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INTERPREGNANCY INTERVAL AND PREECLAMPSIA AMONG PREGNANT WOMEN: A HOSPITAL-BASED CASE CONTROL STUDY IN INDONESIA

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ABSTRACT

Background: Preeclampsia remains a major maternal health problem because of its contribution to maternal and perinatal morbidity and mortality. Interpregnancy interval is an important obstetric factor that may affect maternal physiological recovery and adaptation to subsequent pregnancies. This study aimed to analyze the association between interpregnancy interval and the incidence of preeclampsia among pregnant women.
Methods: A quantitative, observational, case-control study was conducted using medical record data from pregnant women registered between January and December 2025. The sample comprised 66 respondents: 33 with preeclampsia (case group) and 33 without preeclampsia (control group). Data were collected using a structured checklist and analyzed using univariate and bivariate methods. The Chi-square test and Odds Ratio (OR) were applied at the 0.05 significance level.
Results: Most respondents in both groups were within the non-risk reproductive age range and were multiparous. Risky interpregnancy intervals were found in 87.9% of women with preeclampsia and 21.2% of women without preeclampsia. Statistical analysis showed a significant association between interpregnancy interval and preeclampsia incidence ($p < 0.001$). Women with risk interpregnancy intervals had a higher likelihood of developing preeclampsia than those with non-risk intervals (OR = 6.042; 95% CI: 2.393–15.256).
Conclusion: Interpregnancy interval is significantly associated with the occurrence of preeclampsia. These findings emphasize the importance of pregnancy planning, postpartum family planning counseling, and antenatal risk screening to reduce maternal complications related to preeclampsia.
Keywords: antenatal care, interpregnancy interval, preeclampsia, pregnancy spacing, pregnant women

INTRODUCTION

Maternal mortality remains a key indicator of the quality and effectiveness of maternal health services. The Maternal Mortality Ratio (MMR) measures deaths resulting from complications during pregnancy, childbirth, and the postpartum period up to 42 days after delivery per 100,000 live births (Pagirik et al., 2024). Despite being largely preventable, maternal deaths continue to occur due to complications such as hemorrhage, infection, hypertensive disorders of pregnancy, childbirth complications, and unsafe abortion, which together account for approximately 75% of maternal deaths worldwide (WHO, 2025b). The World Health Organization reported around 260,000 maternal deaths

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annually, with an MMR of 197 per 100,000 live births (WHO, 2025b). Among these causes, preeclampsia is particularly significant, contributing to about 14% of maternal deaths and affecting 2–8% of pregnancies globally (WHO, 2025a).

In Indonesia, maternal mortality remains a major public health challenge. In 2023, maternal deaths were still high, with hypertensive disorders in pregnancy reported as the leading specific obstetric cause of maternal death, accounting for 412 cases, followed by obstetric hemorrhage with 360 cases and other obstetric complications with 204 cases (Kemenkes, 2024). A similar pattern is observed in Central Java Province, where 427 maternal deaths were reported in 2024, and hypertensive disorders accounted for 30.0% of cases. In Semarang Regency, 17 maternal deaths occurred during the same period, with pregnancy-related hypertension contributing 29.4% of cases (Dinas Kesehatan Provinsi Jawa Tengah, 2025). These figures highlight the continuing burden of hypertensive disorders, particularly preeclampsia, and emphasize the need to identify preventable and modifiable risk factors.

One challenge in preventing preeclampsia is its complex etiology. Although its exact cause remains unclear, several risk factors have been consistently identified, including maternal age, educational level, parity, multiple pregnancy, interpregnancy interval, chronic hypertension, and diabetes mellitus (Norfitri, 2022; Suryatini et al., 2022). Previous evidence indicates that parity and previous pregnancy history are important obstetric risk factors for preeclampsia. Nulliparity has been identified as one of the recognized risk factors for preeclampsia, while a previous history of preeclampsia increases the likelihood of recurrence in subsequent pregnancies. Therefore, early identification of obstetric risk factors during antenatal care is essential to support timely prevention and monitoring (Chang et al., 2023; Coban et al., 2021; Mustary et al., 2024). Among these factors, the interpregnancy interval is particularly relevant because it can be modified through reproductive health education and family planning services.

Strengthening antenatal care, preconception counseling, and postpartum family planning education is an important strategy for reducing the risk of preeclampsia. These services should focus not only on detecting complications but also on preventing them before pregnancy occurs. Proper pregnancy planning allows women to begin pregnancy in a healthier physiological condition. In this context, the interpregnancy interval is important because short or long intervals may affect maternal recovery and adaptation to subsequent pregnancies. Risk intervals, defined as less than 24 months or more than 59 months, have been associated with increased preeclampsia risk through impaired physiological recovery, endothelial dysfunction, and reduced placental perfusion (Petersen et al., 2021; Saito et al., 2023).

Previous studies provide biological explanations for the relationship between short interpregnancy intervals and adverse pregnancy outcomes, including hypertensive disorders of pregnancy. An interval of less than 24 months may occur before the maternal body has fully recovered from the previous pregnancy and childbirth. Inadequate recovery may affect nutritional reserves, healing of reproductive organs, endometrial remodeling, cardiovascular adaptation, and vascular function. Recent evidence indicates that short interpregnancy intervals are associated with adverse maternal and perinatal outcomes, particularly preterm birth, low birth weight, small for gestational age, premature rupture of membranes, and maternal anemia (Beyene et al., 2025; Hassen et al., 2024). However, the evidence linking short interpregnancy intervals specifically to preeclampsia remains inconsistent, while long interpregnancy intervals have been more consistently associated with increased risk of preeclampsia in several studies (Chen et al., 2024; Gebremedhin et al., 2020; Ni et al., 2023). Therefore, both short and long

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interpregnancy intervals should be considered in maternal risk assessment and pregnancy spacing counseling.

Long interpregnancy intervals may also increase the risk of preeclampsia through different mechanisms. Extended intervals can reduce the immunological adaptation developed during previous pregnancies, leading to decreased maternal tolerance to placental antigens in subsequent pregnancies. This condition may contribute to endothelial dysfunction and impaired placental development. A previous study reported that intervals exceeding ten years may increase the risk of preeclampsia by approximately 2.23 times due to changes in maternal physiological responses that may promote endothelial damage. These findings suggest that both very short and very long intervals are clinically important in preeclampsia prevention (Rahmawati et al., 2025) .

Although many studies have reported a significant association between interpregnancy interval and preeclampsia, findings remain inconsistent across populations and healthcare settings. Variations in maternal age, parity, chronic disease history, nutritional status, and access to antenatal care may influence the strength of this relationship. Furthermore, most studies have examined interpregnancy interval as one of several risk factors, while local hospital-based evidence remains limited.

Based on medical record data from a regional public hospital in Central Java, 307 pregnant women were recorded between January and December 2025, including 33 cases of preeclampsia. However, no previous study at this healthcare facility has specifically examined the association between interpregnancy interval and preeclampsia using secondary medical record data. This gap provides a strong rationale for conducting a focused case-control study based on local evidence.

Therefore, this study aims to analyze the association between interpregnancy interval and the incidence of preeclampsia among pregnant women at a regional public hospital in Central Java. The study provides local evidence on maternity nursing and reproductive health using hospital-based secondary data. It is based on the hypothesis that women with risky interpregnancy intervals are more likely to experience preeclampsia than those with non-risk intervals. Limited to pregnant women recorded in hospital medical records during January–December 2025, this case-control study is expected to support targeted postpartum family planning counseling, improve antenatal risk screening, and contribute to strategies to reduce maternal morbidity related to preeclampsia.

RESEARCH METHOD

This study used a quantitative, observational, case-control design to examine the association between the interpregnancy interval and preeclampsia. Pregnant women diagnosed with preeclampsia were included in the case group, while those without preeclampsia formed the control group. This design enabled comparison of exposure status between women with and without the outcome. To minimize selection bias, cases and controls were drawn from the same hospital population and during the same observation period. Consistent with methodological recommendations, the study applied clear case definitions, standardized exposure assessment, and transparent selection of controls (Panda et al., 2021; WB et al., 2022).

The study was conducted at a regional public hospital in Central Java using medical record data from January to December 2025. This hospital was selected because it provides maternal health services and routinely records pregnancy complications, including preeclampsia. Using a single hospital and a defined period ensured that cases and controls originated from the same clinical population. However, hospital-based data may overrepresent severe or referred cases and may not fully reflect women who do not

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access hospital care (Pembe et al., 2025). Therefore, findings should be interpreted within the context of hospital-based maternal services.

The study population consisted of all 307 pregnant women recorded at the hospital during 2025. The sample included 66 respondents divided equally into 33 cases and 33 controls. A 1:1 ratio was used to facilitate balanced comparison of exposure distribution between groups. Selecting controls from the same source population as cases helps reduce selection bias and improves the interpretation of the association (Yang et al., 2025; Zhao et al., 2025). Purposive sampling was applied based on predetermined inclusion and exclusion criteria. Cases were selected from women with documented preeclampsia, while controls were selected from women without preeclampsia during the same period. Because the study relied on secondary medical records, only records containing complete information on the required variables were included. Standardized eligibility criteria and careful data screening were used to maintain data quality and reduce errors related to incomplete documentation (Mengistu & Kuma, 2020).

The independent variable was the interpregnancy interval, and the dependent variable was preeclampsia. The interpregnancy interval is the time between a previous pregnancy and the current one. It was categorized as risk (< 24 months or ≥59 months) and non-risk (intervals outside these ranges). Preeclampsia status was determined from diagnoses recorded in medical records. Accurate classification is important because hypertensive disorders of pregnancy include several subtypes, such as chronic hypertension, gestational hypertension, preeclampsia, eclampsia, and superimposed preeclampsia (Anh et al., 2024; Panda et al., 2021). In this study, classification relied on existing hospital documentation.

Secondary data were obtained from hospital medical records. Data extraction used a structured checklist containing respondent characteristics, including maternal age, parity, interpregnancy interval, and preeclampsia status. The checklist ensured consistency during data collection. Medical record-based studies recommend systematic abstraction using standardized forms and explicit coding procedures (Sokou et al., 2025). Accordingly, data extraction was conducted consistently with recorded diagnoses and study definitions. Although secondary data allow efficient access to clinical information without direct patient involvement, they may contain incomplete or inconsistent records. Therefore, eligible records were carefully reviewed to reduce potential misclassification and measurement errors (Schaap et al., 2018).

Collected data were reviewed, coded, categorized, and entered for analysis. Maternal age was grouped into risk and non-risk categories, parity into primipara, multipara, and grand multipara, and interpregnancy interval into risky and non-risky categories. Preeclampsia status was classified as case or control according to medical record diagnoses. This categorization was important because both short and long interpregnancy intervals may increase adverse maternal outcomes, suggesting a non-linear relationship with preeclampsia (Chen et al., 2023; Hutcheon et al., 2018). Therefore, grouping intervals into risky and non-risk categories was considered appropriate for analysis.

Data analysis included univariate and bivariate analyses. Univariate analysis described respondent characteristics, including maternal age, parity, and interpregnancy interval, using frequencies and percentages. Bivariate analysis assessed the association between interpregnancy interval and preeclampsia using the Chi-square test because both variables were categorical. Statistical significance was set at $\alpha = 0.05$, with p-values below 0.05 indicating a significant association. This approach is commonly used in observational studies of hypertensive disorders of pregnancy (Sokou et al., 2025; WB et al., 2022).

The Odds Ratio (OR) and 95% confidence interval were also calculated to estimate the strength and precision of the association between the risk of interpregnancy interval and

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preeclampsia. Reporting ORs and confidence intervals is recommended in case-control studies examining maternal risk factors (Mengistu & Kuma, 2020; Pembe et al., 2025). Although only bivariate analysis was performed, future studies may apply multivariable logistic regression to control for confounding factors such as maternal age, parity, body mass index, chronic hypertension, diabetes mellitus, socioeconomic status, and smoking (Mengistu & Kuma, 2020; Pembe et al., 2025; Sokou et al., 2025).

This study used secondary medical record data and involved no direct contact with respondents. Confidentiality was maintained by restricting data access and excluding personal identifiers from reports. Data were used solely for research purposes. Ethical approval was obtained from Universitas Ngudi Waluyo under approval number 945/KEP/EC/UNW/2025. Ethical clearance ensured that the study complied with institutional standards for the protection and responsible use of patient information.

RESULTS

This chapter presents the findings of the case-control study examining the association between interpregnancy interval and the incidence of preeclampsia among pregnant women at a regional public hospital in Central Java. The results are organized systematically to describe the distribution of respondent characteristics, the pattern of interpregnancy interval in the case and control groups, and the statistical association between interpregnancy interval and preeclampsia. The findings are presented using frequencies and percentages because the main variables in this study were categorical. This approach is consistent with common reporting practices in observational studies on hypertensive disorders of pregnancy, where maternal age, parity, and pregnancy-related exposure variables are generally presented separately for case and control groups to support comparison and interpretation (Sneha et al., 2023).

The study involved 66 pregnant women, 33 in the case group and 33 in the control group. The case group included pregnant women diagnosed with preeclampsia, while the control group included pregnant women without preeclampsia. The respondent characteristics described in this section include maternal age, parity, and interpregnancy interval. These variables were selected because they are relevant obstetric factors that may influence maternal pregnancy outcomes. In case-control studies of preeclampsia, reporting these characteristics is important because maternal age and parity may function as risk context variables and potential confounders in the relationship between interpregnancy interval and preeclampsia (Mustary et al., 2024; Sneha et al., 2023).

Table 1. Characteristics of Respondents in the Case and Control Groups (n=33)

Characteristics	Case Group		Control Group	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Maternal Age				
At risk	10	30.3	7	21.2
Non risk	23	60.7	26	78.8
Parity				
Primipara	11	33.3	8	24.2
Multiparous	21	63.6	24	72.7
Grandemultiparous	1	3.0	1	3.0
Interpregnancy Interval				
At risk	29	87.9	7	21.2
Non risk	4	12.1	26	78.8

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Characteristics of Respondents by Maternal Age

Maternal age was categorized into high-risk and low-risk groups. In this study, most respondents in both the case and control groups were in the non-risk age category. Among pregnant women with preeclampsia, 23 respondents or 69.7% were in the non-risk age group, while 10 respondents or 30.3% were in the risk age group. In the control group, 26 respondents (78.8%) were in the non-risk age group, while 7 respondents (21.2%) were in the risk age group.

These results show that the majority of respondents, both with and without preeclampsia, were within the reproductive age group generally considered safer for pregnancy. The proportion of non-risk maternal age was slightly higher in the control group than in the case group. Conversely, the proportion of risky maternal age was higher among women with preeclampsia than among women without preeclampsia. However, the distribution also indicates that preeclampsia occurred not only among women in the risky age category but also among women in the non-risk age category.

Characteristics of Respondents by Parity

Parity was categorized into primipara, multipara, and grand multipara. The results showed that most respondents in both groups were multiparous. In the case group, 21 respondents (63.6%) were multiparous, 11 (33.3%) were primiparous, and 1 (3.0%) was grandmultiparous. In the control group, 24 respondents (72.7%) were multiparous, 8 respondents (24.2%) were primiparous, and 1 respondent (3.0%) was grandmultiparous.

The data indicate that multiparity was the most common parity status in both the preeclampsia and non-preeclampsia groups. The proportion of multiparous women was higher in the control group than in the case group. Meanwhile, the proportion of primiparous women was higher in the case group than in the control group. Grand multiparity was observed at the same rate in both groups, with 1 respondent in each group.

Distribution of Interpregnancy Interval in the Case and Control Groups

The interpregnancy interval was classified into two categories: at risk and non-at-risk. Risk interpregnancy interval refers to pregnancy spacing considered too short or too long, while non-risk interpregnancy interval refers to spacing considered safer for maternal physiological recovery. In the case group, most respondents had an interpregnancy interval. A total of 29 respondents, or 87.9% of women with preeclampsia, were classified as having a risk interpregnancy interval, while only 4 respondents, or 12.1%, had a non-risk interval.

In contrast, the control group showed the opposite pattern. Among pregnant women without preeclampsia, 26 respondents or 78.8% had a non-risk interpregnancy interval, while 7 respondents or 21.2% had a risky interval. This distribution demonstrates a clear descriptive difference between the two groups. Risk interpregnancy interval was more frequently found among women with preeclampsia, whereas non-risk interpregnancy interval was more frequently found among women without preeclampsia.

Table 2. Association Between Interpregnancy Interval and Preeclampsia Incidence

Interpregnancy Interval	Incidence of Preeclampsia				OR (95% CI)	p-value
	Yes		No			
	f	%	f	%		
At risk	29	80,6	7	19,4	6,042 (2,393-15,256)	0.000
Non risk	4	13,3	26	86,7		

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Table 2. shows that the relationship between interpregnancy interval and preeclampsia incidence was further examined through cross-tabulation. Among the 36 respondents with risk interpregnancy intervals, 29 respondents (80.6%) experienced preeclampsia, while 7 respondents (19.4%) did not. In contrast, among the 30 respondents with non-risk interpregnancy intervals, 4 respondents (13.3%) experienced preeclampsia, while 26 respondents (86.7%) did not.

These results show that the proportion of preeclampsia was markedly higher among women with risk interpregnancy intervals than among those with non-risk intervals. Conversely, the proportion of women without preeclampsia was much higher in the non-risk interpregnancy interval group. This pattern supports the descriptive finding that risk interpregnancy interval was more common among preeclampsia cases, while non-risk interpregnancy interval was more common among controls.

The Chi-square test was used to determine whether there was a statistically significant association between interpregnancy interval and the incidence of preeclampsia. The statistical test showed a p-value of 0.000. Since this value was lower than the significance level of $\alpha = 0.05$, the result indicates a statistically significant association between interpregnancy interval and the incidence of preeclampsia.

The magnitude of the association was estimated using the Odds Ratio. The analysis showed an OR of 6.042 with a 95% confidence interval of 2.393–15.256. This means that pregnant women with risk interpregnancy intervals had approximately six times greater odds of experiencing preeclampsia compared with pregnant women with non-risk interpregnancy intervals. The confidence interval did not cross 1, which supports the statistical significance and direction of the association.

DISCUSSION

The findings of this study indicate that the interpregnancy interval is significantly associated with the incidence of preeclampsia among pregnant women at a regional public hospital in Central Java. The majority of women in the case group had a risk interpregnancy interval, whereas most women in the control group had a non-risk interval. The Chi-square analysis showed a statistically significant association (p-value = 0.000), and the Odds Ratio of 6.042 indicated that women with risky interpregnancy intervals had approximately 6 times the odds of preeclampsia compared with those with non-risky interpregnancy intervals. This result supports the hypothesis that pregnancy spacing is an important obstetric factor to consider in preeclampsia prevention and maternal risk assessment.

The respondent characteristics provide important context for interpreting the main finding. Most respondents in both groups were within the non-risk reproductive age range of 20–35 years. This finding is consistent with Nurjanah & Sutarno (2025), who stated that the optimal reproductive age for pregnancy is generally 20–35 years. However, the presence of preeclampsia among women in the non-risk age category shows that preeclampsia cannot be explained by maternal age alone. A previous study stated that pregnancy at a younger age than 20 years or older than 35 years increases the risk of pregnancy complications, including preeclampsia, because of reproductive immaturity or declining physiological function. Nevertheless, the present study suggests that even women in the safer reproductive age group may still develop preeclampsia when other risk factors, such as interpregnancy interval, are present (Tamaledu et al., 2023).

Parity also needs to be considered when interpreting the study's findings. Most respondents in both the case and control groups were multiparous. This pattern is relevant because the interpregnancy interval can only be meaningfully assessed in women with a history of pregnancy. Structural and functional changes in the reproductive system among

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multiparous women may contribute to the risk of preeclampsia. However, in this study, multiparity was found in both groups, suggesting that parity alone may not fully explain the difference in preeclampsia incidence. Instead, the interval between pregnancies appears to provide a more specific explanation for why preeclampsia was more frequent in the case group (Lestari & Putri, 2023).

The high proportion of risk interpregnancy intervals among women with preeclampsia supports the argument that inadequate or prolonged spacing between pregnancies may disturb maternal physiological adaptation. Risk intervals, whether too short or too long, may affect maternal recovery, vascular function, metabolic readiness, and placental development. A previous study stated that the risk of birth spacing is associated with adverse pregnancy and birth outcomes (Ni et al., 2023), but another study explain that preeclampsia was more common among women with high-risk pregnancy spacing than among those with non-risk spacing (Vonia et al., 2025). In the present study, 87.9% of women with preeclampsia had risk interpregnancy intervals, whereas 78.8% of women without preeclampsia had non-risk intervals. This contrast strengthens the interpretation that pregnancy spacing is not only a descriptive characteristic but also a clinically relevant factor in the risk of preeclampsia.

Biologically, the association between short interpregnancy interval and preeclampsia may be explained by incomplete maternal recovery after the previous pregnancy and childbirth. Pregnancy spacing may influence maternal physiological restoration. A short interval may prevent adequate recovery of the vascular and endothelial systems, nutritional reserves, and reproductive organs (Mustary et al., 2024). Impaired placental implantation and spiral artery remodeling with endothelial dysfunction, a key pathway in preeclampsia. This explanation is consistent with the maternal depletion hypothesis, which proposes that rapid successive pregnancies may reduce maternal nutritional and physiological reserves and increase vulnerability to adverse outcomes (Chen et al., 2023; Hutcheon et al., 2018; Vonia et al., 2025).

Long interpregnancy interval may also increase the risk of preeclampsia through the loss of adaptive maternal benefits from a previous pregnancy and impaired immunological adaptation at the maternal-fetal interface. A long interpregnancy interval has been associated with increased risk of preeclampsia, although this relationship may also be influenced by maternal aging, partner change, socioeconomic factors, and underlying maternal health status (Gebremedhin et al., 2020; Mühlrad et al., 2022). Successful pregnancy requires maternal immune tolerance toward the semi-allogeneic fetus, involving placental barrier function, regulatory T cells, decidual natural killer cells, and other immunoregulatory mechanisms (Joo & Lee, 2024). Disruption of immune tolerance at the maternal-fetal interface may contribute to preeclampsia through abnormal immune-cell activity, impaired extravillous trophoblast function, defective placentation, arterial remodeling abnormalities, systemic inflammation, and endothelial dysfunction (Chiang et al., 2024; Dimitriadis et al., 2023; Luo et al., 2022). These mechanisms support the view that the interpregnancy interval may influence preeclampsia risk through both vascular and immunological pathways.

The findings of this study are consistent with a previous study, which reported that risk of interpregnancy intervals, both short and long, were associated with increased risk of preeclampsia (Petersen et al., 2021). Preeclampsia is closely related to abnormal placentation, systemic inflammation, and widespread maternal endothelial dysfunction, reflecting impaired maternal vascular adaptation during pregnancy (Dimitriadis et al., 2023; Opichka et al., 2021). A study found a significant association between pregnancy interval and the incidence of preeclampsia (Amelia & Herlina, 2022). Evidence from larger studies further suggests that longer interpregnancy intervals may increase the risk

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of preeclampsia, particularly among older mothers, while extreme birth spacing is associated with adverse pregnancy outcomes (Gebremedhin et al., 2020; Ni et al., 2023).

Similarly, a previous study suggested that non-risk interpregnancy intervals may have a protective effect against hypertensive disorders in pregnancy (Chen et al., 2024), and another study found that safer pregnancy intervals were associated with a lower risk of pregnancy-related hypertension (Rahmawati et al., 2025).

Nevertheless, the relationship between interpregnancy interval and preeclampsia is not entirely uniform across studies. Another study reported no significant association between pregnancy spacing and preeclampsia, although maternal age was significantly associated with preeclampsia in their case-control study. This finding suggests that the effect of pregnancy spacing may vary across populations and may be influenced by other maternal and obstetric factors (Jayanti et al., 2023). Recent evidence indicates that preeclampsia is a multifactorial condition associated with several risk factors, including advanced maternal age, nulliparity, obesity, chronic hypertension, diabetes mellitus, previous history of preeclampsia, and long pregnancy interval (Chang et al., 2023; Mustary et al., 2024). Differences across studies may also be explained by variation in study design, sample size, population characteristics, exposure categorization, maternal age distribution, and control of confounding variables, particularly because the association between interpregnancy interval and hypertensive disorders of pregnancy may be modified by maternal age and may differ between short and long intervals (Chen et al., 2024; Gebremedhin et al., 2020; Ni et al., 2023). Recent literature also emphasizes that the relationship between interpregnancy interval and preeclampsia may be nonlinear and context dependent, with some studies showing stronger effects for long intervals than short intervals, and others showing neutral or mixed results (Chen et al., 2023; Gebremedhin et al., 2020; Hutcheon et al., 2018).

Clinically, the findings highlight the importance of integrating pregnancy spacing counseling into antenatal, postnatal, and family planning services. Interpregnancy interval should not be used as a single predictor of preeclampsia, but it can strengthen risk assessment when combined with maternal age, parity, body mass index, previous preeclampsia, chronic hypertension, diabetes mellitus, and other clinical factors (Ahrens et al., 2018; Louis et al., 2019). Health workers should provide patient-centered counseling on safe pregnancy spacing, encourage planned pregnancy, and promote routine antenatal examination. For future research, larger sample sizes, prospective designs, and multivariable analyses are needed to control for confounding factors and clarify the independent effect of interpregnancy interval on preeclampsia risk.

CONCLUSION

This study found a significant association between interpregnancy interval and the incidence of preeclampsia among pregnant women. Women with risky interpregnancy intervals were more likely to experience preeclampsia than those with non-risky intervals, indicating that pregnancy spacing is an important factor to consider in maternal risk assessment. Although most respondents in both the case and control groups were within the non-risky reproductive age range and were multiparous, preeclampsia was more frequently observed among women with risky interpregnancy intervals. These findings suggest that preeclampsia prevention should not rely only on identifying hypertension during pregnancy, but should also include early recognition of modifiable reproductive risk factors before and between pregnancies. The study contributes local hospital-based evidence to maternity nursing and reproductive health by highlighting the relevance of interpregnancy interval in preeclampsia risk assessment. Therefore, pregnancy spacing counseling, postpartum family planning education, and antenatal risk screening should be

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strengthened to support safer pregnancy planning and reduce maternal complications related to preeclampsia.

RECOMMENDATIONS

Health workers should strengthen education on optimal pregnancy spacing through antenatal, postnatal, and family planning services, involving both women and their partners in pregnancy planning decisions. Interpregnancy interval assessment should be integrated into routine antenatal risk screening, and women with risk intervals should receive closer monitoring for early signs of preeclampsia. Hospitals and primary health care facilities are encouraged to enhance postpartum family planning counseling and contraceptive services to support safer pregnancy spacing and reduce preventable maternal complications. Future studies should involve larger, multicenter samples and include potential confounding factors such as body mass index, hypertension, diabetes, socioeconomic status, previous preeclampsia, and antenatal care utilization. Prospective and multivariable studies, as well as qualitative research on knowledge, decision making, contraceptive use, access to services, and cultural beliefs, are recommended to better understand factors influencing pregnancy spacing and improve preventive interventions.

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