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Factors Affecting The Incidence of Anemia in Pregnant Women at Rumbio Public Health Center, Kampar Regency: Multivariate Analysis

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ABSTRACT

According to the WHO in 2014, as many as 40% of maternal deaths in developing countries are related to anemia in pregnancy. The prevalence of anemia in Indonesia is 50.9% among pregnant women. In Riau Province, the incidence of anemia among pregnant women is still relatively high at 37.1%. In Kampar Regency, the rate of anemia among pregnant women in 2016 was 16.03%, while in 2017 it rose to 32.59%. This study aims to analyze multivariate factors that cause the incidence of anemia in pregnant women at Rumbio Public Health Center, Kampar Regency. This type of research is quantitative analytic with a cross-sectional design. This study was conducted in March 2023 with a population of 385 pregnant women and a sample size of 78 people. The sampling technique used was purposive sampling. Bivariate and multivariate data analysis using chi-square statistical tests and logistic regression multivariate analysis. The results of bivariate analysis indicate that nutritional status, parity, and socio-economic variables are not significantly associated with anemia (p value> α 0.05), while the variables adherence to taking Fe tablets and age are significantly associated with anemia (p value < α 0.05). The results of multivariate analysis showed that the variable of adherence to taking Fe tablets was significant to anemia because the p value < 0.05, while the independent variable of age was not significant to anemia because the p value > 0.05. The OR value of adherence to taking Fe tablets is 67, meaning that people who are not adherent are more at risk of developing anemia. In conclusion, the variable of adherence to taking tablets is the variable most associated with the incidence of anemia in pregnant women. It is expected of pregnant women to be obedient and on time in taking Fe tablets to avoid the incidence of anemia in pregnancy.

Keywords: Nutritional status; parity; socioeconomic status; adherence to taking Fe tablets; anemia in pregnant women

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INTRODUCTION

In Indonesia, there are various causes of maternal mortality, 80% are caused by obstetric complications and 20% by other causes. Besides that, there are three main factors that cause maternal mortality, namely, bleeding, hypertension during pregnancy or pre-eclampsia, and infection. Hemorrhage occupies the highest percentage of maternal mortality (28%), eclampsia 24% and infection 11%, while indirect causes are chronic energy deficiency 37% in pregnancy, and anemia 40% in pregnancy(1).

According to the World Health Organization (WHO) in 2014 (2), 40% of maternal deaths in developing countries are related to anemia in pregnancy and are mostly caused by iron deficiency and acute bleeding, and it is not uncommon for the two to interact. Pregnant women are very susceptible to iron deficiency anemia because the increase in blood volume is not proportional to the increase in plasma, there is a lack of iron in the diet, and the need for iron increases, as well as digestive and absorption disorders. The prevalence of anemia in Indonesia is still quite high, which is 50.9% in pregnant women, according to the results of Basic Health Research (2015) in Riau province. The incidence of anemia in pregnant women is still relatively high at 37.1% (3).

In Kampar Regency, the rate of anemia in pregnant women still requires special attention. In 2016, the incidence of anemia in pregnant women was 16.03%, while in 2017 it was 32.59%. From these data, there was a significant increase exceeding 50% (4). The following is data on anemia in pregnant women in Kampar Regency :

Table 1. Anemia Case Data in Kampar Regency, 2020

Health Center	Number of Pregnant Women	Anemia (8-11 gr/dl)	%
Rumbio	391	42	10,74
Bangkinang Kota	872	72	8,26
Tapung Hilir 1	685	53	7,74
Gunung Sahilan I	247	15	6,07
Tapung Hulu I	1142	69	6,04
Tapung I	934	24	5,00
Siak Hulu I	1176	40	3,40
Kampar Kiri Hulu II	76	2	2,63
Tapung II	934	24	2,57
Kampar Utara	393	9	2,29
Jumlah	6.850	350	74,5

Based on Table 1, it can be seen that the highest incidence of anemia in pregnant women is in UPT. BLUD Puskesmas Rumbio, as many as 42 people (10.74%) (5).

Some causes of anemia in pregnant women are iron deficiency, folic acid deficiency, infection, and blood disorders. Anemia in pregnancy can be fatal if not immediately overcome, including causing miscarriage, premature partus, prolonged partus, uterine atony, bleeding, and shock. This is related to many influential factors, including nutritional status, age, education, and work, while the effect of anemia on the results of conception can cause miscarriage, fetal death in the womb, fetal death at birth, high perinatal mortality, prematurity, and congenital defects (6).

The prevalence of anemia increases by 15-20% in pregnant women who were anemic before pregnancy. Malnutrition in pregnant women and lack of attention predispose pregnant women to anemia in Indonesia. Anemia will increase the risk of maternal death 3.7 times higher when compared to mothers who are not anemic. One of the nutritional problems experienced by pregnant women today is due to the nutritional status of pregnant women, which can be measured by the Upper Arm Circumference (LILA) < 23.5 cm for LILA at risk and 23.5 cm for LILA not at risk (7).

In Indonesia, the prevalence of Fe tablets among pregnant women is 37.1%. The provision of Fe tablets in 2015 amounted to 85.17%. In this case, the percentage has increased compared to 2014, when it was only 85.1%. The government has conducted a program to overcome anemia in pregnant women by giving Fe tablets, as many as 90 tablets, to pregnant women with the aim of reducing the rate of anemia in pregnant women (8).

Adherence to Fe tablet consumption is something that needs to be considered. Although there are many reports that the coverage of pregnant women who get Fe tablets is good, if they are not consumed by pregnant women, the desired effect will not be achieved. In general, the health status that is expected to be improved will be delayed (9). Non-compliance of pregnant women in consuming Fe tablets can reflect how much pregnant women will develop anemia (10).

There are many things that cause various complications during pregnancy, including the age of the mother during pregnancy. Age is a risk factor for anemia in pregnant women. The age of a mother is related to the female reproductive organs. A healthy and safe reproductive age is 20-35 years old. If the mother is too young, which is less than 20 years old, the mother is afraid of changes in her posture or afraid of getting fat. Mothers tend to eat less, so that nutritional intake, including iron intake, is less, which results in anemia. Whereas at the age of over 35 years, the mother's health condition begins to decline, the function of the uterus begins to decline, and increased medical complications in pregnancy to childbirth(11).

A mother who often gives birth also has a risk of experiencing anemia in the next pregnancy if she does not pay attention to nutritional needs, because during pregnancy, nutrients will be divided between the mother and the fetus she is carrying (12). There are many factors that influence the incidence of anemia in pregnant women, one of which is parity. Parity is of particular concern because it is one of the factors that greatly dominate the occurrence of anemia in pregnancy because the condition of mothers who give birth more than 2x or too often greatly affects the condition of the mother's body both physically and mentally, when the mother gives birth to more than 2x children, the mother's physical condition still requires more iron, both for the growth of the mother's own condition and the fetus she is carrying. If too often experiences pregnancy and childbirth cause iron that has not been formed optimally in the body, always reduced because the mother's body needs it as well as the fetus(13).

In the socio-economic aspect, poverty and low living standards are still major problems faced by most developing countries. Family socioeconomic factors influence the incidence of iron

deficiency anemia because the family's food purchasing power depends on the amount of income earned. The higher the income, the more capable the family will be to fulfill their nutritional needs. This shows that poverty has an influence on anemia in pregnancy (14).

Several studies have examined risk factors that have a statistically significant relationship with the incidence of anemia in pregnant women. Research by Obai et al (15), on the prevalence of anemia and its risk factors among pregnant women attending ANC services in Gulu and Hoima Districts, Uganda, showed that the risk factors significantly associated with the incidence of gravidarum anemia were education level and occupation. The level of education attained was found to be associated with anemia; low education level is associated with unemployment, which leads to poverty, a risk factor for anemia in pregnancy. Research by Derso et al, on factors associated with anemia in pregnant women in Dera Region, Northwest Ethiopia, showed the risk factors that increase the incidence of pregnancy anemia are residence, parity, economic status, adherence to taking iron tablets, and maternal lack of energy, chronic status (6).

The researcher is interested in analyzing multivariate factors that cause anemia in pregnant women, namely, nutritional status, adherence to taking Fe tablets, age, parity, and socioeconomics, with the research title "Factors Causing Anemia in Pregnant Women at UPT. BLUD Puskesmas Rumbio Kabupaten Kampar: Multivariate Analysis".

METODHS

This type of research is an analytical quantitative study with a cross-sectional design; the independent variable is the factors that cause anemia, and the dependent variable is the incidence of anemia in pregnant women. The research was conducted in the working area of the Rumbio Health Center, Kampar Regency, Riau Province, Indonesia. This research will be conducted in January-February 2023 in the working area of the Rumbio Health Center, Kampar Regency. The population in this study was all pregnant women in the working area of the Rumbio Health Center, Kampar Regency, totaling 391 pregnant women, with the number of samples using the large sample formula of 78 pregnant women. The sampling technique in this study was purposive sampling, and data collection was carried out using primary data. Data collection tools for the independent variable of anemia used Hemoglobin sticks, then for the independent variable of nutritional status, using data collection tools in the form of LILA tapes, adherence to taking Fe tablets, age, parity, and socioeconomic status, using questionnaires.

Data were processed using a computer program and presented in univariate, bivariate, and multivariate tables. Data analysis using univariate, bivariate (chi-square), and multivariate analysis using logistic regression. This research has been carried out in accordance with the procedures and research code of ethics with No. 024/LPPM/UPTT/IV/2023.

RESULTS

This study aims to analyze the factors that cause anemia in pregnant women at UPT BLUD Puskesmas Rumbio Kampar Regency in 2022. Data collection in this study began from March 3 to 31, 2023, with a sample size of 78 pregnant women. This chapter will describe the research results of each variable through descriptive and analytical analysis.

Analisis Univariate

Univariate analysis in this study was conducted to determine the characteristics of the respondents studied, including age, occupation, parity, education, socioeconomic status, nutritional status, compliance with FE tablet consumption, and anemia in pregnant women. Each respondent's characteristics in this study can be seen in the table below:

Table 2. Characteristics of Respondents

Characteristics	n	%
Age		
High Risk (<20 and >35)	25	32.1
Low Risk (20-35)	53	67.9
Occupation		
Fishermen	4	5.1
Farmers	41	52.6
Private Employee	13	16.7
Nurse	7	9.0
Housewife	9	11.5
Teacher	4	5.1
Parity		
High risk (>2)	21	26.9
Low Risk (1-2)	57	73.1
Education		
Elementary School-Junior High	40	51.3
School	28	35.9
Secondary Education	10	12.8
Higher Education		
Socio Economic		
Low	61	78.2
High	17	21.8
Nutritional Status		
Good	37	47.4
Poor	41	52.6
Adherence to FE Tablets		
Obedient	32	41.0
Not Obedient	46	59.0
Anemia		
Yes	40	51.3
No	38	48.7
Total Sampel	78	100

From table 2 above, of the 78 pregnant women, the most high risk age (20-35 years) as many as 53 people (67.9%), 41 people (52.6%) work as farmers, parity is low risk (1-2 deliveries) as many as 57 people (73.1%), low education (elementary and junior high school) as many as 40 people (51.3%), low socio economic status 61 people (78.2%), poor nutritional status as many as 41 people (52.2%), non-compliant in taking FE tablets as many as 46 people (59.0%), and experiencing anemia as many as 40 people (51.3%).

Bivariate Analysis

Bivariate analysis in this study correlates the variables of nutritional status, adherence to taking Fe tablets, age, parity, and socioeconomics with the incidence of anemia in pregnant women at UPT. BLUD Puskesmas Rumbio Kampar Regency in 2023.

Table 3. Bivariate Analysis

Factors Causing Anemia	Anemia		Total	P value
	Yes (%)	No (%)		
Nutritional Status				
Good	16 (20.5)	21 (26.9)	37 (47.4)	0.131
Poor	24 (30.8)	17 (21.8)	41 (52.6)	
Adherence to FE Tablets				
Obedient				
Not Obedient	5 (6.4)	27 (34.6)	32 (41.0)	0.000
	35 (44.9)	11 (14.1)	46 (59.0)	
Age				
High Risk (<20 and >35)	18 (23.1)	7 (9.0)	25 (32.1)	0.011
Low Risk (20-35)	22 (28.2)	31 (39.7)	53 (69.9)	
Parity				
High risk (>2)	10 (12.8)	11 (14.1)	21 (26.9)	0.445
Low Risk (1-2)	30 (38.5)	27 (34.6)	57 (73.1)	
Socio Economic				
Low	33 (42.3)	28 (35.9)	61 (78.2)	0.252
High	7 (9.0)	10 (12.8)	7 (21.8)	

From the bivariate analysis table above, it can be seen that the variables of nutritional status, parity and socioeconomic status are not significantly associated with anemia (p value > α 0.05), while the variable of adherence to taking FE tablets and the age variable are significantly associated with anemia (p value < α 0.05).

Multivariate Analysis

Multivariate analysis was performed by including independent variables (adherence to taking FE tablets and age) associated with the dependent variable (anemia), as described in Table 4.

From table 4, the multivariate analysis shows that the variable of adherence to taking FE tablets is significant to anemia because the p value < 0.05 (alpha 5%), while the independent variable age is not significant to anemia because the p value > 0.05. The OR value of adherence to taking FE tablets is

6,700, meaning that people who are not adherent are more at risk of developing anemia than people who adhere to taking FE tablets 6,700 times.

Table 4. Multivariate Analysis

Variabel	OR	95 % CI	P Value
Adherence to FE Tablets	6.700	2.100-2.210	0.000
Age	2.153	0.632-7.336	0.220

DISSCUSION

Bivariate Analysis

Relationship between Nutritional Status and Anemia in Pregnant Women

Based on the results of the study, there is no relationship between nutritional status and anemia in pregnant women with a p-value of 0.131 (p-value> α 0.05). The results of this study are in accordance with the results of (16). The results of multiple logistic analysis obtained insignificant results with a p value of 0.299, so that there is no influence between nutritional status and pregnancy anemia in adolescence. This shows that good or poor nutritional status does not have a direct effect on anemia in pregnant women. This is because the cause of anemia in pregnant women is not only nutritional status, but many factors affect it.

There are theoretically many risk factors for becoming anemic during pregnancy, such as having two pregnancies close together, being pregnant with more than one child, frequent morning sickness and vomiting, not consuming enough iron, having heavy periods before pregnancy, being pregnant as a teenager, and losing a lot of blood. Based on the results of this study, most pregnant women are not compliant with taking iron tablets (FE), so that the impact is not fulfilled by pregnant women's iron, and most pregnant women have poor nutritional status, which is related to the state of anemia of pregnant women, although statistically insignificant (16)(17).

The cause of anemia in pregnant women is not only due to nutritional status factors but also to a lack of iron consumption, blood loss during past childbirth, and chronic diseases. In pregnancy, the decrease in hemoglobin levels found during pregnancy is due to the fact that, in pregnancy, the need for food increases and changes in the blood occur: the increase in plasma volume is relatively greater than the increase in hemoglobin mass and red blood cell volume (18).

Relationship between Adherence to FE Tablets and Anemia in Pregnant Women

From the results of the study, there is a relationship between compliance with taking FE tablets and anemia in pregnant women, with a p value of 0.0000 (p value < α 005). In theory, iron intake apart from food is through iron tablet supplements (FE). This supplement is usually given to groups prone to iron deficiency, including pregnant women. Giving Fe tablets to pregnant women is done because the need for iron is very large, while intake from food alone cannot meet these needs (19).

The need for iron is 3000 to 5000 mg in the body, which is excreted by the body every day, is only 1 mg, and only 60% (1800 - 3000 mg) is in erythrocytes, 30% is as iron reserves, and only 20% is in various other organs such as muscles, enzymes and others. Therefore, it is very important to give iron tablets to someone who is affected by iron deficiency anemia, and there is no absorption disorder to In 7-10 days, the level of Hb increases by taking Fe tablets of 1.4 mg/day (12).

The results of this research are in line with research by Sonia (20). Based on the Kendall Tau analysis test, it was found that the p-value was 0.000 ($p < 0.05$), so Ha was accepted, so it can be concluded that there is a significant relationship between compliance in taking Fe tablets and the incidence of anemia in pregnant women at Kasihan II Bantul Health Center. The value of the correlation coefficient is 0.464, indicating a moderate relationship with a positive pattern, meaning that the higher the compliance in taking Fe tablets, the lower the incidence of anemia in pregnant women. The results of research by Esiara showed the same results, where based on the results of statistical tests using Chi-Square, the p value = 0.004 was obtained, where the p-value of 0.004 <0.05, which indicates that there is a significant relationship between compliance of pregnant women in taking Fe tablets with anemia in the Muara Batu Health Center Working Area, North Aceh District (21).

Relationship between Age and Anemia in Pregnant Women

Based on the results of the study, there is a relationship between age and anemia in pregnant women with a p-value of 0.001 (p-value < α 0.05). Age is a risk factor for anemia in pregnant women. The age of a mother is related to the female reproductive organs. A healthy and safe reproductive age is 20-35 years. If the mother's age is too young, which is less than 20 years old, the mother is afraid of changes in her posture or of getting fat. Mothers tend to eat less, so that nutritional intake, including iron intake, is lower, which results in anemia. Whereas at the age of over 35 years, the mother's health condition begins to decline, the function of the uterus begins to decline, and increased medical complications in pregnancy to childbirth(22).

The results of this study are in line with research by Jasmi (10), from the chi square test obtained a value of $p = 0.000$ ($p <0.05$) which means that there is a significant relationship between age and the incidence of anemia in pregnant women with an Odds Ratio value of 15.818 explaining that the chances of pregnant women who are at high risk of age are 15 times more likely to experience anemia than pregnant women with low-risk age. Similar to the results of research by Riyani et al, it shows that from the results of statistical tests using the Chi Square non-parametric test, the p-value is 0.000 ($p < 0.05$), so it can be concluded that there is a significant relationship between maternal age and the incidence of anemia in pregnant women(23).

Based on the researcher's analysis, pregnant women whose age is not categorized as risky are less likely to experience anemia as long as they are supported by good nutritional intake, so that hemoglobin levels are stable in the blood. The right age for programming pregnancy is between the ages of 20 and 35 years. At that age the reproductive organs have functioned properly and are ready to conceive and give birth, while pregnant women with the age category < 20 years are still in the adolescent category

where independence and mindset have not been fully formed and the age category > 35 years in theory begins to experience a decrease in the physiological function of the body including also in producing red blood cells.

Relationship between Parity and Anemia in Pregnant Women

Based on the results of the study, there is no relationship between parity and anemia in pregnant women with a p value of 0.445 (p value> α 0.05). In theory, parity is related to the incidence of anemia in pregnant women [13], however based on the results of the study, the mother's parity is dominant in parity 3, so the results of this study are also in accordance with Wiknjosastro's theory in that parity ≥ 4 has a higher maternal mortality rate, because the mother has given birth a lot which causes the function of the reproductive organs to deteriorate and according to the results of this study pregnant women are not compliant in taking Fe tablets, this causes anemia in pregnant women which will risk the mother and fetus and will result in the delivery process later (24).

The results of this study are in line with the results of research by (25)The Fisher Exact test results obtained a p value of 0.214, greater than 0.05, so there is no significant relationship between maternal parity and the incidence of anemia in pregnant women. The results of this study contradict the results of the research (23) based on the Chi-Square statistical test, the p-value is 0.000 (p < 0.05), which means that there is a relationship between the variables studied, so it can be concluded that there is a significant relationship between maternal age and the incidence of anemia in pregnant women.

Relationship between Socio-Economic and Anemia in Pregnant Women

Based on the results of the study, there was no relationship between socioeconomics and anemia in pregnant women with a p-value of 0.252 (p-value> α 0.05). in line with the results of research by (14), showed no relationship between family income and the prevalence of anemia in pregnant women, researchers argue that family income is not the only risk factor that causes the high prevalence of anemia in pregnant women. However, the results of this study contradict the results of previous research conducted by (26) stating that pregnant women with low family income are three times more at risk of anemia compared to mothers who have high family income. Family income is an important factor affecting the level of anemia in pregnant women because it increases several other related factors, such as nutrition, education, awareness, and hygienic conditions.

Multivariate Analysis

Multivariate analysis showed that the variable of adherence to taking FE tablets was significant to anemia because p value < 0.05 (alpha 5%), while the independent variable of age was not significant to anemia because p value > 0.05. The OR value of adherence to taking FE tablets is 6,700, meaning that people who are not adherent are more at risk of developing anemia than people who adhere to taking FE tablets by 6,700 times. The results of this study show that adherence to taking Fe tablets is the variable most associated with anemia in pregnant women, according to the theory of iron intake, apart from food, which is through iron tablet supplements. These supplements are usually given to groups

prone to iron deficiency, such as pregnant women. Supplementing iron tablets in pregnant women is done because the need for iron is very large, while intake from food alone cannot meet these needs (27).

The need for iron 3000 to 5000 mg in the body, which is excreted by the body every day, is only 1 mg, and only 60% (1800 - 3000 mg) is in erythrocytes, 30% is as iron reserves, and only 20% is in various other organs such as muscles, enzymes, and others. Therefore, it is very important to give iron tablets to someone who is affected by iron deficiency anemia, and there is no absorption disorder, then in 7-10 days, the level of Hb can increase by taking blood supplement tablets of 1.4 mg/day (19).

The iron tablet supplements, or better known as blood supplement tablets, commonly used are iron folate tablets, each tablet containing 200 mg Ferosulfate or 60 mg elemental iron and 0.25 mg folic acid In some people, the administration of iron tablets can cause symptoms such as nausea, pain in the stomach area, sometimes diarrhea, and difficulty defecating. In addition, after taking the tablets, the stool will be black, but this is not harmful. The frequency of these iron tablet side effects depends on the dose of iron in the pill, not on the form of the mixture. The higher the dose given, the greater the likelihood of side effects(28).

The results of this study are in line with research(29) from the results of multiple logistic regression tests, it was found that the factor of adequate consumption of Fe tablets is the most influential (OR 9.221), meaning that if pregnant women do not regularly consume iron tablets, there is a 9.221 times higher risk of experiencing anemia. In line with the results of research by (28), that compliance with Fe tablet consumption (r = 0.00, p = 0.009) has an influence on the incidence of gravidarum anemia and is statistically significant and based on the results of multiple logistic regression analysis (multivariate regretion) the variable of compliance with taking Fe tablets is the variable most associated with the incidence of anemia in pregnant women. One blood supplement tablet contains 60 mg of elemental iron and 0.400 mg of folic acid, which can help the red blood cell-forming organs to produce haemoglobin during pregnancy. Fe tablets are needed at least 90 tablets during pregnancy. Pregnant women who regularly and obediently consume Fe tablets are at less risk of anemia than pregnant women who do not take Fe tablets.

Research by (30) results of multivariate analysis using multiple logistic regression obtained the results of Fe consumption which had the most influence on the incidence of anemia in pregnant women. in pregnant women. Therefore, pregnant women are recommended to consume at least 90 Fe tablets during pregnancy, because pregnant women tend to experience a deficiency of both iron and folate. Pregnant women's need for Fe increases for the formation of the placenta and red blood cells by 200-300%.

CONCLUSION AND RECOMMENDATIONS

From the results of the study, it can be concluded that the variables of nutritional status, parity, and socioeconomic status are not significantly associated with anemia (p value > α 0.05), while the variables of adherence to taking Fe tablets and age are significantly associated with anemia (p value < α 0.05). Multivariate analysis showed that the variable of adherence to taking FE tablets was significant

to anemia because p value < 0.05 (alpha 5%), while the independent variable of age was not significant to anemia because p value > 0.05. The OR value of adherence to taking Fe tablets is 6,700, meaning that people who are not adherent are more at risk of developing anemia than people who adhere to taking Fe tablets by 6,700 times. The variable of adherence to taking tablets is the variable most associated with the incidence of anemia in pregnant women. It is expected of pregnant women to be obedient and timely in taking Fe tablets to avoid the incidence of anemia in pregnancy.

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