JMU
Jurnal Medika Udayana
ISSN: 2597-8012 JURNAL MEDIKA UDAYANA, VOL. 13 NO.10, OKTOBER, 2024
Received: 2023-10-26 Revision: 2024-05-05 Accepted: 12-09-2024

EFFECT OF PROVIDING HIGH PROTEIN MILK INTAKE ON INCREASING HB LEVELS IN PREGNANCY WITH ANEMIA

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ABSTRACT

Indonesia still has a high maternal mortality rate, and three main causes contribute to it, the cause of anemia is bleeding. Anemia is related to a lack of protein, and the solution to this problem is to provide iron tablets and protein intake to pregnant women. A study was conducted to determine the effect of high-protein milk intake on increasing Hb levels in pregnant women with anemia. The study design was a one-group pretest-posttest pre-experiment, and the population studied were all third-trimester pregnant women with anemia in the Puskesmas Sukosewu. The total population was 50, and the sample size was 33. The statistical test used in this study was the Wilcoxon Signed Rank Test, and the results showed that the average Hb level before treatment was 10.1 gr/dl, which increased to 11.1 gr/dl after treatment. The data analysis showed that the high-protein milk intake significantly increased Hb levels in pregnant women with anemia in the Wava Husada Hospital (p = 0.000). This study concludes that milk protein intake has a significant effect on increasing Hb levels in pregnant women. Pregnant women with anemia are advised to pay attention to their nutritional intake, especially protein intake.
Keywords: High Protein Milk., Hb Levels.,Anemia Pregnant Women

INTRODUCTION

Anemia is a common but potentially dangerous health issue that can affect all age groups, including pregnant women, teenagers, and school-aged children. Globally, around 40% of pregnant women experience anemia [1]. The high maternal mortality rate in Indonesia is still dominated by three main causes: hemorrhage, hypertension during pregnancy (HDK), and infections [2]. Hemorrhage ranks highest as the cause of maternal death throughout the perinatal period, while anemia is one of the conditions that can lead to hemorrhage. Anemia during pregnancy is defined as having a hemoglobin level below 11 g/dL in the first and third trimesters, or a hemoglobin level below 10.5 g/dL in the second trimester [3]. Pregnancy causes an increase in plasma volume by about 30%, red blood cells by 18%, and hemoglobin by 19%. If this does not occur, pregnant women may face serious issues. Anemia increases the frequency of complications during pregnancy and childbirth. The risks of maternal mortality, prematurity, low birth weight, and perinatal mortality all rise [4]. Additionally, antepartum and postpartum hemorrhage are more commonly observed in anemic women [5]. Hemoglobin levels during pregnancy gradually decrease, starting in the first trimester (TM I). They continue to decline to the lowest point in the second trimester (TM II), then increase again in the third trimester (TM III) [6]. The prevalence of anemia during pregnancy is higher in developing countries compared to developed countries [1-2]. In 2016, the prevalence of anemia among women of reproductive age in ASEAN countries was 30.79%, with Indonesia ranking sixth at 28.83%. This follows Thailand, which had a prevalence of 31.85%, and precedes Malaysia, with a prevalence of 24.9% [7]. Based on the analysis by the Indonesian Ministry of Health in 2019, the prevalence of anemia among pregnant women in Indonesia remains high, at around 48.9%, which exceeds the anemia prevalence threshold of 40%. The Indonesian government has undertaken various measures to prevent anemia in pregnant women, one of which is recommending that every pregnant woman consume at least 90 iron supplement tablets (Fe) during pregnancy [2]. Although the coverage of pregnant women in Indonesia is quite high, the incidence of anemia among pregnant women in the lower-middle economic class continues to increase as pregnancy progresses. The rates are 8% in the first trimester, 12% in the second trimester, and 29% in the third trimester across all community health centers in Bojonegoro Regency. In 2021, the number of pregnant women visiting Puskesmas Sukosewu increased, with 28% of these pregnant women

experiencing anemia, out of 100% of the pregnant women who visited.

From this data, it can be concluded that the incidence of anemia among pregnant women remains quite high, despite the free distribution of iron supplement tablets in Bojonegoro Regency [8]. Hemoglobin is composed of iron and protein. Protein plays a role in transporting iron to the bone marrow to form new hemoglobin molecules. The protein in red blood cells is responsible for binding oxygen and transporting it throughout the body [9]. Additionally, proteins form transferrin, which binds to iron and carries it to the bone marrow for the process of hemoglobin formation. If the iron levels are insufficient, hemoglobin production is disrupted, resulting in anemia in pregnant women [10]. The results of the analysis of food consumption patterns regarding protein sources indicate that 31.8% of pregnant women consume plant-based proteins such as tofu and tempeh, with a food weight of 40 grams per day. Meanwhile, 95.5%-100% of pregnant women never consume animal-based proteins such as offal, beef, shrimp, or crab. From this data, it can be seen that the protein intake of pregnant women who only consume plant-based proteins like tofu and tempeh remains below the Recommended Nutrient Intake (RNI) target, which is approximately ≥76 grams [11]. This solution to this issue is by providing iron supplement tablets along with increasing protein intake for pregnant women. Protein can be obtained from plant-based or animal-based sources. It is crucial to consume protein-rich foods with every meal, and animal-based protein is highly recommended. Animal-based proteins are more easily absorbed by the body. Proteins are not only found in red blood cells (erythrocytes) but also exist in significant amounts in blood plasma, where they function to maintain blood osmotic pressure. If the protein levels in the blood plasma are low, blood osmotic pressure can be disrupted or decreased. [12].

The objective of this research is to determine the effect of high-protein milk intake on the increase of hemoglobin levels in pregnant women with anemia at Puskesmas Sukosewu.

METHOD

The research design used in this study is pre-experiment one group pretest-posttest. This study was conducted at Puskesmas Sukosewu in August 2023. The samples were taken from the Obgyn Clinic for three months, from June to August 2023. The inclusion criteria for the study samples are all third-trimester pregnant women with anemia, aged 20-35 years, without any other medical conditions, and willing to participate in the study by providing informed consent. The sampling technique used in this study is total sampling, with a sample size of 33 pregnant women in the third trimester with anemia at Puskesmas Sukosewu. Pregnant women who were diagnosed with anemia during their visit underwent an Hb examination, then they were given high-protein pregnancy milk to be consumed for one month. Subsequently, during the follow-up visit, another Hb examination was conducted, and the data were analyzed using observation sheets. The instruments used for data collection are the Hemoglobinometer and the High-Protein Milk Intake Observation Sheet.

The pre-test and post-test results were then compared to determine if the intervention had a significant effect. Statistical analysis in this study used the Wilcoxon Signed Rank Test. This research has obtained ethical approval from the Research Ethics Committee of Puskesmas Sukosewu.

RESULT

The results of this study to determine the effect of high-protein milk intake on the increase of hemoglobin levels in pregnant women with anemia are as follows:

Hemoglobin Levels Before High-Protein Milk Intake

Table 1. Hemoglobin Levels Before High-Protein Milk Intake

Hemoglobin Level	Mean	Minimum Value	Maximum Value
Pre-test	10,1 gr/dl	9,1 gr/dl	10,6 gr/dl

The table indicates that the average hemoglobin level before high-protein milk intake is 10.1 g/dL, with a minimum value of 9.1 g/dL and a maximum value of 10.6 g/dL.

Hemoglobin Levels After High-Protein Milk Intake

Table 2. Haemoglobin Levels After High-Protein Milk Intake

Hemoglobin Level	Mean	Minimum Value	Maximum Value
Post-test	11,1 gr/dl	10,7 gr/dl	11,6 gr/dl

The table indicates that the average hemoglobin level after high-protein milk intake is 11.1 g/dL, with a minimum value of 10.7 g/dL and a maximum value of 11.6 g/dL.

The Effect of High-Protein Milk Intake on the Increase of Hemoglobin Levels in Pregnant Women with Anemia

Table 3. The Effect of High-Protein Milk Intake on the Increase of Hemoglobin Levels in Pregnant Women with Anemia

Wilcoxon Signed Rank Test	ρ-value	Ranks
Hemoglobin level before intervention – Hemoglobin level after intervention	0,000	Positive Ranks = 33

The table showed the results of the Wilcoxon Signed Rank Test, indicating a p-value of ρ = 0.000. This result is smaller than the significance level used, which is α = 0.05. Therefore, there is an effect of high-protein milk intake on the increase of hemoglobin levels in pregnant women with anemia at Puskesmas Sukosewu. Additionally, the Ranks values indicate that all 33 respondents fall into the Positive Ranks category, meaning that all respondents experienced an increase in hemoglobin levels after being given a high-protein milk intake.

DISCUSSION

In this section, we will discuss the results of the research conducted on the effect of high-protein milk intake on the increase of hemoglobin levels in pregnant women with anemia at Puskesmas Sukosewu

Hemoglobin Levels Before Administration of High-Protein Milk

The research results indicate that the average hemoglobin level before the administration of high-protein milk is 10.1 g/dL, with a minimum value of 9.1 g/dL and a maximum value of 10.6 g/dL. These results show that all respondents are experiencing anemia. Anemia is a condition in which the body has a too-low number of red blood cells. Red blood cells contain hemoglobin, which functions to carry oxygen to all body tissues [13]. Anemia is one of the biggest public health problems in the world, especially among Women of Reproductive Age (WRA). The most common causes of anemia during pregnancy are iron deficiency, folic acid deficiency, and acute bleeding [14].Hematological changes related to pregnancy are due to the increased circulation to the placenta and breast growth. Plasma volume will increase by about 45-65%, starting in the second trimester of pregnancy, and reaching a maximum in the ninth month with an increase of around 1000 ml. It decreases slightly near term and returns to normal three months after childbirth [15]. Stimulation that increases plasma volume, such as plasma lactogen, causes an increase in aldosterone secretion. During pregnancy, the amount of iron needed is much greater compared to non-pregnant women. The iron available in the mother's body will be transferred to the fetus according to the gestational age. In the first trimester, iron is not absorbed much by the fetus, but in the second and third trimesters, the amount of iron needed by the body will increase [16]. Therefore, pregnant women must be able to meet their nutritional needs during pregnancy, both from food and iron supplements. If the iron in the mother's body is not sufficient, it can reduce the mother's hemoglobin levels, leading to anemia during pregnancy. Paying attention to nutritional needs during pregnancy is very important because not only can anemia occur, but it can also interfere with the growth and development of the fetus in the womb and cause other complications [17].This fact is consistent with research findings that show the incidence of anemia in pregnant women is more common in the third trimester (45.7%) compared to the second trimester (44.1%) and the first trimester (40.5%) [18]. Among pregnant women experiencing anemia, around 51 women (40.8%) are in the gestational age between the 13th and 28th weeks. Meanwhile, approximately 70 women (59.2%) are in the gestational age between the 29th and 40th weeks [13]. Based on this data, it can be concluded that the occurrence of anemia is more frequent in the third trimester compared to the second trimester. In the third trimester of pregnancy, there is a need for increased intake of nutrients containing building and regulatory substances compared to the second trimester. The third trimester is a period during which the fetus undergoes rapid growth and development, as well as preparation for childbirth [19]. If a pregnant woman experiences anemia, her body's metabolic capacity may decrease. Thus, the growth and development of the fetus in the womb can be disrupted [20]. The phenomenon observed as a research fact and the theory above illustrates that the occurrence of anemia is due to many factors, such as internal factors like gestational age, and external factors like inadequate nutritional intake for pregnant women.

Hemoglobin Levels After Administration of High-Protein Milk

The research results indicate that the average hemoglobin level after being given high-protein milk intake is 11.1 g/dL, with a minimum value of 10.7 g/dL and a maximum value of 11.6 g/dL. These results indicate that after being given high-protein milk intake, almost all respondents did not experience anemia. Protein is one of the essential nutrients to be considered during pregnancy. Pregnant women require a higher protein intake compared to non-pregnant conditions, which is beneficial for supporting cell formation for both the mother and the fetus [15].A good protein intake classification will decrease the incidence of anemia in pregnant women. Protein functions to transport iron through transferrin. If the body lacks protein intake, it can lead to disturbances in iron

transportation and the formation of hemoglobin and red blood cells, resulting in iron deficiency anemia. Protein is a component of all living cells and also the largest part of the body after water. Protein has the characteristic of building and maintaining body cells and tissues, a function that cannot be replaced by other substances [21].These facts and theories form the basis for researchers to formulate the opinion that the high-protein milk intake consumed by respondents plays a role in meeting the hemoglobin levels of pregnant women.

The Effect of High-Protein Milk Intake on Increasing Hemoglobin Levels in Pregnant Women with Anemia

The data analysis results on the effect of high-protein milk intake on increasing hemoglobin levels in third-trimester pregnant women with anemia showed a ρ-value of 0.000. The data result of $\rho = 0.000 < 0.05$, which means $\rho < \alpha$, leads to the acceptance of H1, indicating that there is an effect of high-protein milk intake on increasing hemoglobin levels in third-trimester pregnant women with anemia in the Puskesmas Sukosewu. Additionally, the Ranks values show that all 33 respondents fall into the Positive Ranks category, meaning that all respondents experienced an increase in hemoglobin levels after being given high-protein milk.

This research aligns with a study on the relationship between protein, iron, and vitamin C intake and anemia in second and third-trimester pregnant women, which found a p-value of 0.001 [22]. the research supports the finding that non-anemic pregnant women consume animal protein more frequently (4-5 times a week) compared to anemic pregnant women (3-4 times a week). Non-anemic pregnant women consume plant protein 3-5 times a week, while anemic pregnant women consume plant protein more frequently (6-7 times a week) [23-24].The quality of protein is determined by the type and proportion of amino acids it contains. Complete proteins, or those with high biological value, are proteins that contain all essential amino acids in proportions suitable for growth [25-26]. Sources of complete protein include all animal proteins except gelatin. Incomplete proteins, or those of lower quality, lack one or more essential amino acids. One of the sources of high-quality protein is high-protein milk [27].

Based on the above facts and theories, the researcher believes that as the gestational age increases, along with other influencing factors, the need for hemoglobin in the blood also increases. Meeting this need must be balanced with adequate nutrition, including sufficient protein intake.

CONCLUSION

The conclusions of this study are; 1) The average hemoglobin level before the administration of high-protein milk was 10.1 g/dL, with a minimum value of 9.1 g/dL and a maximum value of 10.6 g/dL, 2) The average hemoglobin level after the administration of high-protein milk was 11.1 g/dL, with a minimum value of 10.7 g/dL and a maximum value of 11.6 g/dL, 3) There is an effect of high-protein milk intake on increasing hemoglobin levels in pregnant women with anemia at Puskesmas Sukosewu (p-value = 0.000). Pregnant women who have a protein intake below the Recommended Dietary Allowance (RDA) should pay attention to their protein intake. Proper and effective health promotion by community health workers or other health professionals, particularly midwives, regarding the nutritional needs during pregnancy-including the quantity, timing, and type of intake appropriate for the gestational age reduces the number of pregnant women suffering from anemia and aid in the early detection of anemia. Additionally, there needs to be increased awareness about the importance of consuming iron tablets and high-protein foods for pregnant women.

ACKNOWLEDGEMENTS

This research was self-funded. The funding covered the cost of purchasing the milk used in the study. The device used to measure hemoglobin levels was the researcher's equipment, allowing the study to be conducted on an adequate scale and obtain significant data.

CONFLICT OF INTEREST

The researcher acknowledges the potential for a high conflict of interest, given that the source of funding is personal.

ETHICAL APPROVAL

This study received approval from the Research Ethics Committee of Puskesmas Sukosewu. Before the research began, all respondents were provided with informed choice information, including a complete explanation of the research objectives, procedures to be carried out, and potential risks and benefits. Respondents were allowed to ask questions and understand this information before signing the consent form. Privacy and data confidentiality were ensured, and the collected data would be securely stored and used solely for research purposes. Additionally, respondents were given the freedom to withdraw from the study at any time without any consequences.

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