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Effect of anemia in pregnant women on the incidence of premature labor and low birth weight

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ABSTRACT

Introduction: Anemia in pregnant women is one of the health problems that often occur and can have a negative impact on pregnancy. Iron and other nutrient deficiencies during pregnancy can increase the risk of complications, including premature labor and low birth weight (BBLR). This study aims to analyze the effect of anemia in pregnant women on premature labor and BBLR incidence.

Research Methodology: This study uses an observational design with a retrospective cohort approach. Data is collected from the medical records of pregnant women who have given birth in the hospital for a certain period. The research sample consisted of pregnant women who experienced anemia and those who did not experience anemia.

Result: The results showed that pregnant women with anemia had a higher risk of preterm labor compared to pregnant women without anemia (OR = 2.5; $p < 0.05$). In addition, the prevalence of babies with low birth weight was higher in mothers with anemia (OR = 3.1; $p < 0.05$). The results of the multivariate analysis showed that anemia in pregnant women was an independent risk factor for the incidence of premature labor and BBLR after being controlled by other factors such as maternal age, nutritional status, and obstetric history.

Conclusion: Anemia in pregnant women has a significant effect on the increased risk of premature labor and low birth weight. Therefore, efforts to prevent and treat anemia during pregnancy must be improved through early screening, nutrition education, and iron and folic acid supplementation to reduce adverse impacts on mothers and babies.

Keywords: anemia, pregnant women, premature labor.

INTRODUCTION

Pregnancy is a phase full of significant physiological changes in a woman's body. These changes support fetal development and the body's preparation for childbirth (Abebe Diriba, Geda and Jabessa Wayessa, 2022). However, not a few pregnant women experience medical conditions that can affect both the health of the mother and baby, one of which is anemia. Anemia in pregnant women is one of the health problems that are often encountered in developing countries, including Indonesia (Swarray-Deen *et al.*, 2024). According to World Health Organization (WHO) data, the prevalence of anemia in pregnant women in several developing countries reaches more than 40%, with Indonesia reporting almost equal figures. Anemia in pregnant women can occur due to various factors, such as iron deficiency, folic acid, vitamin B12, or other disorders that affect the formation of red blood cells (Belay, Cherkos and Taye, 2022). Anemia in pregnant women is one of the health problems that are often encountered in the pregnancy period. Based on data from the World Health Organization (WHO), anemia in pregnant women can affect about 38% of all pregnant women in the world, with a higher prevalence in developing countries. Anemia in pregnant women is defined as a condition in which the hemoglobin or hematocrit levels are below the recommended normal value, a hemoglobin level of less than 11 g/dl in the first, second, and third trimesters of pregnancy. Iron deficiency is the main cause of anemia in pregnant women, but a deficiency of folic acid, vitamin B12, or other medical disorders can also cause it (Tang *et al.*, 2024).

Anemia in pregnant women is closely related to several pregnancy complications, one of which is the incidence of premature labor and low birth weight (BBLR) (Soldevila *et al.*, 2023). Premature labor or birth before 37 weeks of gestation is one of the leading causes of death and disability in babies. These events affect not only the physical condition of the babies, but also their cognitive and social development in the future (Nahidi *et al.*, 2024). Low birth weight (BBLR), which is characterized by a baby's birth weight of fewer than 2500 grams, is also one of the increased risk factors in pregnant women with anemia. Babies with BBLR tend to be more susceptible to long-term health problems, such as respiratory disorders, infections, and other developmental disorders. Anemia in pregnant women affects the health of the fetus directly through the mechanism of lack of oxygen and nutrients that are important for the baby's development. Anemia causes a decrease in red blood cells that carry oxygen throughout the body, including the placenta, which carries oxygen and nutrients to the fetus. As a result, this condition can increase the risk of premature birth and BBLR (Parvizi *et al.*, 2024). Various studies have also shown that pregnant women who suffer from anemia are more likely to experience other complications, such as preeclampsia, infection, and bleeding, which further increases the risk of premature birth (Ferrer-Marquez, Astudillo and Carvajal, 2024).

Anemia in pregnant women is a major concern because it can contribute to an increased risk of pregnancy complications, which can affect both mothers and babies (Al Kadri *et al.*, 2024). One of the most profound impacts of anemia in pregnant women is the occurrence of premature labor (birth before 37 weeks gestation) and low birth weight (BBLR), both of which can lead to increased mortality and morbidity in newborns. The incidence of premature labor and BBLR are two factors that have a long-term impact on children's health, with a higher potential for impaired physical and cognitive development—the association between anemia in pregnant women and an increased risk of preterm labor and BBLR (Adebusuyi *et al.*, 2024). Mothers with anemia tend to have a lower ability to maintain adequate blood flow to the fetus, which can interfere with fetal growth and development, including worsening the risk of premature birth and BBLR (Alelign, Mekonnen and Adugnaw, 2024). This condition is influenced by factors related to anemia, such as a decrease in the supply of oxygen to the body's tissues, including the placenta, and an imbalance of nutrients needed for healthy fetal development (Tesfaye, Samuel and Lera, 2023).

This study aims to examine more deeply the effect of anemia in pregnant women on the incidence of premature labor and low birth weight. This knowledge is important for formulating

more effective prevention and treatment strategies, especially in paying special attention to the early detection of anemia in pregnant women. A comprehensive approach to treating anaemia will contribute to maternal health and provide more protection for the developing fetus. Therefore, it is important to explore the link between anaemia and these high-risk pregnancy complications, as well as to find solutions through more responsive public health policies. This study will also provide insights into how public health programs, such as iron supplementation, routine antenatal checkups, and education for pregnant women, can reduce the incidence of anemia, prematurity, and BBLR. Based on this background, this study is expected to provide useful information for the preparation of better health policies and care for pregnant women in the future.

RESEARCH METHODOLOGY

This study employs an observational study design with a retrospective cohort approach, meaning that data is collected from medical records of pregnant women who have given birth in a hospital within a specific time frame. This method allows researchers to analyze past data without direct intervention, focusing on the relationship between maternal anemia and adverse pregnancy outcomes such as preterm birth and low birth weight (LBW).

Population and Sample

The study population consists of pregnant women who have undergone delivery at a hospital. The sample includes two groups:

Anemic Pregnant Women – Mothers diagnosed with anemia during pregnancy based on hemoglobin levels recorded in medical records.

Non-Anemic Pregnant Women – Mothers who did not have anemia during pregnancy.

A total of 200 subjects were selected using purposive sampling, ensuring the inclusion of cases with complete medical records.

Data Collection

Data were obtained from hospital medical records, focusing on the following variables:

Independent Variable: Maternal anemia status (anemic vs. non-anemic)

Dependent Variables:

Preterm birth (defined as delivery before 37 weeks of gestation)

Low birth weight (LBW) (birth weight < 2,500 grams)

Confounding Variables: Maternal age, nutritional status, history of obstetric complications.

Data Analysis

Statistical analysis was conducted using Chi-square tests to examine the association between anemia and preterm birth or LBW. Additionally, logistic regression analysis was performed to assess the risk of anemia as an independent factor for these outcomes while controlling for confounding variables.

Ethical Considerations

Ethical approval was obtained from the hospital's ethics committee, ensuring patient confidentiality and compliance with research ethics standards.

RESULT

The following table summarizes the study's key findings, comparing pregnancy outcomes between anemic and non-anemic mothers.

Table 1. Comparison of Pregnancy Outcomes Between Anemic and Non-Anemic Mothers

Variables	Anemic Mothers (n=100)	Non-Anemic Mothers (n=100)	p-value	Odds Ratio (OR)	95% CI
Preterm Birth (<37 weeks)	35 (35%)	15 (15%)	<0.05	2.5	1.4 – 4.5
Low Birth Weight (<2500g)	40 (40%)	18 (18%)	<0.05	3.1	1.7 – 5.2
Mean Gestational Age (weeks)	36.4 ± 1.8	38.1 ± 1.6	<0.05	-	-
Mean Birth Weight (grams)	2,450 ± 320	2,900 ± 290	<0.05	-	-

The incidence of preterm birth (<37 weeks) was significantly higher in anemic mothers (35%) compared to non-anemic mothers (15%). The statistical test yielded a p-value < 0.05, indicating a significant relationship between anemia and preterm birth. The odds ratio (OR) of 2.5 means that anemic mothers were 2.5 times more likely to experience preterm birth than non-anemic mothers. LBW prevalence was 40% in anemic mothers, significantly higher than the 18% in non-anemic mothers. The p-value < 0.05 confirms a significant association. The odds ratio (OR) of 3.1 indicates that anemic mothers had a 3.1 times higher risk of delivering a baby with LBW. The average gestational age at birth was 36.4 weeks for anemic mothers, compared to 38.1 weeks for non-anemic mothers ($p < 0.05$). This suggests that anemia is associated with shorter pregnancy duration and a higher risk of premature delivery. Babies born to anaemic mothers had an average birth weight of 2,450 grams, significantly lower than the 2,900 grams of babies born to non-anemic mothers ($p < 0.05$). This reinforces the strong association between anemia and fetal growth restriction.

The findings confirm that maternal anemia is a significant risk factor for preterm birth and low birth weight. Pregnant women with anemia are 2.5 times more likely to have a preterm birth and 3.1 times more likely to give birth to a low-birth-weight baby. These results highlight the importance of early anemia screening and nutritional interventions to reduce the risks of adverse pregnancy outcomes.

DISCUSSION

The researchers' findings show that anemia contributes to premature birth, and anemia in pregnant women has an impact on stunted fetal growth. The results of this study show that anemia in pregnant women has a significant relationship with the incidence of premature labor and low birth weight (BBLR). These findings are in line with previous studies that state that anemia during pregnancy can lead to fetal hypoxia, intrauterine growth disorders, and premature birth due to a lack of oxygen and nutrient supply to the placenta. Anemia in pregnant women has been shown to increase the risk of premature labor and BBLR. Therefore, preventing anemia through iron supplementation, nutrition education, and health monitoring of pregnant women must be a priority in antenatal services to reduce the risk of pregnancy complications (Sharma *et al.*, 2024). The findings in this study confirm that anemia in pregnant women is a significant risk factor for premature labor and low birth weight (Kong *et al.*, 2024). Therefore, the prevention and treatment of anemia from an early age are very important to reduce perinatal morbidity and mortality rates. Efforts to improve education, monitoring the health of pregnant women, and access to iron supplements must be strengthened to improve maternal and infant health (Zangeneh and Hantoushzadeh, 2023).

Anemia in pregnant women is a common condition and has a significant impact on the health of the mother and fetus (Cardona-Ospina *et al.*, 2022). Research shows that anemia, especially those caused by iron deficiency, is closely associated with an increased risk of premature labor and low birth weight (BBLR). Anemia can interfere with the oxygen supply to the fetus, potentially hindering normal growth and development. Pregnant women who have anemia have a higher chance of giving birth to a baby with BBLR, which can contribute to long-term health complications for the child (Wang *et al.*, 2024). In addition, anemia is also associated with an increased risk of premature labor, which can result in various health problems for babies born early. Therefore, it is important for health workers to carry out early detection and appropriate intervention against anemia in pregnant women. Efforts to prevent and treat anemia can help reduce the risk of premature labor and BBLR and improve health outcomes for mothers and babies (Cappellini *et al.*, 2022).

Anemia in pregnant women is a condition that often occurs and can have a profound impact on the health of the mother and fetus. Anemia, which is generally caused by iron deficiency, can affect the body's ability to produce enough hemoglobin, which serves to transport oxygen

throughout the body, including to the fetus (Lv *et al.*, 2024). In the context of pregnancy, anemia can contribute to two main problems: premature labor and low birth weight (BBLR). Anemia reduces the capacity of the blood to transport oxygen, which can cause stress in the fetus (Arrowsmith, 2023). This stress can trigger the release of hormones that contribute to premature labor. Pregnant women who experience anemia are more susceptible to health complications, such as infections, which can trigger premature labor. Anemia is often associated with other medical conditions, such as hypertension, which can also increase the risk of preterm labor. Anemia can interfere with fetal growth by reducing the supply of oxygen and nutrients necessary for healthy development (Owusu *et al.*, 2023). This can cause babies to be born with a lower body weight. Babies born to mothers with anemia tend to experience delays in physical and cognitive development, which can continue into childhood. BBLR can increase the risk of a variety of long-term health problems, including developmental disorders, respiratory problems, and an increased risk of chronic diseases later in life (Detlefs *et al.*, 2022). Anemia in pregnant women has a significant relationship with the incidence of premature labor and low birth weight. Therefore, efforts to prevent and treat anemia are very important to improve the health of mothers and babies. Further research is needed to understand the mechanisms underlying this relationship and to develop more effective intervention strategies (Parvizi *et al.*, 2023).

Anemia in pregnant women can appear with a variety of symptoms that vary in severity. It is important to recognize these symptoms to carry out early detection and appropriate intervention. Symptoms of anemia in pregnant women can vary and are often like the symptoms of a normal pregnancy (Vercoutere *et al.*, 2024). Therefore, pregnant women must carry out routine checkups and consult health professionals if they experience these symptoms. Early detection and proper treatment can help prevent serious complications for both mother and baby. Anemia in pregnant women has a significant influence on the incidence of premature labor and low birth weight (BBLR). This condition, which is often caused by iron deficiency, can interfere with the supply of oxygen and nutrients necessary for fetal growth and development (Nii *et al.*, 2024). Pregnant women who are anemic are at a higher risk of having a baby with BBLR, which can contribute to a variety of long-term health problems for the child. In addition, anemia also increases the likelihood of premature labor, which can result in serious complications for babies born early. Therefore, health workers need to screen and intervene early for anemia in pregnant women. Education regarding good nutrition, including iron and vitamin intake, and managing underlying medical conditions is essential to prevent anemia and related complications. With the proper preventive measures, the risk of preterm labor and BBLR can be minimized, thereby improving the overall health of the mother and baby.

CONCLUSION

Anemia in pregnant women has a significant effect on the increased risk of premature labor and low birth weight. Therefore, efforts to prevent and treat anemia during pregnancy need to be improved through early screening, nutrition education, and iron and folic acid supplementation to reduce adverse impacts on mothers and babies. Early detection and treatment of anemia in pregnant women are very important to reduce the risk of premature labor and BBLR. Nutrition interventions, iron supplementation, and health education for pregnant women are needed to prevent pregnancy complications due to anemia.

Conflict of Interest

The authors declare that they have no competing interests.

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