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The Relationship Between Prenatal Attachment and Compliance with Iron Tablet Consumption in Pregnant Women in the Working Area of the Benteng

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Abstract: **Introduction:** Prenatal attachment is a close, warm, and loving cognitive and emotional bond that forms between a mother and her fetus, aimed at the well-being of both the mother and the fetus. This bond is known to encourage healthy behaviors, such as adherence to iron tablet intake during pregnancy. Objective: To determine the relationship between prenatal attachment and adherence to iron tablet consumption in the service area of the Benteng Community Health Center in Palopo City. Methods: A cross-sectional design involving 33 third-trimester pregnant women using total sampling. Prenatal attachment was measured using the Indonesian version of the Prenatal Attachment Inventory (IPAI), and adherence was measured using a questionnaire. Data analysis was performed using Fisher's Exact Test. **Results:** Prenatal attachment was significantly associated with iron tablet adherence ($p = 0.004 < p = 0.05$). A total of 51.5% of pregnant women had high prenatal attachment, and 60.6% of pregnant women had high adherence. Conclusion: Prenatal attachment, a healthy lifestyle behavior among pregnant women, has been proven effective in improving adherence to iron tablet consumption. A close, warm, and loving emotional bond between the mother and the fetus can be utilized in antenatal care practice.

Keywords: prenatal attachment, compliance, iron supplement tablets, pregnancy

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Introduction

The infant mortality rate (IMR) is a key indicator of population health, linked to maternal and infant health, and is a global policy goal under the Sustainable Development Goals (SDGs). The target for 2030 is to reduce the infant mortality rate to 12 per 1,000 live births; however, global IMR data for 2020 stood at 28 per 1,000 live births. In 2021, the IMR in Indonesia reached 19.5 per 1,000 live births, with 35.2% of cases attributed to low birth weight and preterm births. Furthermore, data on the proportion of mothers giving birth to live-born infants in the past two years (2023–2024) with live-born infants with low birth weight (LBW) showed only a slight decrease from 12.58% to 12.47% (Health Research and Development Agency, Ministry of Health of the Republic of Indonesia, 2024). South Sulawesi Province ranks among the provinces with the highest percentage of mothers giving birth to live-born infants (LBI) in the past two years, and the percentage of live-born infants (LBI) born with low birth weight (LBW) increased slightly from 12.65% (2023) to 16.54% (2024) (Indonesian Ministry of Health Research and Development Agency, 2024).

One of the main factors causing live births with LBW is anemia in pregnant women during pregnancy. Anemia is defined as a condition in which the hemoglobin (Hb) or red blood cell count in the body is below normal (Dos Santos et al., 2024) (Jagadeeswari et al., 2024). Anemia is diagnosed when the mother's hemoglobin level is less than 11.0 g/dL (Khan Galzie & Imtiaz Rasool, 2022). In the first and third trimesters, hemoglobin levels must be below 10.5 g/dL in the second trimester (Balcha et al., 2023). This condition is often caused by a deficiency in iron, folic acid, or vitamin B12, all of which are essential for red blood cell formation and maintaining the health of pregnant women (Tejavat, 2023). Factors influencing the incidence of anemia in pregnant women include education, compliance with iron tablet consumption, socio-geography, occupation, knowledge, and socioeconomic status (Purwanto & Dhiyaulhaq, 2024), (Nurhasanah et al., 2023).

The most effective prevention and treatment of anemia in pregnant women during pregnancy is through nutritional intervention, specifically the administration of iron tablets with a recommended minimum intake of 90 tablets during pregnancy (Departemen Kesehatan, 2021). However, iron tablet intervention programs face significant

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challenges, namely low compliance with iron tablet consumption and the perception that it is not very important (Rahimi et al., 2025), (Shreffler et al., 2021). Several factors contributing to low compliance include gastrointestinal side effects, lack of educational interventions, and social and psychological factors (Abdullahi et al., 2014), (Gebremedhin et al., 2017).

Prenatal Attachment is a form of intervention that plays a very important role in influencing the health behavior of pregnant women (Lima et al., 2024), (Branjerdporn et al., 2022). Prenatal Attachment is defined as the emotional bond and unique relationship that develops between the mother and the fetus during pregnancy (Gioia et al., 2023). The bond between the mother and the fetus reflects the extent to which the mother begins to view and understand the fetus as an individual, engage in mental interactions, and consciously take on the role of a good parent (Moura et al., 2024), (Palmieri et al., 2024).

High-quality prenatal attachment interventions have been shown to correlate closely with better health behaviors and optimal preventive practices during pregnancy. Mothers who have a strong emotional bond with their fetus tend to have higher internal motivation to maintain their health for the sake of the fetus's well-being and better development (Abasi et al., 2021), (Lee et al., 2023). Specifically regarding treatment adherence, several studies show that prenatal attachment can function as a psychological mechanism that helps mothers overcome obstacles such as nausea or constipation due to TTD because the perceived benefits for the fetus are considered more important. A study found a positive correlation between strong maternal attachment to the fetus and increased medication adherence in pregnant women (Davies et al., 2023), (De Korte et al., 2023), (Lima et al., 2024). Therefore, this study aims to analyze the relationship between prenatal attachment and compliance with iron tablet consumption among pregnant women in the service area of the Benteng Health Center in Palopo City.

Method

This study employed an analytical observational research design using a cross-sectional approach, in which the researcher observed or measured independent and dependent variables. The study population consisted of all pregnant women in their third trimester (minimum gestational age of 28 weeks) within the service area of the Benteng Community Health Center in Palopo City. The sample in this study consists of all pregnant women in their third trimester within the service area of the Benteng Community Health Center in Palopo City. This study involved 33 pregnant women as the sample. The sampling technique used was total sampling, which involves selecting the entire population as the sample. The study was conducted in the service area of the Benteng Community Health Center in Palopo City from September to November 2025. e instrument used to measure prenatal attachment is the Indonesian version of the Prenatal Attachment Inventory (IPAI), which has been adapted into Indonesian by Suryaningsih et al. (2021). This instrument consists of 21 items using a 1–4 Likert scale (1 = almost never, 2 = sometimes, 3 = often, 4 = always). The instrument has been validated for reliability with a Cronbach's alpha value of 0.842, indicating high internal consistency and making it suitable for use among pregnant women in Indonesia. The prenatal attachment category was determined based on the sample mean: respondents were categorized as having high prenatal attachment if the total score was >mean, and as having low prenatal attachment if the total score was <mean. Meanwhile, adherence to iron tablet consumption was assessed using a questionnaire.

Data analysis for this study included univariate and bivariate analyses. Univariate analysis aimed to describe the characteristics of each assessed variable. In this study, the variables to be described were prenatal attachment and iron tablet adherence among pregnant women. Bivariate analysis was used to examine the relationship between two variables suspected to be associated or correlated. To analyze the relationship between prenatal attachment and iron tablet adherence among pregnant women, Fisher's Exact Test was used. This test was chosen because the relatively small sample size (n=33) could potentially result in expected cell frequencies of less than 5, making Fisher's Exact Test statistically more appropriate (Agresti, 2002). If the p-value is < 0.05, the two variables are related; if the p-value is > 0.05, the two variables are not related.

Results and Discussion

The characteristics of the respondents in this study were divided based on general characteristics, obstetric history, and factors influencing iron tablet consumption compliance.

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Table 1. Frequency Distribution of Pregnant Women in the Working Area of the Benteng Community Health Center, Palopo City, in 2025 Based on General Characteristics

Characteristic	F	%
Age		
20-35 Year	27	81,8
<20, >35 Year	6	18,2
Total	33	100
Education		
Primary School	6	18,2
Junior High School	8	24,2
Senior High School	4	12,1
College	15	45,5
Total	33	100
Occupation		
Housewife	22	66,7
Civil Servant	5	15,1
Private	3	9,1
Entrepreneur	3	9,1
Total`	33	100

Based on Table 1 it can be seen that 81.8% of respondents were aged 20–35 years, which is the safe reproductive age range for pregnancy and childbirth. Furthermore, regarding the occupation variable, 22 (66.7%) respondents were housewives.

Prenatal Attachment

Table 2. Frequency Distribution of Pregnant Women in the Benteng 2025 Health Center Work Area, Palopo City, Based on Prenatal Attachment

Prenatal Attachment	F	%
Low	16	48.5
High	17	51.5
Total	33	100

Table 2 shows that of the 33 pregnant respondents, 22 (66.7%) had high prenatal attachment. This indicates that the emotional bond and affection formed between the mother and her fetus in this study was good. However, 11 (33.3%) respondents still had low prenatal attachment.

Compliance with Iron Tablet Consumption

The distribution of respondents based on iron tablet consumption compliance is as follows.

Table 3 . Frequency Distribution of Pregnant Women in the Working Area of the Benteng Community Health Center, Palopo City, in 2025 Based on Iron Tablet Consumption Compliance

Iron Tablet Consumption Compliance	F	%
Low	13	33.4
High	20	60.6
Total	33	100

Table 3 shows that 60.6% of pregnant women in this study had a high level of prenatal attachment, which means that the emotional bond between the mother and her fetus was strong, warm, and loving

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Relationship between Prenatal Attachment and Fe Tablet Consumption Compliance

The results of the cross-tabulation between prenatal attachment and iron tablet consumption compliance are as follows:

Table 4. Cross-Tabulation between Prenatal Attachment and Iron Tablet Consumption Compliance

		Iron Tablet Consumption Compliance				Total		OR
		Not Obey		Obedient				
		F	%	F	%	f	%	
Prenatal Attachment	Low	10	62,5	6	37,5	16	100	0,004
	High	2	11,8	15	88,2	17	100	
	Total	12	36,4	21	63,6	33	100	

Table 4 shows that there is a difference in the patterns of iron tablet adherence between the two prenatal attachment groups. In the group of mothers with low prenatal attachment, the majority of respondents were non-adherent to iron tablet intake, namely 10 respondents (62.5%), while only 6 pregnant women (37.5%) were adherent. Compared to respondents with high prenatal attachment, the proportion of compliant respondents was much higher, namely 15 respondents (88.2%), while 2 respondents (11.8%) were non-compliant. The results of this descriptive analysis indicate that the higher the prenatal attachment, the greater the mothers' compliance in taking iron tablets.

Given the relatively small sample size (n=33) and the potential for low expected cell frequencies in a 2x2 contingency table, Fisher's Exact Test was selected as the primary inferential test. This choice aligns with Agresti's (2002) recommendation that Fisher's Exact Test is more appropriate for categorical analyses with small samples than the conventional Chi-Square test. The complete results of the statistical tests are presented in Table 5.

Table 5. Results of Fisher's Exact Test on the relationship between prenatal attachment and iron tablet adherence among pregnant women in the third trimester

Statistical Test	Value	Df	Asymptotic Significance (2-sided)	p-value (Exact, two-tailed)
Pearson Chi-Square	9,169	1	0,002	0,004
Fisher's Exact Test				0,004
Number of Valid Cases	33	12		

Based on Table 5, the results of the analysis using Fisher's Exact Test show a p-value of 0.004 < 0.005 (two-sided exact significance). These results provide statistically significant evidence that there is a meaningful association between prenatal attachment and adherence to iron tablet intake among pregnant women in their third trimester in the service area of the Benteng Community Health Center in Palopo City.

These findings indicate that pregnant women with high prenatal attachment tend to have better adherence to iron tablet intake (88.2%) compared to those with low prenatal attachment, among whom the majority (62.5%) exhibit low adherence to iron tablet intake. These results align with a study conducted by (Gioia et al., 2023), which found that maternal-fetal attachment significantly influences health behaviors among pregnant women, encouraging them to adopt protective health practices. The psychological mechanisms underlying this relationship involve the internalization of maternal roles, whereby pregnant women with high prenatal attachment recognize that iron tablet intake is a form of sincere responsibility for the long-term well-being of the fetus (Camarneiro et al., 2024), (Coté et al., 2025).

A study conducted by (Konje et al., 2022) in Tanzania found that adherence to iron supplementation was very low among pregnant women, with gastrointestinal side effects and a lack of motivation being the main barriers. These findings offer a new perspective: prenatal attachment in pregnant women during pregnancy serves as a protective factor that helps them overcome these barriers throughout their pregnancy. Mothers with high prenatal attachment are more motivated and have a strong awareness of the positive impact on fetal development when taking iron tablets regularly. This is supported by research (Gonzales Jr. & Barcelo, 2023) showing that high-quality prenatal care has a significant correlation with prenatal attachment, which greatly influences mothers' healthy lifestyle behaviors.

The practical implication of this study is the need to integrate the promotion of prenatal attachment into antenatal care programs at all healthcare facilities, with the aim of improving adherence to iron supplementation. Health education interventions focused on the well-being of the mother and fetus can strengthen prenatal

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attachment and improve adherence to supplementation. However, this study has limitations. The cross-sectional design limits the ability to establish causal relationships, so a longitudinal study is needed to gain a deeper understanding of the relationship between prenatal attachment and adherence to iron tablet consumption. Additionally, this study did not control for confounding variables such as social support, socioeconomic status, parity, educational level, and experiences of iron tablet side effects, which could influence both variables.

Conclusion

Based on the results of the study, it can be concluded that the majority of third-trimester pregnant women in the service area of the Benteng Community Health Center in Palopo City have high prenatal attachment, specifically 17 women (51.5%). Furthermore, among the third-trimester pregnant women in the service area of the Benteng Community Health Center in Palopo City, there is high compliance with iron tablet consumption, specifically 21 women (63.6%). Furthermore, based on the results of the Fisher's Exact Test analysis, there is a significant association between prenatal attachment and iron tablet adherence among pregnant women in the service area of the Benteng Community Health Center in Palopo City, with a p-value of 0.004 ($p < 0.05$).

Authors' Contribution

All authors contributed equally to every aspect of this research, from the initial study design and data collection to the analysis, interpretation, manuscript preparation, and critical revisions. All authors have read and approved the final version for submission.

Conflict of Interests Statement

The authors declare no conflict of interest.

Data Availability

The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Informed Consent

Written informed consent was obtained from the participants.

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