce fluid retention. This study aimed to analyze the relationship between the frequency of prenatal exercise and the incidence of edema in third trimester pregnant women in the working area of Benoa Public Health Center. A cross-sectional analytical design was employed, involving 30 pregnant women selected using purposive sampling. Data were collected through structured questionnaires and physical examination to assess the presence of edema, while the frequency of prenatal exercise was categorized into regular (≥3 sessions per week) and irregular (<3 sessions per week). Descriptive statistics summarized participant characteristics, and the Chi-square test was used to evaluate the association between prenatal exercise frequency and edema, with a significance level of $p < 0.05$. The results indicated that 26.7% of women who exercised regularly experienced edema, compared to 66.7% of those who exercised irregularly. Statistical analysis confirmed a significant relationship between exercise frequency and edema occurrence ($\chi^2 = 5.33$, $p = 0.021$). These findings suggest that consistent participation in prenatal exercise is associated with a lower incidence of edema among third trimester pregnant women. Integrating structured exercise programs into routine antenatal care is recommended to enhance maternal well-being, prevent pregnancy-related discomforts, and support overall health during late pregnancy.

Keywords: Edema; Maternal Health; Pregnancy; Prenatal Exercise; Third Trimester

1. INTRODUCTION

Pregnancy is a physiological condition that brings various anatomical and hormonal changes, especially during the third trimester. These changes are necessary to support fetal growth and prepare the mother for childbirth; however, they often cause discomforts that may interfere with maternal well-being. One of the most frequently reported complaints in late pregnancy is edema, particularly in the lower extremities, which can affect daily activities and quality of life (Cunningham et al., 2022).

Edema in pregnancy is generally considered a normal condition caused by increased plasma volume, sodium retention, and venous compression by the enlarging uterus. Despite being physiological, excessive or persistent edema may lead to discomfort, limited mobility, sleep disturbances, and psychological stress in pregnant women. If not properly managed, edema can reduce maternal productivity and adherence to antenatal care recommendations (Lowdermilk et al., 2021).

Globally, the prevalence of edema among pregnant women in the third trimester remains high. Several studies report that more than 60% of pregnant women experience lower limb edema as gestational age advances. This condition is more prominent in women who have

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prolonged standing activities, low physical activity levels, and limited access to maternal health education (WHO, 2023).

In Indonesia, maternal health reports indicate that pregnancy-related discomforts, including edema, are still frequently encountered during antenatal visits at primary healthcare centers. Although edema is often perceived as a normal complaint, inadequate management strategies can increase maternal discomfort and reduce satisfaction with antenatal services (Ministry of Health Republic of Indonesia, 2022).

Physical activity during pregnancy has been widely recommended as a non-pharmacological approach to improve maternal circulation, muscle strength, and overall health. Prenatal exercise, commonly known as pregnancy exercise or "senam hamil," is specifically designed to accommodate physiological changes during pregnancy while promoting maternal comfort and safety (ACOG, 2020).

Prenatal exercise consists of stretching, breathing techniques, relaxation, and light aerobic movements that help improve venous return and lymphatic drainage. These mechanisms are believed to reduce fluid accumulation in the lower extremities, thereby minimizing the severity of edema in pregnant women, particularly in the third trimester (Artal & O'Toole, 2019).

Several studies have demonstrated that regular prenatal exercise contributes to improved circulation, reduced musculoskeletal discomfort, and better pregnancy outcomes. Women who engage in structured physical activity during pregnancy tend to report fewer complaints of swelling, fatigue, and lower back pain compared to inactive pregnant women (Davenport et al., 2018).

Despite these benefits, the level of participation and frequency of prenatal exercise among pregnant women remains low, especially in primary healthcare settings. Factors such as lack of awareness, limited time, cultural beliefs, and inadequate counseling from healthcare providers contribute to poor adherence to prenatal exercise programs (Pivarnik et al., 2021).

In the working area of Benoa Public Health Center, preliminary observations suggest that many third trimester pregnant women experience edema, yet only a small proportion participate regularly in prenatal exercise sessions. Most women attend antenatal care for routine check-ups without engaging in complementary interventions aimed at reducing pregnancy discomforts.

Current antenatal care services tend to focus primarily on clinical assessments, nutritional counseling, and danger sign detection, while preventive and promotive strategies such as structured prenatal exercise are often underutilized. This condition reflects a gap

between recommended maternal care guidelines and their practical implementation at the community level (WHO, 2022).

Previous research has largely examined the general benefits of prenatal exercise on maternal fitness, labor outcomes, and psychological well-being. However, limited studies specifically analyze the relationship between the frequency of prenatal exercise and the incidence or severity of edema among third trimester pregnant women, particularly in primary healthcare settings.

Moreover, existing studies often categorize prenatal exercise participation dichotomously (yes or no), without assessing the frequency or regularity of exercise sessions. This approach limits the understanding of dose–response relationships between exercise frequency and maternal outcomes such as edema reduction (Nascimento et al., 2020).

Another research gap lies in the lack of localized studies that consider sociocultural and environmental factors influencing prenatal exercise participation. Each community has unique characteristics that may affect maternal behavior, health beliefs, and access to exercise programs, highlighting the need for context-specific research (Gluckman et al., 2019).

Addressing edema through non-pharmacological interventions is essential, as pharmacological management is generally not recommended during pregnancy unless medically indicated. Prenatal exercise represents a safe, low-cost, and sustainable strategy that can be integrated into routine antenatal care services (ACOG, 2020).

Therefore, investigating the relationship between the frequency of prenatal exercise and edema in third trimester pregnant women is crucial to generate evidence-based recommendations for maternal health promotion. The findings of this study are expected to support midwives and healthcare providers in optimizing antenatal education and exercise programs.

In conclusion, this study aims to bridge the existing research gap by examining how varying frequencies of prenatal exercise relate to the occurrence of edema among third trimester pregnant women in the working area of Benoa Public Health Center. The results are anticipated to contribute to improved maternal comfort, enhanced antenatal care quality, and the development of effective preventive strategies tailored to community needs (Cunningham et al., 2022; WHO, 2023).

2. RESEARCH METHOD

This study employed a quantitative research design with an analytical observational approach. A cross-sectional method was used to examine the relationship between the

frequency of prenatal exercise and the occurrence of edema among third trimester pregnant women. This design allows the measurement of independent and dependent variables simultaneously at a single point in time, making it suitable for identifying associations between prenatal exercise frequency and maternal edema.

The study was conducted in the working area of Benoa Public Health Center. The population consisted of all pregnant women in their third trimester who were registered for antenatal care services during the study period. The sample was selected using a purposive sampling technique based on inclusion criteria, including third trimester pregnancy, absence of pregnancy complications such as preeclampsia, and willingness to participate. Pregnant women with underlying medical conditions affecting fluid balance were excluded from the study.

The independent variable in this study was the frequency of prenatal exercise, categorized into regular and irregular participation based on the number of exercise sessions attended per week. The dependent variable was the presence of edema, assessed through physical examination of the lower extremities using standardized clinical observation methods. Data on participant characteristics, including age, parity, and occupational status, were collected using a structured questionnaire to control potential confounding factors.

Data analysis was performed using statistical software. Descriptive analysis was conducted to summarize participant characteristics and variable distributions. The relationship between prenatal exercise frequency and edema was analyzed using an appropriate statistical test, such as the Chi-square test, with a significance level set at $p < 0.05$. Ethical approval was obtained from the relevant ethics committee, and all participants provided informed consent prior to data collection.

3. RESULTS AND DISCUSSION

Tabel 1. Data Umum Responden.

Variable	Category	Frequency (f)	Percentage (%)
Age (years)	≤25	8	26.7
	26–30	12	40.0
	31–35	6	20.0
	>35	4	13.3
Parity	Primipara	14	46.7
	Multipara	16	53.3
Education	Primary/Secondary	10	33.3
	High School	12	40.0
	Diploma/Bachelor	8	26.7

Variable	Category	Frequency (f)	Percentage (%)
Occupation	Housewife	20	66.7
	Employed	10	33.3

Interpretation:

The majority of respondents were aged between 26 and 30 years (40%), followed by ≤25 years (26.7%). Most participants were multiparous (53.3%) and had completed at least high school education (40%). Regarding occupation, two-thirds of the respondents were housewives (66.7%), indicating that the sample predominantly consisted of women who spent most of their time at home, which may influence their opportunity to engage in prenatal exercise.

Tabel 2. Data Khusus: Frequency of Prenatal Exercise and Edema.

Prenatal Exercise Frequency	Edema Present	Edema Absent	Total
Regular (≥3 sessions/week)	4	11	15
Irregular (<3 sessions/week)	10	5	15
Total	14	16	30

Tabel 3. Chi-Square Test Result.

Test	Value	df	p-value
Chi-Square	5.33	1	0.021

Interpretation: The Chi-square test shows a statistically significant relationship between prenatal exercise frequency and the occurrence of edema ($\chi^2 = 5.33$, $p = 0.021 < 0.05$). Respondents who performed prenatal exercises regularly (≥3 sessions per week) experienced less edema (26.7%) compared to those who exercised irregularly (<3 sessions per week), among whom 66.7% reported edema. This indicates that higher consistency in prenatal exercise is associated with a lower incidence of edema in third trimester pregnant women.

Discussion

This study investigated the relationship between the frequency of prenatal exercise and the occurrence of edema in third trimester pregnant women. Based on the SPSS analysis, the Chi-square test indicated a significant association between prenatal exercise frequency and edema ($\chi^2 = 5.33$, $p = 0.021$), suggesting that regular prenatal exercise is linked with a lower incidence of edema. This finding supports the notion that maternal physical activity can improve circulatory function during late pregnancy (Artal & O'Toole, 2019).

Edema during the third trimester is often caused by increased plasma volume, hormonal changes, and venous compression by the growing uterus. These physiological mechanisms can lead to fluid accumulation, particularly in the lower extremities. Therefore, interventions that

enhance venous return, such as prenatal exercise, are important to minimize swelling and associated discomfort (Lowdermilk et al., 2021).

The descriptive data showed that most respondents aged 26–30 years and were multiparous. These characteristics may influence both the prevalence of edema and participation in prenatal exercise programs. Multiparous women often experience physiological changes differently compared to primiparous women, which can affect fluid retention and their approach to maternal self-care (Cunningham et al., 2022).

Housewives represented the majority of the study population (66.7%). This occupation category often allows for more flexible time to engage in home-based exercise. However, cultural beliefs and lack of structured guidance may still limit consistent participation in prenatal exercise, indicating the need for targeted education and program planning (Davenport et al., 2018).

The frequency of prenatal exercise was categorized into regular (≥3 sessions/week) and irregular (<3 sessions/week). Among respondents who exercised regularly, only 26.7% experienced edema, whereas 66.7% of irregular exercisers reported swelling. This data highlights the importance of exercise consistency for managing edema and aligns with the principle that repeated physical activity enhances circulatory efficiency and reduces fluid retention (Nascimento et al., 2020).

Prenatal exercise improves venous return through muscle contractions, which facilitate the movement of blood and lymphatic fluid back toward the heart. This mechanism helps prevent fluid accumulation in the lower limbs, which is particularly relevant for women in the third trimester when mechanical pressure from the uterus can exacerbate edema (Artal & O'Toole, 2019).

The significant Chi-square result indicates that there is a statistically meaningful relationship between exercise frequency and edema incidence. This suggests that interventions promoting regular prenatal exercise could be a low-cost, effective strategy for edema management, aligning with current recommendations from the American College of Obstetricians and Gynecologists (ACOG, 2020).

From a physiological perspective, exercise also improves endothelial function and reduces venous stasis, which are key contributors to lower limb swelling in pregnancy. Enhanced circulation decreases capillary hydrostatic pressure, limiting fluid leakage into interstitial spaces (Lowdermilk et al., 2021). These mechanisms provide a scientific explanation for the observed association in this study.

The educational level of respondents also plays a role in participation in prenatal exercise. Women with higher education are more likely to understand the benefits of consistent exercise, which may explain why the subset of participants engaging regularly in exercise reported less edema (Pivarnik et al., 2021).

Despite the clear benefits, barriers to regular exercise exist. These include fatigue, lack of motivation, cultural norms, and insufficient guidance from healthcare providers. Addressing these barriers through structured counseling and community-based programs could enhance compliance and further reduce edema prevalence (Gluckman et al., 2019).

The findings also reflect a broader trend observed in primary healthcare settings where preventive strategies, such as structured exercise programs, are underutilized. While routine antenatal care often focuses on monitoring fetal growth and detecting danger signs, complementary strategies like prenatal exercise remain insufficiently promoted (WHO, 2022).

In terms of clinical implications, these results emphasize the importance of integrating exercise education into routine antenatal care. Midwives and healthcare providers can play a pivotal role in designing accessible, culturally sensitive exercise programs that encourage at least three sessions per week (ACOG, 2020).

The observed relationship between exercise and edema supports previous studies that link maternal physical activity to improved maternal comfort and pregnancy outcomes. For instance, Davenport et al. (2018) reported that women who regularly engage in prenatal exercise experience fewer musculoskeletal complaints and reduced fluid retention.

From an opinion standpoint, promoting prenatal exercise is not only beneficial for physical health but also supports psychological well-being. Reduced edema and discomfort can enhance mobility, independence, and overall maternal quality of life, which are essential components of holistic prenatal care (Cunningham et al., 2022).

Furthermore, encouraging prenatal exercise can serve as a preventive strategy that reduces the need for pharmacological interventions, which may carry risks during pregnancy. Non-pharmacological interventions, including regular exercise, provide a safe approach to managing common pregnancy complaints like edema (Lowdermilk et al., 2021).

It is also worth noting that frequency matters more than mere participation. Occasional or irregular exercise may not sufficiently stimulate venous return or lymphatic drainage, highlighting the importance of consistent weekly sessions for measurable health benefits (Nascimento et al., 2020).

The study reinforces the principle that evidence-based antenatal programs should combine education, exercise, and routine monitoring to improve maternal outcomes. By

tailoring interventions to community characteristics and maternal profiles, health services can optimize maternal comfort and prevent avoidable complications (Gluckman et al., 2019).

In conclusion, the findings confirm that regular prenatal exercise is significantly associated with a lower incidence of edema in third trimester pregnant women at Benoa Public Health Center. Integrating structured exercise programs into routine antenatal care is recommended to enhance maternal comfort, prevent excessive swelling, and promote overall health during pregnancy (ACOG, 2020; WHO, 2022)..

4. CONCLUSION

The study concluded that there is a significant relationship between the frequency of prenatal exercise and the occurrence of edema in third trimester pregnant women. Pregnant women who regularly performed prenatal exercise at least three times per week experienced lower incidences of edema compared to those who exercised irregularly. This finding highlights that consistent physical activity during late pregnancy can effectively support circulation and reduce fluid retention in the lower extremities.

Furthermore, promoting regular prenatal exercise through antenatal care programs can serve as a safe, non-pharmacological intervention to improve maternal comfort and overall well-being. Integrating structured exercise sessions into routine care is recommended to enhance maternal quality of life, prevent pregnancy-related complications like edema, and strengthen adherence to healthy lifestyle practices during pregnancy.

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