ANEMIA IN PREGNANT WOMEN AND ITS DETERMINANTS: A CROSS-SECTIONAL STUDY AT UMMU HANI MOTHER AND CHILDREN'S HOSPITAL, PURBALINGGA REGENCY

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ABSTRACT

Anemia in pregnant women is still a global problem, almost half of all pregnant women throughout the world experience anemia. Ummi Hani Mother and Children Hospital is one of the referral hospitals for mothers and children in Purbalingga that provides the antenatal care service. This study aimed to identify the determinants of anemia in pregnant women at the hospital. This research was an analytical observational study with a cross-sectional design. A total sample of 100 pregnant women was taken using convenience sampling method from a population of 135 pregnant women. The dependent variable was anemia status in pregnant women, while the independent variables included age, education, employment, gestational age, level of knowledge, and level of compliance with taking Fe tablets. Data sources were obtained from medical records, parturition registers, and cohorts of pregnant women at Ummi Hani Mother and Children Hospital. Primary data collection used a structured questionnaire. Bivariate analysis used chi square and/or Fisher exact, and multivariate analysis used logistic regression. This study found that 51% of pregnant women suffered from anemia. Multivariate analysis results showed pregnant women who had a low level of education were 5.07 times more likely to suffer from anemia compared to pregnant women who had a high level of education (p-value=0.002; OR=5.07; 95%CI=1.79-14.37), unemployed pregnant women were 2.73 times more likely to suffer from anemia compared to employed pregnant women (p-value=0.045; OR=2.73; 95%CI=1.02-7.29). This research highlights importance of improving health promotion regarding risks of anemia and prevention measures such as consuming nutritious and varied foods at affordable prices which is focused on groups of low-educated and unemployed pregnant women.

Keyword : Anemia, pregnant women, education level, employment status

INTRODUCTION

Anemia in pregnant women is still a global problem. It was estimated that almost half of all pregnant women worldwide experienced anemia (World Health Organization, 2021). Based on the 2018 Basic Health Research Results, the prevalence of anemia in pregnant women in Indonesia increased from 37.1% in 2013 to 48.9% in 2018 (Ministry of Health of the Republic of Indonesia, 2019). Anemia is a condition when the hemoglobin concentration is lower than the normal limit value (Snook *et al.*, 2021). Pregnant women are categorized as anemic if their hemoglobin level is <11 gr/dl (Ministry of Health of the Republic of Indonesia, 2020). Pregnant women are susceptible to anemia because physiologically during pregnancy, blood volume increases, resulting in a blood thinning process which results in a decrease in hemoglobin (Hb) concentration (Putri *et al.*, 2023).

Anemia in pregnant women is characterized by weakness, pale eyelids, pale tongue and lips, dizziness, and dizzy eyes (Ministry of Health of the Republic of Indonesia, 2020). Iron and folic acid deficiencies are the causes of anemia in pregnant women. This is because the need for iron and folic acid is high during pregnancy, while food intake is insufficient and if you don't get supplementation, pregnant women are susceptible to anemia (Nasir *et al.*, 2020).

The impact of anemia in pregnant women can occur on the fetus and mother, such as miscarriage, abnormal maternal immune-inflammatory status, premature birth, low birth weight, low ***Weight***-for-***age*** z-score, midd-upper arm circumference, and has a significant impact on the child's physical and neurological growth and development (Finkelstein *et al.*, 2020a; Huang *et al.*, 2015; Zhang *et al.*, 2021). Moreover, pregnant women who suffer from severe anemia can be at risk of maternal death (Daru *et al.*, 2018).

Several factors that could increase the risk of anemia in pregnant women included age (Sari *et al.*, 2021; Sukmawati *et al.*, 2021), maternal education (Stephen *et al.*, 2018; Wasono *et al.*, 2021), economic status (Septiasari, 2019), gestational age (Ayensu *et al.*, 2020),

level of knowledge (Sukmawati *et al.*, 2021), and compliance to Fe tablet supplementation (Chalik and Hidayati, 2019).

The Ministry of Health of the Republic of Indonesia has determined that if a pregnant woman is found to be at high risk based on the results of the first antenatal care service, then subsequent antenatal care can be carried out at the hospital in accordance with the recommendations of the results of the first antenatal care (Ministry of Health of the Republic of Indonesia, 2023). The Ummu Hani Mother and Child Hospital, Purbalingga Regency is a type C hospital which is one of two referral hospitals for high risk pregnant women in Purbalingga Regency (Purbalingga Regency Government, 2023). Based on the results of a preliminary study at The Ummu Hani Mother and Child Hospital Purbalingga Regency, it was known that there were many cases of anemia in pregnant women with a total of 67 cases recorded in December 2022. Information regarding what are the determinants of anemia in pregnant women in Purbalingga Regency is still limited. Previous research on the determinants of anemia in pregnant women in Purbalingga Regency only examined one variable, namely consumption of green vegetables and only covered one sub-district (Hermawan *et al.*, 2020). Meanwhile, our study will analyze several determinants of anemia in pregnant women such as socio-demographics (age, level of education, employment status), gestational age, level of knowledge, and level of compliance with taking Fe tablets in Purbalingga Regency. This study was also conducted at the Ummu Hani Hospital, Purbalingga Regency, where pregnant women came from several areas in the Regency. The study aimed to identify the determinants of anemia in pregnant women at the Ummu Hani Mother and Child Hospital, Purbalingga Regency. The results of this study can help the Purbalingga Regency government in formulating targeted prevention measures, therefore pregnant women in this area are not at risk of developing anemia.

METHODS

This study was an analytical observational study with a cross

sectional design carried out at the Ummu Hani Mother and Child Hospital, Purbalingga. Umm Hani Hospital, Purbalingga Regency, was chosen as the research location because this hospital is one of two hospitals that are a reference for maternal and child health in Purbalingga Regency, apart from the Regional General Hospital, dr. Goeteng Taroenadibrata. We only conducted research at maternal and child health referral hospitals in Purbalingga Regency which confirmed our research permits. The Purbalingga Regency government is also focusing on this hospital to become a comprehensive obstetric neonatal emergency service (PONEK) hospital (Purbalingga Regency Government, 2023). Therefore, it will be more likely to find pregnant women who suffer from anemia. Data collection was conducted in July 2023. The population in this study was all pregnant women who accessed antenatal care at the Umm Hani Mother and Child Hospital, Purbalingga Regency in 2023, a total of 135 pregnant women. The sample size calculation was based on the Slovin formula with an error rate of 5% obtained by 100 respondents. Sample selection in this study used the incidental sampling method. A total of 100 respondents were selected from pregnant women who were visiting the Umm Hani Mother and Child Hospital, Purbalingga Regency to have their pregnancy checked during the obstetrician's practice schedule at the hospital. Data collection through interviews was conducted to obtain a sample of 100 respondents. The data collection process took 5 days. Inclusion criteria included pregnant women who did not have chronic diseases, did not have blood transfusions, and pregnant women who lived in Purbalingga Regency, while the exclusion criteria were incomplete medical records. The dependent variable was anemia status in pregnant women, while the independent variables included age, education, employment, gestational age, level of knowledge, and level of compliance with taking Fe tablets. Data sources on anemia and gestational age of respondents were obtained from medical records at the Maternal and Child Health Polyclinic and Maternity Room Polyclinic. The structured

questionnaire to assess knowledge used in this research was a questionnaire adopted from Verrayanti's (2018) study where the questionnaire had been tested for validity and reliability by Verrayanti (2018) involving 30 respondents. In this study, the Fe consumption adherence questionnaire used the Morisky Medication Adherence Scale (MMAS) which had been tested for validity and reliability by a previous study by Haikal et al (2018) involving 15 respondents. Anemia status was categorized as anemia if the hemoglobin (Hb) level was below 11 gr/dl and non-anemia if the Hb level was above or equal to 11 gr/dl. The knowledge questionnaire consisted of 20 questions and the questionnaire for the level of compliance with Fe tablet consumption consisted of 8 questions. The knowledge level category was poor if the respondent answered less than 12 questions correctly, moderate if the respondent answered 12-14 questions correctly, and good if the respondent answered 15-20 questions correctly. The level of compliance with taking fe tablets was categorized as low if the respondent answered 0-5 questions correctly, moderate if the respondent answered 6-7 questions correctly, and high if the respondent answered 8 correctly. Data analysis carried out was univariate, bivariate and multivariate. Logistic regression was carried out to identify determinants of anemia in pregnant women. The statistical tests used were chi square and/or Fisher exact using STATA software. This research was approved by the health research ethics commission of the Muhammadiyah University of Purwokerto with Register number KEPK/UMP/08/VIII/2023.

RESULTS AND DISCUSSION

Respondent Characteristics

The respondents involved in this research were 100 pregnant women. Previously, Table 1 showed detailed characteristics of respondents based on age, education level, occupation, gestational age, level of knowledge and level of compliance to Fe tablets supplementation.

Table 1. Characteristics of Respondents

Characteristics	Total (n=100)	Percentage (%)
Age (years)		
20-35	96	96
>35	4	4
Level of education		
Elementary school	4	4
Junior high school	23	23
Senior high school/vocational school	55	55
3-year diploma	5	5
Bachelor	13	13
Employment		
Housewife	73	73
Private sector employee	19	19
Teacher	4	4
Village Apparatus	1	1
Regionally Owned Enterprises	1	1
State Civil Apparatus	1	1
Freelance	1	1
Gestational age		
First trimester	8	8
Second trimester	41	41
Third trimester	51	51
Level of knowledge		
Good	36	36
Moderate	25	25
Poor	39	39
Level of compliance with taking Fe tablets		
High	10	10
Moderate	35	35
Low	55	55

Table 1 shows that the majority of pregnant women were aged 20-35 years (96%) with the majority having a senior high school/vocational school (55%). Most pregnant women were housewives (73%), gestational age was in the third trimester (51%), had a poor level of knowledge (39%), and had a low level of compliance to Fe tablets supplementation (55%).

Prevalence of Anemia in Pregnant Women

Table 2. Prevalence of anemia in pregnant women

Prevalence of anemia in pregnant women	Total (n=100)	Percentage (%)
Anemia	51	51
Non-anemia	49	49

Table 2 shows that 51% of pregnant women suffered from anemia, while 49% of pregnant women did not suffer from anemia.

Determinants of Anemia in Pregnant Women

Table 3. Results of bivariate analysis of the determinants of anemia in pregnant women

Variable	Anemic Status				Total		*P value*
	Anemia		Non-anemia				
	n	%	n	%	n	%	
Age (years)							
>35	3	75,0	1	25,0	4	100,0	0,618
20-35	48	50,0	48	50,0	96	100,0	
Level of education							
Low	21	77,78	6	22,22	27	100,0	0,001
High	30	41,10	43	58,90	73	100,0	
Employment status							
Unemployed	42	57,53	31	42,47	73	100,0	0,032
Employed	9	33,33	18	66,67	27	100,0	
Gestational age							
Third trimester	24	47,06	27	52,94	51	100,0	
Second trimester	22	53,66	19	46,34	41	100,0	0,654
First trimester	5	62,50	3	37,50	8	100,0	
Level of knowledge							
Poor	26	66,67	13	33,33	39	100,0	
Moderate	12	48,00	13	52,00	25	100,0	0,029
Good	13	36,11	23	63,89	36	100,0	
Level of compliance to Fe tablets supplementation							
Low	35	63,64	20	36,36	55	100,0	
Moderate	11	31,43	24	68,57	35	100,0	0,012
High	5	50,00	5	50,00	10	100,0	

Table 3 shows that based on the results of bivariate analysis, education level (p value = 0.001), employment status (p value = 0.032), level of knowledge (p value = 0.029), and level of compliance to Fe tablets supplementation (p value = 0.012) had significant relationship with the incidence of anemia in pregnant women. The next analysis carried out was a multivariate analysis by including independent variables that had a p value <0.25 based on the results of the bivariate analysis, including education level, employment status, level of knowledge, and level of compliance to Fe tablets supplementation. The results of the multivariate analysis are presented in Table 4.

Table 4. Final model of multivariate analysis of determinants of anemia in pregnant women

Variable	*p-value*	OR	95% CI
Level of education	0,002	5,07	1,79-14,37
Employment status	0,045	2,73	1,02-7,29

Table 4 shows that based on the results of the multivariate analysis in the final model, the level of education was the most influential determinant of anemia in pregnant women (p value=0.002; OR=5.07; 95% CI=1.79-14, 37) where pregnant women who have a low level of education are 5.07 times more likely to experience anemia compared to pregnant women who have a high level of education. Employment status also had a significant relationship with the incidence of anemia in pregnant women (p value=0.045; OR=2.73; 95% CI=1.02-7.29) where pregnant women who did not work had a probability of 2.73 times more likely to experience anemia compared to working pregnant women.

Our study found that 51% of pregnant women at Ummi Hani Mother and Child Hospital, Purbalingga Regency experienced anemia. The prevalence was almost the same as the percentage of anemia in pregnant women in Indonesia, namely 48.9% based on the results of basic health research in 2018. Previous studies conducted in other regions in Indonesia also reported the percentage of anemia in pregnant women which was almost the same as our research included 48.1% in Banyumas Regency, 53.1% in Lahat Regency, and 61.5% in Medan City (Kusumawati and Rahardjo, 2020; Noviyanti *et al.*, 2019; Sjahriani and Faridah, 2019).

There were several determinants of anemia in pregnant women, as in our research which found that anemia during pregnancy was influenced by the level of education and work status of pregnant women. Education level was the dominant determinant influencing anemia in pregnant women. Pregnant women who have a low level of education are 5.07 times more likely to develop anemia than pregnant women who have a high level of education. These results

are consistent with previous research in Bone District, Indonesia and Tanzania, which stated that the prevalence of anemia was greater in pregnant women with low education (Edison, 2019; Stephen *et al.*, 2018). a high Level of education of pregnant women reduced the risk of developing anemia during pregnancy (Stephen *et al.*, 2018). This is possibly because there are benefits when pregnant women are highly educated. Pregnant women who have a high level of education can have high productivity and higher income so they tend to obtain more information and make better decisions about their nutritional adequacy (Yadav *et al.*, 2021). Thus, this can result in good dietary diversity practices, including during pregnancy (Gudeta *et al.*, 2022; Yadav *et al.*, 2021). Every time pregnant women eat, they must consume a variety of foods, namely foods that contain carbohydrates, protein, vitamins and minerals. If pregnant women eat a diet that is less diverse and nutritionally balanced, and lacks iron intake such as liver, eggs, meat, fish, fruit and vegetables, then pregnant women can suffer from anemia (Ministry of Health of the Republic of Indonesia, 2020). Pregnant women with higher education (diploma or above) were 5.58 times more likely to have good knowledge about anemia than pregnant women who did not have formal education. Furthermore, pregnant women who had good knowledge were 2.54 times more likely to comply with anemia prevention practices. The anemia prevention practices included habits in fulfilling nutrition and complying with the consumption of Fe tablets (Balcha, Eteffa, Arega Tesfu, *et al.*, 2023). This will prevent pregnant women's hemoglobin levels from below normal limits. This is important because anemia has bad effects such as premature birth, low birth weight babies (Finkelstein *et al.*, 2020b; Huang *et al.*, 2015), and anemia in pregnant women will have a negative impact on the child's physical development and cause nerve damage (Zhang *et al.*, 2021). Moreover, if a pregnant woman suffers from severe anemia, there is a risk of maternal death (Daru *et al.*, 2018).

This study also found that unemployed pregnant women were more at risk of experiencing anemia

than pregnant women who were employed. Pregnant women who did not have a job probably tended to have a lower socio-economic status (Rizkah and Mahmudiono, 2017). Septiasari, 2019 stated that pregnant women who earned less than the district minimum wage were more at risk of anemia than pregnant women who earned more than the regency minimum wage (Septiasari, 2019). Hospital-based research conducted by Khaskheli *et al* (2016) found that 83.27% of pregnant women who experienced anemia had low socioeconomic status (Khaskheli *et al.*, 2016). Balcha *et al* (2023) also stated that pregnant women whose family's monthly income was low could affect their ability to purchase nutritious household food products so that pregnant women did not get enough nutrition and were at risk of developing anemia (Balcha, Eteffa, Tesfu, *et al.*, 2023).

The limitation of this research was that it could not explain cause and effect because the study design applied was cross-sectional. The sample in this study was not representative of the population so it was not appropriate to generalize the results. This was because the sample selection method used convenience/incidental sampling. However, this study also had the advantage of being a research location in one of the two hospitals that are referral hospitals for maternal and child health in Purbalingga Regency, making it more likely to find pregnant women suffering from anemia than in a first-level health service facility.

CONCLUSION

The determinants of anemia in pregnant women identified at Ummi Hani Mother and Child Hospital Purbalingga Regency were low level of education and unemployed. Health promotion about the risk of anemia and prevention of anemia in pregnant women, such as consuming nutritious food at affordable prices, is focused on groups of pregnant women who have a low level of education and do not work, which is important to be carried out by health workers in health service facilities.

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