

The Association of Antenatal Care Regularity and Iron Supplementation with Anemia among Third Trimester Pregnant Women During the Covid-19 Pandemic

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ABSTRACT

Anemia during pregnancy remains a persistent maternal health problem in Indonesia. Nationally, the prevalence is nearly 49%, with certain regions such as Central Kalimantan reporting figures above 60%. At Permata Ibu Clinic, the prevalence among third-trimester pregnant women reached 25%. Antenatal care (ANC) and regular iron supplementation are essential interventions for reducing anemia. However, the COVID-19 pandemic disrupted routine maternal health services, which may have influenced anemia rates. To analyze the relationship between ANC attendance, iron supplementation, and anemia incidence among third-trimester pregnant women during the COVID-19 pandemic. This retrospective analytic observational study used secondary medical record data from April 2020 to April 2021. A total of 123 purposively selected third-trimester pregnant women were included. Data were analyzed using Chi-square tests. Regular ANC visits were recorded in 61% of participants, while 52% adhered to iron tablet supplementation. The majority of respondents (65.9%) were not anemic. Chi-square analysis revealed significant associations between ANC regularity and anemia ($p < 0.001$), and between iron supplementation and anemia ($p < 0.001$). Both correlations were of moderate strength ($r \approx 0.48$). Consistent ANC visits and adherence to iron supplementation significantly reduced anemia prevalence among third-trimester pregnant women during the COVID-19 pandemic. Strengthening ANC accessibility and improving compliance with iron supplementation remain crucial strategies for maternal health programs, particularly during health emergencies.

Keywords: anemia, antenatal care, COVID-19, iron supplementation

BACKGROUND

Anemia during pregnancy is one of the most common nutritional disorders worldwide, especially in low- and middle-income countries. Globally, it is estimated that about 40% of maternal deaths in developing countries are linked to anemia (WHO, 2021). In Indonesia, the prevalence among pregnant women ranges from 37% to 48%, with several provinces showing even higher rates (Ministry of Health RI, 2019).

Pregnant women with anemia are at increased risk for adverse outcomes, including low birth weight, preterm delivery, prolonged labor, postpartum hemorrhage, and maternal mortality (Siu, 2017; Rahmati et al., 2020). Iron deficiency anemia, the most common form, results mainly from poor dietary intake, increased iron demand during pregnancy, and inadequate supplementation adherence.

ANC provides a platform for early detection and prevention of maternal complications, including anemia. During the COVID-19 pandemic, however, many women avoided healthcare facilities due to fear of infection and mobility restrictions, leading to reduced ANC visits and decreased iron supplementation compliance (Lincetto et al., 2020; Goyal et al., 2021). These service disruptions may have contributed to the persistence of anemia among pregnant women despite existing iron supplementation programs.

This study investigates the effect of ANC attendance and iron supplementation adherence on anemia incidence among third-trimester pregnant women during the COVID-19 pandemic at Permata Ibu Clinic.

METHODS

This study employed a retrospective analytic observational design to investigate the relationship between antenatal care (ANC) attendance, iron supplementation adherence, and anemia status among pregnant women. A retrospective design was chosen because it allows researchers to analyze existing medical records, providing insight into health outcomes without intervening or influencing patient care. This approach is particularly suitable for examining associations in clinical settings where prospective data collection may be time-consuming or ethically constrained.

The study population consisted of pregnant women who attended the Permata Ibu Clinic in Central Kalimantan between April 2020 and April 2021. Focusing on this population enabled the study to assess maternal health practices and outcomes in a defined healthcare setting during a specific period, allowing for a systematic and reliable collection of data from routine clinical records.

A purposive sampling technique was applied to select participants who met the inclusion criteria. From the available records, 123 third-trimester pregnant women were identified as eligible for analysis. Purposive sampling was chosen to ensure that only participants with complete and relevant data on ANC visits, iron supplementation, and hemoglobin measurements were included, thus improving the quality and validity of the study findings.

The study variables were clearly defined. Independent variables included ANC attendance (categorized as regular vs. irregular) and adherence to iron supplementation (regular vs. irregular). The dependent variable was anemia status, operationalized as hemoglobin levels below 11 g/dl, following the World Health Organization standard for anemia in pregnancy. This clear distinction of variables facilitated a structured analysis of the potential relationships.

For data analysis, bivariate methods were employed to examine associations between independent and dependent variables. Specifically, Chi-square tests were used to determine whether significant differences existed between groups, with a significance level set at 0.05. Additionally, correlation coefficients were calculated to evaluate the strength and direction of associations, providing a quantitative measure of the relationship between maternal health practices and anemia outcomes. Overall, the methodological approach combined a retrospective design, purposive sampling, clear variable definition, and appropriate statistical analysis. This structured approach allowed for an effective investigation of how ANC attendance and iron supplementation adherence influence anemia status among third-trimester pregnant women, providing evidence that could inform clinical practice and maternal health interventions.

RESULTS

The study included 123 third-trimester pregnant women, with the majority (81%) aged between 20–35 years. Regarding gestational age, 46% of respondents were in the early third trimester (28–31 weeks). These characteristics indicate that most participants were in the typical reproductive

age range and at a critical stage of pregnancy where anemia risk can impact both maternal and fetal health.

Analysis of antenatal care (ANC) attendance showed that 61% of the respondents attended ANC regularly, while 39% had irregular visits. Proper ANC attendance is crucial for monitoring maternal health, providing iron supplementation, and detecting conditions such as anemia early. Regarding iron supplementation adherence, 52% of pregnant women reported regular intake, whereas 48% did not adhere consistently. Adherence to iron supplementation is essential in preventing iron-deficiency anemia, especially during the third trimester when fetal iron demand increases.

The prevalence of anemia among the respondents was 34.1%, indicating that more than one-third of pregnant women in this population had hemoglobin levels below 11 g/dl. This highlights anemia as a significant health concern in this group.

Bivariate analysis using the Chi-square test revealed significant associations between maternal health practices and anemia status. Regular ANC attendance was significantly associated with lower anemia incidence ($p < 0.001$; $r = 0.481$). Similarly, adherence to iron supplementation was significantly correlated with reduced anemia prevalence ($p < 0.001$; $r = 0.478$). These results suggest that both ANC attendance and iron supplementation play important roles in preventing anemia during late pregnancy.

Table 1. ANC Attendance, Iron Supplementation, and Anemia Prevalence

Variable	Category	Frequency (%)
Age	20–35 years	99 (81%)
Gestational Age	Early third trimester (28–31 weeks)	57 (46%)
ANC Attendance	Regular	75 (61%)
	Irregular	48 (39%)
Iron Supplementation Adherence	Regular	64 (52%)
	Irregular	59 (48%)
Anemia Status	Anemic (<11 g/dl)	42 (34.1%)
	Non-anemic	81 (65.9%)
Chi-square (ANC vs Anemia)	-	$p < 0.001$, $r = 0.481$
Chi-square (Iron vs Anemia)	-	$p < 0.001$, $r = 0.478$

Table 1 demonstrates that regular ANC attendance and adherence to iron supplementation are strongly associated with lower anemia prevalence among third-trimester pregnant women. The significant Chi-square results and moderate correlation coefficients indicate that maternal health practices are key determinants of anemia, emphasizing the importance of promoting consistent ANC visits and iron intake to improve maternal outcomes.

DISCUSSION

This study highlights the critical role of ANC visits and iron supplementation adherence in preventing anemia during pregnancy, even amid the COVID-19 pandemic. Women who consistently attended ANC and regularly consumed iron tablets were significantly less likely to develop anemia.

Our findings align with previous studies in Ethiopia, India, and Indonesia, which reported that irregular ANC visits and poor compliance with iron supplementation increased anemia risk (Kejela et al., 2020; Dolang, 2020; Worku et al., 2018).

During the COVID-19 pandemic, reduced healthcare access and negative attitudes toward supplementation were reported globally, which hindered maternal nutrition interventions (Amalia et al., 2021; Eylul et al., 2020). However, this study suggests that those who managed to maintain ANC attendance and supplementation benefited substantially in terms of anemia prevention.

Strengthening ANC services through telemedicine, community health workers, and improved iron tablet distribution strategies may help mitigate service disruptions during future crises (Barger et al., 2022).

CONCLUSION

Regular ANC visits and consistent iron supplementation significantly reduced the risk of anemia among third-trimester pregnant women at Permata Ibu Clinic during the COVID-19 pandemic. Ensuring continuity of maternal health services and promoting adherence to supplementation programs remain vital strategies in reducing maternal morbidity.

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