Original Article

The Relationship of Anemia In Pregnant Women With Low Birth Weight

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ABSTRACT

Background: Pregnancy anemia is one indicator of measuring the success of a nation's health development. Anemia in pregnant women can increase the risk of LBW. As adults, LBW babies have a greater risk of stunting. This study aimed to determine the relationship between the incidence of anemia in pregnant women and low birth weight in the Ngancar Community Health Center area, Kediri Regency.

Methods: This research design uses a retrospective cohort. The population in this study was 346 respondents, and the sample was 186. A simple random sampling technique and measuring instruments were used in the form of a Pregnancy Mother's Register Book and a Childbirth Register Book. The research was conducted on 20-25 August 2023 in the Ngancar Community Health Center Working Area, Kediri Regency. The independent variable is the incidence of anemia in pregnant women (X), and the dependent variable is low birth weight (LBW) (Y). Bivariate data analysis with Spearman Rank with a significant value (p < 0.05).

Results: The results of data analysis using Spearman Rank regarding the relationship between the incidence of anemia in pregnant women and Low Birth Weight obtained a significant value (p) of 0.0001 (p < 0.05). Thus, it is stated that there is a relationship between the incidence of anemia in pregnant women and low birth weight.

Conclusion: Anemia can increase the occurrence of LBW, but from this research, it is known that not all pregnant women with anemia in their pregnancies will give birth to LBW babies because anemia is not the only factor causing LBW. Pregnancy checks are done monthly, and good nutrition and Fe tablets are needed to prevent anemia and LBW

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Introduction

Anemia in pregnancy is a national problem and is one of the factors that is an indicator of measuring the success of a nation's health development, which describes the socio-economic capacity to meet the nutritional quantity and quality needs of society (Septiyaningsih & Yunadi, 2021; Septiyaningsih, Yunadi, & Kusumawati, 2021). Anemia is a condition where hemoglobin (Hb) levels are lower than usual and inhibits the flow of oxygen through the blood throughout the body. Pregnant women whose hemoglobin levels are less than 11 gr/dl are caused by low nutritional intake during the first trimester of pregnancy. Pregnant women often suffer from anemia because the need for iron in

both mother and fetus increases. Iron requirements during pregnancy increase more than before pregnancy because blood volume increases 50% during pregnancy, and a certain amount of iron is needed for the formation of hemoglobin and fetal and placental growth (Melnychuk, Komar, & Onyshchuk, 2023)

Anemia in pregnant women can increase the risk of LBW 3 time In pregnant women with anemia, the erythrocytes in the blood circulation or Hb mass are reduced so that they are unable to fulfill their function as carriers of oxygen to the body, and this causes the supply of nutrients from the mother to the fetus to disrupt the nutritional needs of the fetus and subsequently can inhibit the growth and development of the fetus which results in the baby weighing less than usual at birth (Abbas, Kumar, Mahmood, & Somrongthong, 2021). LBW is one of the main factors in increasing infant mortality. LBW has an absolute birth weight of < 2,500 grams regardless of gestational age(Hansen, 2021; Sehrawat & TM, 2020). Babies who have a birth weight less than usual have a higher risk of experiencing problems or complications at birth

In Indonesia, 48.9% of pregnant women experienced anemia. WHO data states that the prevalence of LBW in the world is 15.5%, or around 20 million babies born per year, 96.5% of which occur in developing countries (Riskesdas, 2018).LBW is one of the leading causes of neonatal deaths in 2021, namely 34.5%. In East Java Province, there were 3.8% of LBW babies and 987 neonatal deaths due to LBW. Babies with LBW in Kediri Regency were 774 babies (3.7%), and neonatal deaths due to LBW were 43 neonates.

Anemia in pregnancy is one of the maternal factors causing LBW (Liu et al., 2022). Research on anemia states that anemia in pregnant women causes the incidence of low birth weight (LBW) babies. Anemia is 83.3% (25 people) and not anemia amounting to 16.7% (5 people). The chi-square test results obtained P-value = 0.014. This shows that there is a relationship between anemia in pregnant women and the incidence of low birth weight (LBW) babies. The analysis results showed that OR = 5,000 (95% CI = 1,510-16,560) means that pregnancy anemia has a 5 times chance of having low birth weight (LBW) babies compared to those without anemia. (Harlisa R, 2023) Other research also states a relationship between Anemia and the incidence of low birth weight with p-value = 0.011 <α = 0.05. (Akmalia GI, 2022)

Based on a preliminary study conducted in the Ngancar Health Center Area, Kediri Regency, Indonesia, there were 97 people with anemia in 2021, and in 2022 there were 92 people. The number of LBW babies in 2021 will be 28; in 2022, there will be 36 babies. From data on anemia of pregnant women in 2021 and 2022, there was a decrease of 5% (5 people), but in LBW data, there was an increase of 28% (8 babies).

Anemia in pregnant women increases the risk of having a low birth weight baby, the risk of bleeding before and during delivery, and can even cause the death of the mother and baby if the pregnant woman suffers from severe anemia (Safitri, Saifulaman, Sansuwito, & Alim, 2023). Anemia in pregnant women has health impacts on the mother and child in the womb, including increasing the risk of low birth weight babies, miscarriage, premature birth, and death in mothers and newborns. Pregnant women with Hb levels <10 g/dl have a 2.25 times higher risk of giving birth to LBW babies, while pregnant women with severe anemia have a 4.2 times higher risk of giving birth to LBW babies compared to mothers who are not severely anemic

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(Margawati, Syauqy, Utami, & Adespin, 2023; Yuliastanti, Ambarwati, Sulastri, & Rahmawati, 2023). Problems in LBW babies include hypoglycemia, hyperbilirubinemia, infection or sepsis, and drinking disorders. According to the World Health Organization (WHO), LBW is a major general medical problem worldwide because of its short-term and long-term impact on well-being. When adults LBW babies have a greater risk of stunting and suffering from non-communicable diseases such as diabetes, hypertension, and heart disease.13 It is hoped that prevention and control efforts can be carried out as early as possible to reduce the incidence of LBW (Farag et al., 2021; McLoughlin, Berthon, Williams, & Wood, 2019).

Methods

This research design uses a retrospective cohort study, which was conducted to determine the relationship between the incidence of anemia in pregnant women and low birth weight. The research was carried out on 20 - 25 August 2023 in the work area of the Kediri Regency Health Center. The population of this study was 346 respondents. The sampling technique was simple random sampling to obtain a sample of 186 respondents. Namely, some pregnant women had their Hb levels checked in the working area of the Ngancar Community Health Center, Kediri Regency, in July 2022 – June 2023. The independent variable was the incidence of anemia in pregnant women, and the dependent variable was Low Birth Weight (LBW).

The instruments used in this research were the Pregnancy Mother's Register Book and the Childbirth Register Book. Respondent data collected is in the form of general data and unique data. General data consists of questions covering the mother's identity (age, parity, gestational age, number of ANC visits). Specific data consists of Hb levels and baby birth weight. The data that has been collected is then subjected to data processing, which includes editing, coding, tabulating, and data analysis. This research has received a certificate of ethical suitability from the STIKES Karya Husada Kediri Research Ethics Commission with number 0266/EC/LPPM/STIKES/KH/VIII/2023

Results

Table 1. General Characteristics of Respondents

Variable	Frequency	Percent
Respondent's Age		
Age <20 years	15	8
Age 20-35 years	143	76,9
Age >35 years	28	15,1
Parity		
Primipara	85	45,7
Multiparous	96	51,6
Grandemulti	5	2,7
Gestational age		
Preterm (<38 weeks)	0	0
Entire Month (38-41 weeks)	186	100
Pregnancy test		
Not ANC	1	0,5
Irregular ANC (<6x)	9	4,9
Regular ANC (≥6x)	176	94,6

From Table 1, it is known that based on the age of the respondents, the majority were 20-25 years, namely 143 respondents or 76.9%, based on parity of the respondents, half of them were primipara, namely 96 respondents or 51.6%, based on gestational age, all of them were full term, namely, 186 respondents or 100%, and based on pregnancy checks, almost all of them were Regular ANC (≥6x), 176 respondents or 94.6%

Table 2 Description based on Hb levels of pregnant women

Respondent's Hb Level	Frequency	Percent
Anemia	100	53,8
Not Anemic	86	46,2
Total	186	100

Data Source: Primary data 2023

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Table 2 above shows that most Hb levels are anemic, namely, 100 respondents (53.8%).

Table 3 Description based on birth weight of babies

Baby Birth Weight	Frequency	Percent
LBW	54	29
Normal Birth Weight	123	66
Big baby	9	5
Total	186	100%

Data Source: Primary data 2023

From Table 3, it is known that based on birth weight, the majority of babies are expected, namely 123 respondents (66%). Almost half of the respondents experienced LBW, namely, 54 respondents or 29%, and a small portion were large babies, 9 respondents or 5%.

Table 4 Description based on Hb levels with birth weight of babies

Respondent's Hb Level	Baby Birth Weight								Correlation Coefficient	P Value
	LBW		Normal Birth Weight		Big Baby		Total			
	n	%	n	%	n	%	n	%		
Anemia	39	21	56	30	5	3	100	54	0,211	0,004
Not Anemic	15	8	67	36	4	2	86	56		
Total	54	29	123	66	9	5	186	100		

Data Source: Primary data 2023

Table 4 shows that based on Hb levels and birth weight, almost half of them were not anemic with normal birth weight. Namely, 67 respondents, or 36%, and the small number of respondents who were anemic and LBW were 39 respondents, or 21%, with p of 0.004 (p<0.005) with a correlation coefficient of 0.211 so it is stated that there is a relationship between the incidence of anemia in pregnant women and low birth weight. This relationship shows a positive correlation direction with low correlation strengths.

Discussion
Incidence of Anemia in Pregnant Women

Based on Hb levels, it is known that most individuals are classified as anemic. Age is recognized as a significant risk factor for anemia in pregnant women, as it is closely associated with the condition of the female reproductive organs. Research findings indicate that maternal age during pregnancy has a substantial impact on the likelihood of developing anemia. Additionally, other studies reveal a strong relationship between factors such as maternal age and parity with the incidence of anemia in pregnant women, as shown in an analysis conducted in the Working Area of the South Cilacap Health Center I. Pregnant women of age at risk have a 2,667 times greater chance of developing anemia compared to pregnant women of age who are not at risk. Pregnant women with at-risk parity (≥3) are 2,304 times more likely to experience anemia compared to mothers who have no-risk parity (< 23.5cm). The younger and older a pregnant mother's age will affect the required nutritional needs. Lack of adequate nutrition during pregnancy, especially at less than 20 years and more than 35 years, will increase the risk of anemia. Pregnancy at the age of 35 years is at risk of developing anemia. This happens because, during pregnancy at < 20 years of age, biologically, human emotions are not yet optimal and tend to be unstable and mentally immature. This results in a lack of attention to meeting nutritional needs during pregnancy. At <20 years of age, a woman's body is not ready to accept pregnancy because it is still growing. Therefore, pregnant women still need nutrients for their growth, and nutrition for the pregnancy itself is reduced, making them susceptible to anemia. The age of pregnant women >35 years is also associated with a decline and decrease in body endurance as well as the condition of

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pregnant women's biological organs experiencing a decline, which makes hemoglobin production decrease, making them susceptible to anemia (Abdullah, Ilmiah, Prihatono, & Kurniawan, 2024; Azizatullatifah & Sarbini, 2024). Parity is an essential factor in the incidence of iron anemia in pregnancy. Women who experience frequent pregnancies and childbirth become increasingly anemic because they lose a lot of iron, this is because, during pregnancy, women use up the iron reserves in their bodies. Other research states that mothers with a parity of two or more have a 2.3 times greater risk of experiencing anemia than mothers with a parity of less than two. The higher the parity, the higher the risk of the mother experiencing anemia in pregnancy. High parity can increase the frequency of complications in pregnancy and childbirth because women who have given birth frequently can experience damage to the blood vessels and vascularization of the uterine wall due to previous births, resulting in inadequate blood flow to the placenta, which can ultimately reduce its function and affect circulation, nutrition to the fetus. Apart from that, having a history of a lot of bleeding can cause anemia in subsequent pregnancies (Andriana, 2021; Jayani, Kartini, & Putri, 2020). Those in parity who are at risk are 7.436 times more likely to be non-compliant with consuming Fe compared to respondents who are parity who are not at risk. The parity of the respondents will influence their knowledge and experience and will have an impact on their compliance with consuming Fe tablets. Because the higher and lower the parity, the higher the risk that will occur during pregnancy. This means that mothers with primiparous or grande multiparous parity will be more at risk of not complying with Fe consumption because primiparous mothers have no previous experience regarding Fe

consumption and grand multiparous mothers have repeatedly consumed Fe, resulting in boredom or boredom in consuming Fe compared to multiparous parity which is parity. Which is ideal and not risky.

The regularity of ANC is also related to the incidence of anemia in pregnant women as a risk factor for LBW. Primigravid pregnant women who do not regularly attend ANC visits have a 6.7 times higher risk of giving birth to LBW compared to first-time pregnant women who regularly attend ANC examinations due to lack of pregnancy knowledge and not getting early detection of disease (Suryani, Peristiowati, & Puspitasari, 2020; Winarsih, Revika, & Nabila, 2024). The frequency of ANC visits also influences the incidence of anemia in pregnant women. Other research reveals a relationship between the regularity of ANC and the incidence of anemia in pregnant women with a p-value of 0.002. Pregnant women who make regular ANC visits have a lower risk of developing anemia than pregnant women who have irregular antenatal care visits. Apart from that, mothers who regularly have ANC will also find it easier to identify abnormalities experienced from the start of pregnancy and can be detected early.

Anemia in pregnant women can be influenced from a nutritional perspective, starting with depletion of iron stores (ferritin) and increased iron absorption, which is reflected in the increasing iron binding capacity, resulting in depletion of iron reserves, continued transferrin saturation, and reduced amounts of converted protoporphyrin. To heme as serum ferritin levels decrease. This results in anemia characterized by low Hb levels (Angriani & Satriono, 2023; Balbaa, Kamel, Salem, & Sadek, 2023). Other research also states that pregnant women are obedient to consuming iron tablets but still experience

anemia, namely moderate anemia and mild anemia. This is due to the mother's inadequate nutritional intake. Besides that, the mother's busy work life makes the mother easily tired and will ultimately cause the mother to experience anemia even though she has taken Fe tablets. Apart from that, mothers comply with consuming 90 Fe tablets during pregnancy, but misusing them, namely drinking them with coffee, tea, or milk, will, of course, result in the Fe tablets not being absorbed optimally.

Hence, anemia in pregnant women becomes unavoidable. In addition, some mothers also experience pregnancy with excessive nausea and vomiting, so they are physically very weak. So, even if you consume iron tablets, the mother's Hb level is still in the mild anemia category under these conditions. By theory, Hb levels are expected to be standard in pregnant women who consume Fe tablets because iron needs in pregnancy cannot be met only from food, even though it contains a lot of iron and has high absorption. Therefore, it is recommended that nutritional adequacy be met through supplementation. Pregnant women who are deficient in Fe can experience iron anemia. Iron deficiency can also cause fatigue, so giving Fe tablets is one of the services provided at pregnancy visits, where each tablet contains 300 mg of ferrous sulfate ($FeSO_4$) (60 mg of iron). Pregnant women's non-compliance in consuming Fe tablets is also due to pregnant women's ignorance about the benefits of Fe tablets and the impact that will occur if the mother is deficient in iron during pregnancy (Georgieff, 2020; Means, 2020).

According to researchers, the regularity of pregnant women's ANC visits makes it easier for health workers to meet the need for blood/Fe tablets during pregnancy and provide health education regarding anemia. However, maternal compliance in consuming Fe tablets requires support from various parties other than health workers, namely support from family, husband, biological mother, and in-laws as the people closest to the pregnant mother who can motivate the mother to regularly consume Fe tablets and foods that contain lots of iron. Compliance with consuming Fe can be measured from the accuracy of the number of Fe tablets consumed, the accuracy of how to consume Fe tablets, and the frequency of consuming Fe tablets daily. Pregnant women's classes and WhatsApp groups for pregnant women are necessary for pregnant women to get various information related to their pregnancy.

Baby Birth Weight

Based on birth weight, it is known that most babies are categorized as having a normal weight. However, many respondents experienced low birth weight (LBW), indicating the need for attention to maternal and neonatal health factors. Other research states that pregnant women under the age of 20 years have a 1.5 times higher chance of developing LBW than pregnant women aged between 20 and 35 years. Babies are more likely to be born LBW because delivery carries a risk of complications such as bleeding and infection that is more than three times higher. Babies occurring just before the age of 20 years and after the age of 35 years have a significant risk, even up to two to four times higher than babies in women who are in good reproductive health (20-35 years) (E. Nurjanah & Hutasoit, 2024; S. Nurjanah & Anggraeni, 2024). other similar studies also state that One of the factors that influence the occurrence of LBW is the mother's age. Pregnancy at a young age is a risk factor because the reproductive organs are immature and not ready to be fertilized (pregnancy), so it can be detrimental to the mother's health and hinder the development and growth of the fetus.

Pregnancy at an old age dramatically affects the mother's condition because, at this age, the mother's health has begun to decline; if the mother's condition declines, this will also affect the fetus she is carrying.

Other studies have indicated a significant relationship between maternal parity and low birth weight (LBW) incidence in babies. The findings suggest that mothers with moderate parity (2 or 3 children) are less likely to experience LBW compared to those with lower or higher parity. This research concludes that parity is a key factor influencing the likelihood of LBW, as supported by statistical analysis demonstrating a strong correlation. According to researchers' assumptions, the incidence of LBW is not only caused by maternal age, parity, gestational age, and prenatal examinations, but this is due to the amount of nutritional intake received by the mother and fetus while still in the womb, whether or not it meets dietary needs during pregnancy, as well as how concerned it is. Mothers should carry out recommendations from health workers regarding their health during pregnancy and adequate information regarding the prevention of complications, especially factors that cause LBW that can arise in the mother and fetus, so that she can anticipate LBW (E. Nurjanah & Hutasoit, 2024; S. Nurjanah & Anggraeni, 2024).

This is in line with other research that shows that 54.2% of respondents with dangerous carbon monoxide levels experienced LBW. As many as 66.7% of respondents who did not complete antenatal care (ANC) visits experienced LBW. As many as 100% of respondents who did not consume complete iron experienced LBW. It was found that there was no significant relationship between maternal carbon monoxide levels, ANC visits, iron intake, and the incidence of LBW. The results of in-depth interviews in other research based on qualitative studies show that although ANC visits were carried out, their implementation is still lacking in quality because counseling activities are not optimal. As for compliance with the intake of blood supplement tablets by mothers during pregnancy, some respondents stated that they did not comply because of the side effects they experienced, forgetfulness, and lack of attention to the importance of iron intake during pregnancy. (Rahim FK,2020)

Relationship between the incidence of anemia in pregnant women and the baby's birth weight

Based on Hb levels and birth weight, it is observed that nearly half of the respondents had normal hemoglobin levels and normal birth weight. A smaller proportion of respondents experienced anemia accompanied by low birth weight. Research findings indicate a relationship between anemia in pregnant women and the incidence of low birth weight, with a positive correlation. However, the strength of this correlation is low, suggesting that while the two variables are related, other factors may also play a significant role.

Another study revealed a significant relationship between anemia in pregnant women and low birth weight (LBW) incidence, as demonstrated by the results of a Chi-Square statistical test. This finding highlights anemia as an essential factor associated with the likelihood of LBW in newborns. The results of the analysis show that the OR value = 5.016, meaning that pregnant women who experience anemia are 5.016 times more likely to give birth to LBW. Anemia in pregnancy is when the body has few red blood cells or cells that cannot carry oxygen to various body organs. The health condition of pregnant women is critical because it affects the condition of the body that will be born. Anemia in pregnancy is very dangerous for the mother and fetus.

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The impact of anemia on pregnant women is abortion, premature birth, impaired fetal growth and development or low birth weight (LBW), antepartum hemorrhage, and premature rupture of membranes. Anemia in pregnancy is a mother's condition with Hb levels < 11 gr% in Trimester I and III, while in Trimester II, Hb levels < 10.5 gr%. Pregnancy anemia is called a "Potential Danger To Mother and Child," which is why anemia requires serious attention from all parties involved in health services (Guspianto & Ibnu, 2020; Rini, 2020)

According to researchers, based on the correlation coefficient obtained in this study with a low value (0.237), it is known that anemia can increase the occurrence of LBW. Still, anemia is not the only factor causing LBW. Pregnancy checks are performed monthly, and good nutrition and Fe tablets are needed to prevent anemia and LBW.

Another study found that adherence to iron tablets during pregnancy is significantly related to birth weight. Most mothers who adhered to iron tablet consumption gave birth to babies with normal birth weight, while a small proportion of non-compliant mothers gave birth to babies with low birth weight (LBW). The statistical analysis indicated a meaningful relationship between adherence and birth weight, with a negative correlation, suggesting that non-compliance increases the likelihood of LBW. These findings emphasize the importance of compliance with iron supplementation during pregnancy to support healthy birth outcomes.

It is known that a small proportion of pregnant women did not experience anemia. Additionally, there were pregnant women who, despite being anemic, gave birth to babies with normal birth weight. Interestingly, a few anemic pregnant women even gave birth to larger-than-normal babies. These variations highlight the complex relationship between maternal anemia and birth weight, suggesting that other factors may influence birth outcomes.

The pregnant woman's age does not influence a baby's birth weight. A baby's birth weight is influenced by two factors, namely internal and external factors. Age is included in the mother's internal factors. High parity will impact the emergence of various health problems for both the mother and the baby. Repeated pregnancies and childbirth cause damage to the blood vessels in the uterine walls and a decline in the flexibility (elasticity) of tissues that have been repeatedly stretched by pregnancy so that they tend to develop abnormalities in the location or growth of the placenta and fetal development, resulting in low birth weight (LBW). This is due to other factors that result in LBW babies. From the research results, it was found that more primiparous/grand multiparous mothers gave birth to non-LBW babies. Pregnant women with CED have 10 times the chance of giving birth to an LBW baby. Insufficient upper arm circumference is a measure of lack of nutrition in pregnant women, which causes risks and complications for pregnant women and giving birth and can affect the process of growth and development of the fetus so that it is likely to give birth to an LBW baby.

Another study found a significant relationship between chronic energy deficiency (CED) in mothers and the incidence of low birth weight (LBW). Among mothers with CED, the majority gave birth to babies with LBW, while a smaller proportion had babies with regular birth weights. In contrast, most mothers without CED gave birth to babies with normal birth weight, though a significant number still had LBW babies. The statistical analysis showed a p-value of 0.045 ($p < 0.05$),

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indicating a meaningful relationship, with an odds ratio (OR) of 3.333. This means that pregnant women with CED have more than three times the risk of giving birth to LBW babies compared to those without CED.

Nutritional problems can cause malnutrition status in pregnant women they experience. Nutritional problems that pregnant women often experience are chronic energy deficiency and nutritional anemia, which can inhibit fetal growth, thereby causing the risk of low birth weight of the baby. Half of SEZ pregnant women experience a deficit in energy and protein intake, so providing additional food that focuses on macro and micronutrients for pregnant women is vital to prevent low birth weight babies and stunted toddlers (Stunting).

Based on an analysis of 10 journals regarding the relationship between CED and the incidence of LBW in newborn babies, all journals concluded that there was a relationship between CED and the incidence of LBW in newborn babies. Chronic energy deficiency (CED) is a condition in which the mother suffers from a chronic lack of food, which results in health problems for the mother. The presence of CED results in a small placenta size and a lack of supply of nutrients to the fetus, so the nutritional needs of the fetus are not met and will result in LBW. This condition of nutritional imbalance or malnutrition causes the mother to experience a decrease in blood volume. Blood volume is essential for carrying nutrients or O2 to the fetus through the placenta. Decreased blood volume causes inadequate cardiac output; blood to the placenta, which carries nutrients to the fetus, is reduced, causing a smaller placenta size. Also, impaired circulation of O2 and nutrition will result in stunted fetal growth or LBW. Chronic energy deficiency causes pregnant women not to have adequate nutritional reserves to provide the physiological needs of pregnancy, namely hormonal changes and increased blood volume to supply oxygen throughout the system for fetal growth.

Other research results found a significant relationship between preeclampsia and the incidence of LBW with p-value = 0.001 (p<0.05). The magnitude of the PR association was 1.483 with 95% CI (1.21-1.86). This means that mothers with preeclampsia have a 1,483 risk of having an LBW baby. The incidence of LBW is related to the handling of severe cases of preeclampsia and eclampsia requiring active action, namely immediate termination of pregnancy regardless of gestational age and estimated fetal weight so that babies with low birth weight can be born. Therefore, monitoring by health workers is essential for mothers who experience complications in their pregnancies, especially those who have high blood pressure during pregnancy, so that they can be treated early. Conservative treatment is carried out so that LBW incidents can be prevented. One of the causes is preeclampsia, which begins with abnormalities in the formation of blood vessels, which can cause LBW due to IUGR or early (premature) termination of pregnancy.

Other research on multiple pregnancies and low birth weight (LBW) shows a significant association. The results indicate that women with multiple pregnancies are at a higher risk of giving birth to babies with LBW compared to those with single pregnancies. This relationship underscores the increased likelihood of LBW in cases of multiple pregnancies. In multiple pregnancies, the uterus stretches excessively, thereby exceeding the tolerance limit and causing premature labor. While the weight of each child is less than average, the total weight is greater

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than that of a single baby. One child can be 50 to 1000 grams heavier than the other. In half the cases, the children are at full-term weight. In one-eighth of pregnancies, the babies were under 1500 grams. The remaining three-eighths are between 1500-2500 grams, according to theory. Multiple pregnancies that cause LBW are caused by genetic factors that have a history of multiple pregnancies because certain families tend to give birth to twins, which are usually inherited paternally but can also be maternal; this is the same as the existing theory. The parity factor causes multiple pregnancies, which is based on the theory that in primiparas, it is 9.8 per 1000. Various pregnancies can also increase the incidence of severe pre-eclampsia 5 times, and nutritional factors, which are divided into 2 in the uterus, can also cause anemia (Deviana, Damayanti, & Hamidah, 2024; Mufida, Rohmah, & Siwi, 2024).

According to researchers, there is a low relationship between the incidence of anemia in pregnant women and birth weight; this causes the lower the incidence of anemia, the lower the birth weight, and is influenced by many other factors that can cause anemia, such as CED, Pre-Eclampsia, and Pregnancy—twins born prematurely. Lack of nutritional intake and consumption of Fe tablets in pregnant women can cause pregnant women to suffer from anemia. Pregnant women need special attention to meeting dietary needs and consuming Fe tablets during pregnancy. Other things that can be done are increasing ANC to at least 6x, providing health education about the growth and development of the fetus in the mother's womb, danger signs during pregnancy, and self-care for the mother during pregnancy so that she can maintain good health of the mother and fetus during pregnancy.

Conclusion

The contributions to this study were collaborative. The study was conceptualized and designed, with data collection and analysis conducted by the primary researcher. Assistance was provided in data collection, and valuable insights were offered during the analysis process. Statistical analysis and interpretation of results were carried out, with all contributors reviewing and approving the final manuscript, ensuring its quality and accuracy.

Authors Contributions

The authors contributed significantly to the conception and design of the study, development of the research methodology, and overall supervision of data collection and analysis. Data collection and statistical analysis were carried out, followed by the interpretation of results. The authors collaborated on drafting and revising the manuscript, with a particular focus on the literature review, methodology, and results.

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All authors contributed to the final manuscript, ensuring accuracy and clarity in the presentation of the research findings.

Conflicts of Interest

The research team declares that no conflicts of interest, whether financial, personal, or professional, existed at any stage of this study, ensuring that the research was conducted with complete independence and integrity.

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