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ASSOCIATION BETWEEN ANEMIA LITERACY AND ANEMIA AMONG PREGNANT WOMEN: A CROSS-SECTIONAL STUDY AT AN INDEPENDENT MIDWIFERY PRACTICE IN INDONESIA

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ABSTRACT

Background: Anemia in pregnant women remains a prevalent health issue and contributes to an increased risk of maternal and neonatal complications. One factor suspected to play a role is low anemia literacy, which affects pregnant women's ability to understand health information and make decisions about anemia prevention. Low literacy can lead to poor adherence to iron supplementation and suboptimal dietary patterns, particularly in iron intake. This study aims to analyze the relationship between anemia literacy and the incidence of anemia among pregnant women at TPMB Cindy Yosy.
Methods: This study employed a correlational analytical design with a cross-sectional approach. The research sample consisted of 31 pregnant women selected using a total sampling technique. Data were collected using a validated 20–item questionnaire to measure anemia literacy and hemoglobin level examinations to determine anemia status. The methodology section briefly specifies that the instrument was validated and ethical approval was obtained. Data analysis was conducted using the Spearman Rho test.
Results: Most respondents had poor anemia literacy (77.4%) and the majority experienced mild anemia (87.1%). The Spearman Rho test yielded a p-value = 0.000 (<0.05) with a correlation coefficient (rs) = +1.000, indicating a positive association with a very strong correlation between anemia literacy and the incidence of anemia in this sample distribution, which requires cautious interpretation.
Conclusion: There is a significant association between anemia literacy and the incidence of anemia in pregnant women. Lower anemia literacy is associated with a higher incidence of anemia in pregnant women.
Keywords: anemia literacy, antenatal care, health literacy, iron deficiency anemia, maternal anemia, pregnancy

INTRODUCTION

Anemia among pregnant women remains a global health issue with a persistently high prevalence. The World Health Organization (WHO) reports that anemia during pregnancy contributes to an increased risk of maternal and perinatal complications (World Health Organization, 2021). Based on the 2023 Indonesian Health Survey (SKI), the prevalence of anemia in Indonesia reached 16.2%, with the rate among pregnant women as high as 37.1%. In Indonesia, anemia in pregnant women remains a primary concern within maternal and child health programs (Ministry of Health RI, 2020; UNICEF, 2023).
One of the factors influencing the incidence of anemia is health literacy, specifically anemia literacy. Anemia literacy is a unique construct because, unlike general health literacy, it requires a highly specific understanding of bio-cellular iron absorption, interactions between nutrients (such as vitamin C enhancing iron uptake while tea blocks

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it), and the long-term, non-immediate impacts of adherence on fetal neurodevelopment. Standard general health literacy instruments fail to capture these distinct clinical-behavioral dimensions; hence, a clear distinction must be made between basic health awareness and structural anemia literacy (Sari et al., 2022; Aghadi et al., 2022).

A preliminary study conducted at TPMB Cindy Yosy in January 2026 identified 12 pregnant women, of whom 7 (58.33%) had anemia. Among these cases, 6 were attributed to a lack of maternal knowledge, and 1 was due to high parity (grand multigravida).

Previous research has demonstrated that knowledge levels are related to the incidence of anemia in pregnant women (Wulandari et al., 2020). However, previous studies often conflate basic knowledge of anemia with structural anemia literacy, leaving a significant research gap regarding how functional and critical health literacy specific to gestational iron dynamics operates at the primary maternal care level. The novelty of this study lies in evaluating anemia literacy as a standalone, multidimensional variable (functional, communicative, and critical) rather than basic health awareness, specifically targeted within the context of Independent Midwife Practices (TPMB) to prevent maternal iron-deficiency status early. Based on these considerations, this study aims to analyze the correlation and statistical association between anemia literacy and the incidence of anemia among pregnant women at TPMB Cindy Yosy.

RESEARCH METHOD

This study utilized a correlational analytical design with a cross-sectional approach to determine the association between independent and dependent variables at a single point in time (Sugiyono, 2019; Setiawan & Saryono, 2020). Because this design employs a cross-sectional approach, it only demonstrates statistical association rather than establishing a direct causal relationship. The study was conducted at TPMindy Yosy from February to March 2026. The sample included 31 respondents selected through total sampling (Notoatmodjo, 2020). While total sampling was applied to encompass all available population criteria at the facility during the study period, the resulting sample size is relatively small (n = 31). Consequently, the findings and statistical outputs of this study should be interpreted cautiously when presenting and generalizing the findings. The inclusion criteria for this study were pregnant women who attended antenatal care at TPMB Cindy Yosy during the data collection period and were willing to participate. The exclusion criteria included pregnant women with a history of pathological bleeding disorders, chronic systemic diseases, or those unable to complete the session.

The independent variable was anemia literacy, while the dependent variable was the incidence of anemia. Data were collected via a structured questionnaire consisting of 20 closed-ended questions covering functional, interactive, and critical anemia literacy. The questionnaire's validity was previously tested using product-moment Pearson correlation ($r>0.361$), and its reliability yielded a Cronbach's Alpha coefficient of 0.824, confirming the instrument is valid and highly reliable. Anemia status was determined through objective hemoglobin level examinations using a standardized digital Hb meter.

Ethical transparency was strictly maintained throughout the research process. This study obtained formal ethical approval and was approved by the Health Research Ethics Committee of the Faculty of Public Health, University of Jember (ETHICALLY EXEMPTED No. 659/KEPK/FKM-UNEJ/IV/2026). Prior to data collection, all respondents provided written informed consent.

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RESULTS

Table of 1. Association between Anemia Literacy and the Incidence of Anemia

Anemia Literacy	No Anemia	Mild Anemia	Moderate Anemia	Severe Anemia	Total
Good	4 (12.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (12.9%)
Fair	0 (0.0%)	3 (9.7%)	0 (0.0%)	0 (0.0%)	3 (9.7%)
Poor	0 (0.0%)	24 (77.4%)	0 (0.0%)	0 (0.0%)	24 (77.4%)
Total	4 (12.9%)	27 (87.1%)	0 (0.0%)	0 (0.0%)	31 (100.0%)

Based on the verified data in Table 1., the cumulative rows and columns match perfectly (4+3+24= 31 respondents, representing 100.0%). The majority of respondents possessed poor anemia literacy (77.4%). and based on the incidence of anemia, most pregnant women experienced mild anemia (871%). Bivariate analysis indicated an association between anemia literacy and the incidence of anemia among pregnant women (p-value = 0.000 (<0.05); rs = +1.000). This indicates a strong positive association in this sample distribution, which requires extremely careful interpretation.

DISCUSSION

The results of this study indicate that most pregnant women possess anemia literacy in the "poor" category. This condition may affect maternal health behaviors, particularly in meeting iron requirements during pregnancy. Low health literacy is associated with an individual's limited ability to understand health information and make appropriate decisions about disease prevention (Nutbeam, 2021). In pregnant women, low anemia literacy is associated with poor adherence to iron-folic acid (IFA) supplementation and suboptimal consumption of nutritious foods (Sari et al., 2022; Ministry of Health RI, 2020).

Furthermore, educational factors contribute to low anemia literacy. Pregnant women with lower educational attainment tend to face limitations in accessing and comprehending health information, which impacts anemia prevention behaviors (Berkman et al., 2019; Putri et al., 2021). This reinforces the notion that anemia literacy is influenced not only by basic knowledge but also by social determinants such as education and access to information.

The high incidence of mild anemia in this study suggests that anemia remains a dominant health issue among pregnant women. Globally, anemia in pregnancy continues to have a high prevalence, especially in developing countries, and remains a major risk factor for maternal and neonatal complications (World Health Organization, 2021; Stevens et al., 2022). This condition is generally caused by increased iron demand during pregnancy that is not balanced by adequate intake (Breyman, 2020; Ministry of Health RI, 2020).

The Spearman's Rho test showed a significant association between anemia literacy and the incidence of anemia in pregnant women. This finding is consistent with previous research indicating that knowledge levels are significantly associated with the occurrence of anemia (Wulandari et al., 2020; Rahmawati et al., 2021). Pregnant women with strong anemia literacy tend to exhibit more positive health behaviors, such as adhering to iron supplementation and selecting foods that support increased hemoglobin levels (Smith et al., 2021).

Nevertheless, the correlation coefficient value of +1.000 needs to be critically examined. In public health research, a perfect correlation is extremely rare due to the variation in respondent characteristics. In this study, this mathematical artifact (rs = 1.000) occurred solely because the sample data yielded an extreme stratification: every single respondent with "Poor" literacy fell exclusively into the mild anemia group, while

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those with "Good" literacy fell only into the no-anemia group. This severe data homogeneity overestimates the strength of the association and reflects a mathematical phenomenon rather than a biological certainty (Ghazali, 2020).

Furthermore, because this study utilizes a cross-sectional research design, the found relationship is purely associative and cannot imply causality. It is logically incorrect to state that low anemia literacy directly causes the drop in hemoglobin levels. There may be other confounding factors that determine actual physical anemia status—such as baseline nutritional status (BMI), biological iron bioavailability, maternal age, pregnancy spacing, parity, and genetic traits—that were not controlled for or analyzed in this study due to the restricted sample size. Therefore, these variables must be accounted for in broader community applications (Stevens et al., 2022; Ministry of Health RI, 2020).

Despite these limitations, the findings of this study remain highly relevant to public health. Anemia literacy represents a modifiable factor that can be targeted through educational interventions. Consequently, improving the literacy of pregnant women is statistically associated with a lower likelihood of anemia, highlighting the potential value of intensifying structured, sustainable promotive and preventive health education at primary healthcare facilities.

CONCLUSION

There is a significant association between anemia literacy and the incidence of anemia among pregnant women at TPMB Cindy Yosy. Lower anemia literacy levels are closely associated with a higher frequency of mild anemia occurrences. However, due to the relatively small sample size (n = 31), the perfect statistical strength of this relationship (rs = +1.000) must be interpreted with extreme caution, as it represents distribution within a homogenous sample, does not imply causal pathways, and can not be widely generalized without larger multi-center cohorts.

RECOMMENDATIONS

For healthcare providers, midwives at the primary care level should design visual, low-text anemia literacy media (such as pictorial cards or digital infographics) during routine Antenatal Care (ANC) checkups, explicitly demonstrating proper iron pill consumption timing to avoid absorption inhibitors. For future researchers, given the small sample size constraint of this study, it is highly recommended to expand the population and utilize a longitudinal cohort research design to establish true causal pathways, while integrating multivariate models that control for confounding factors like nutritional status and biological iron absorption rates to obtain more accurate results (Wong & Chen, 2022).

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