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Effect of Beet and Lemon Juice on Increasing Hb Levels in Anemia Pregnant Women at the Tanjung Langkat Health Center in 2024

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ABSTRACT

The absence of red blood cells in the body is known as anemia. Anemia during pregnancy increases the risk of postpartum hemorrhage in expectant mothers. The results of the initial survey at the Tanjung Langkat Health Center in March 2024 showed that there were 24 pregnant women and 5 pregnant women were found to have anemia in TM 3. Beetroot juice is one of the many strategies pregnant women can use to avoid anemia. This study aims to ascertain how beet juice affects pregnant women with anemia by raising their hemoglobin levels. An experimental quasy design is a type of experiment that does not fully control all external variables (as in a fully randomized experiment), but still attempts to test a cause-and-effect relationship. In the pretest and posttest one group method, there is only one experimental group that is measured twice, namely before and after treatment (intervention). Based on the results of the study, Giving pregnant women with anemia beet and lemon juice has the effect of raising their hemoglobin levels. The majority of expectant mothers who drink this juice see a marked rise in hemoglobin levels. To raise awareness and knowledge of pregnant women, more education is required regarding the significance of preventing anemia during pregnancy and the choice of foods and drinks that encourage rising hemoglobin levels.

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1. Introduction

When the quantity of red blood cells or the amount of hemoglobin they contain is less than normal, it is called anemia. ("Impact of Continuous Kangaroo Mother Care Initiated Immediately after Birth (IKMC) on Survival of Newborns with Birth Weight between 1.0 To< 1.8 Kg: Study Protocol for a Randomized Controlled Trial," 2020). The optimal hemoglobin concentration varies widely, depending on factors such as age, gender, height of residence, smoking habits, and pregnancy status. For example, pregnant women often experience decreased hemoglobin levels due to increased blood volume during pregnancy, which can lead to anemia if iron and other nutrient intake is insufficient. A decrease in hemoglobin (Hb) levels in the blood, which is a condition known as anemia, can indeed cause a variety of symptoms that interfere with a person's daily life. Red blood cells contain a protein called hemoglobin, which is responsible for carrying oxygen throughout the body. The body doesn't get enough oxygen when hemoglobin levels drop, which results in discomfort. Anemia, a disorder characterized by a drop in hemoglobin (Hb) levels in the blood, can, in fact, result in a number of

symptoms that affect a person's day-to-day functioning. Red blood cells contain a protein called hemoglobin, which is responsible for carrying oxygen throughout the body. The body doesn't get enough oxygen when hemoglobin levels drop, which results in discomfort. A disorder known as anemia occurs when the blood's hemoglobin levels or red blood cell count are low, which impairs the blood's capacity to carry oxygen throughout the body.

Iron deficiency is the most frequent nutritional cause of anemia, while deficiencies in folate, vitamins B12, and A are also significant contributors (Bhadra & Deb, 2020). Anemia is a severe worldwide public health issue that mostly impacts young children, teenage girls and women who are menstruation, and women who are pregnant or just gave birth (Owais et al., 2021). Beetroot has a distinctive smell that not everyone likes even though it has so many benefits. The combination that I apply between beetroot and lemon is a follow-up action that I have previously done with beetroot and carrots and beetroot and tomatoes. But people prefer beetroot and lemon. The combination of lemon as a source of vitamin C creates a fresh sensation when drinking it and reduces the distinctive smell of beetroot. So I combine beetroot and lemon as the main goal of increasing Hb and increasing endurance for pregnant women.

Through various global health programmes, WHO continues to work to reduce the prevalence of anaemia worldwide, with a focus on more effective interventions in the most vulnerable populations. The World Health Organization estimates that anemia affects 40% of children aged 6 to 59 months, 37% of pregnant women, and 30% of women aged 15 to 49. These numbers demonstrate that anemia is quite common across a range of age groups and reproductive statuses. A low red blood cell count or a lack of hemoglobin is the hallmark of anemia, a medical condition that can cause a number of health issues in children, including exhaustion, stunted growth, and diminished cognitive abilities, as well as an increased risk of pregnancy complications for the mother. WHO also stresses the significance of preventing and treating anemia, which includes taking iron supplements, improving a healthy diet, and getting the right diagnosis and care based on each person's unique anemia cause (Stevens et al., 2022).

Anemia is a disease that develops when the blood's hemoglobin content or red blood cell count falls below the normal range. Red blood cells contain a protein called hemoglobin, which is responsible for carrying oxygen throughout the body. The body will struggle to distribute oxygen to different organs and tissues if hemoglobin levels are low, which can result in anemia's common symptoms, which include weakness, exhaustion, shortness of breath, and dizziness (Gao & Monaghan, 2018). When the body doesn't have enough hemoglobin to transport oxygen to the organs and tissues, anemia results. In extreme situations, anemia can impair a child's cognitive and motor development. Additionally, it may result in issues for expectant mothers and their unborn children. Poor diet, infections, chronic illnesses, heavy periods, problems during pregnancy, and family history can all contribute to anemia. Iron deficiency in the blood is frequently the cause (Huch & Schaefer, 2006). Iron deficiency and malaria are the two main causes of anemia in many low- and lower-middle-income nations, however anemia can be prevented and treated. These two situations have a significant effect on the region's public health and are frequently linked to environmental, social, and economic variables.

The most susceptible populations to anemia worldwide, particularly in poor nations, are pregnant women, women of reproductive age, and children under the age of five. Infections, particularly malaria, and iron deficiencies are the primary causes of anemia in this population. Interventions to address anaemia should include iron supplementation, food fortification programmes, infection prevention, as well as appropriate medical care for this vulnerable group. Children at this age have very high nutritional needs to support their growth and development, and they are more susceptible to nutritional deficiencies that can lead to anemia, adolescent girls and menstruating women, as monthly blood loss can increase the risk of anemia, Especially if they don't get enough iron in their diet, pregnant and postpartum women, who experience an increased need for iron to support fetal development and recovery after childbirth. Pregnant women who suffer from anemia may be more susceptible to problems both during pregnancy and during delivery. According to research on anemia prevalence, 269 million children between the ages of 6 and 59 months are thought to suffer from anemia, and half a billion women between the ages of 15 and 49—including non-pregnant and pregnant women—are thought to have anemia globally. 2019 prevalence rates: 37% (32 million) of pregnant

women aged 15–49 have anemia, compared to 30% (539 million) of non-pregnant women (Abdulwahab et al., n.d.). With an estimated 106 million women and 103 million children suffering from anemia in Africa and 244 million women and 83 million children in South-East Asia, the WHO Regions of Africa and South-East Asia are the most impacted (Adjoa, 2023).

A number of symptoms and health issues can arise from anemia, a medical condition that happens when the body does not have enough hemoglobin or healthy red blood cells to supply oxygen to the body's tissues. Those who suffer from anemia often encounter the following symptoms: Weariness: One of the primary signs of anemia is extreme exhaustion, even after minimal exertion; insufficient oxygen delivery to the brain can result in lightheadedness or a fainting sensation; and freezing hands and feet. Hands and feet may feel chilly or numb, and headaches may result from insufficient oxygen-rich blood flow to the body's extremities. Because the brain does not receive enough oxygen to operate correctly, people with anemia frequently have headaches and shortness of breath, which can be particularly problematic when exercising. This is because the body is trying to provide more oxygen to the vital organs (Shaduka, 2022). If the anemia reaches very severe levels, this condition can lead to heart failure or loss of consciousness, which requires immediate medical attention. Treatment of severe anemia often requires more intensive treatment, including blood transfusions or medication to address the underlying cause (in the mouth, nose etc.).

Anemia is diagnosed based on measurements of hemoglobin concentration in the blood, which indicates how much hemoglobin (a protein in red blood cells that carries oxygen) is present in the body. A low hemoglobin level below the specified threshold indicates the presence of anemia. This threshold varies depending on the individual's age, gender, and physiological status, such as whether or not a person is pregnant (Organization, 2024). Anemia can be brought on by a number of things and is frequently regarded as a sign of an underlying illness. Generally speaking, anemia happens when the body does not produce enough hemoglobin or red blood cells to carry oxygen to the tissues. Anemia is mostly caused by malnutrition, particularly insufficient amounts of iron, vitamin B12, and folic acid. The synthesis of healthy red blood cells depends on this vitamin. Malnutrition-induced anemia can be brought on by an unbalanced diet, poor nutrient absorption, or elevated physiological requirements (such as during pregnancy or a child's growth period). (e.g. blood loss from parasitic infections, haemorrhage associated with childbirth, or menstrual loss). To meet the body's demands, iron must be absorbed efficiently in the digestive system. However, iron absorption may be hampered by certain physiological and medical disorders (Pasricha et al., 2021).

Infections, especially those of an infectious or parasitic nature, can lead to anemia through the destruction of red blood cells, impaired absorption of nutrients, or chronic blood loss. Effective management of anemia requires a multidisciplinary approach that includes the treatment of infections, as well as nutritional therapy to improve nutritional status and increase red blood cell production (Yadav et al., 2023). Inflammatory anemia is a common condition in chronic diseases, including HIV infection. Anemia is caused by HIV in a number of ways, including decreased red blood cell formation, increased red blood cell death, blood loss, and medication side effects. HIV patients' anemia needs to be managed holistically, which includes treating the underlying infection, modifying medication, and giving them the nutrients or medicines they need.

Abundant and persistent blood loss due to heavy menstruation, pregnancy, and postpartum bleeding are the main causes of anemia, especially iron deficiency anemia. Proper management, including treatment for menstrual disorders, iron supplements, and management of postpartum bleeding, is essential to prevent and manage anemia in women, especially during the reproductive and postpartum periods (Basso et al., 2022). In many places, particularly those where these ailments are more prevalent, inherited red blood cell disorders—such as thalassaemia, sickle cell abnormalities, other hemoglobinopathies, and abnormalities of enzymes or red blood cell membranes—are significant causes of anemia. Proper and coordinated management is essential for patients with congenital blood disorders to improve their quality of life and prevent further complications. With blood transfusions, iron chelation therapy, and appropriate medication, as well as emotional and educational support, patients can better manage their condition and reduce the risk of serious complications. Constant

medical monitoring is also crucial in ensuring that the care provided remains in line with the patient's needs throughout their lives (Lindbergh, 2012).

Individuals' productivity and quality of life are greatly impacted by anemia, one of the major health issues facing the world today. This disorder arises when the blood's hemoglobin concentration or red blood cell count is below normal, which impairs the blood's capacity to carry oxygen throughout the body. Malnutrition, persistent illnesses, infections, genetic problems, and bleeding are some of the causes of anemia (Chaparro & Suchdev, 2019). In Developing Countries: Research indicates that 43% of people in developing nations suffer from anemia, with children and women of childbearing age being the most susceptible. Malnutrition, infections, chronic illnesses, and restricted access to healthcare facilities are the primary causes of the high anemia rate in the area. Iron deficiency is the main cause of anemia in many underdeveloped nations, particularly in children and pregnant women. In Developed Nations: Though some populations are still at risk, such as pregnant women, the elderly, and people with chronic illnesses, the prevalence of anemia is lower in developed nations, at about 9%. While malnutrition can also be a contributing factor in some demographic groups, anemia is typically more frequently linked to specific medical conditions or blood abnormalities in industrialized nations (Chaparro & Suchdev, 2019). Pregnant women in developed nations like Australia and the United States of America have anemia rates of 20% and 18%, respectively, whereas in developing nations, such as Ethiopia, Pakistan, and Indonesia, the rates are significantly higher at 50.1%, 76.7%, and 35.5%, respectively. The World Health Organization (WHO) research states that the prevalence of anemia in children aged 6 to 59 months is 39.8% worldwide, while it is 29.9% in women aged 15 to 49 (Gupta & Gadipudi, 2018). In Indonesian up to 90 Fe pills should be taken daily by pregnant women. However, the iron odor produces nausea and vomiting, which is why this treatment is frequently hated. Therefore, non-pharmacological therapy—including beet consumption—is required in a healthy and safe manner.

According to the findings of a preliminary survey carried out in December 2023 by researchers at the Tanjung Langkat Health Center, seven pregnant women out of 28 had anemia. Furthermore, in 2024 in January there will be 22 pregnant women, February 24 pregnant women and March 24 pregnant women. Furthermore, from 24 pregnant women in March, it was found that 5 pregnant women experienced anemia in TM 3 and after finding out, it turned out that many of these pregnant women did not know how to add the Hb. The purpose of this study is to assess how beet juice can raise hemoglobin levels in pregnant patients with anemia at Tanjung Langkat Health Center. The findings of this study are expected to significantly improve the health of expectant mothers in the area and offer scientific proof of the advantages of beet juice as a remedy for anemia prevention and treatment. Based on data obtained from the Tanjung Langkat Health Center in 2024, it shows that out of 499 pregnant women, there are 13 pregnant women who experience anemia. The incidence of anemia that still occurs is because prevention and treatment have not been carried out before pregnancy. Service care in pregnancy is to prevent complications during pregnancy and childbirth with blood tests carried out at least twice during pregnancy, namely in the first and third trimesters, pregnancy check-up visits at least four times during pregnancy, namely once in the first trimester, once in the second trimester and twice in the third trimester.

2. Research Methods

Quasi-experiments are used when the research cannot fully control or randomly select samples. Nevertheless, this study still has the goal of examining the influence or cause-and-effect relationship. The administration of beet juice served as the study's independent variable, while the pregnant women's hemoglobin levels served as its bound variable. True experimental design evolved into the form of pseudo-experimental design. One group (the experimental group) receives a treatment or intervention in an experiment with a control group, whereas the other group (the control group) receives no treatment or a conventional treatment. In the realm of quasi-experiments, although there is a control group, randomization (the process of randomly selecting participants) may not be implemented or cannot be carried out for practical, ethical, or logistical reasons. Therefore, external variables can be more difficult to control.(Setyawan, 2017) Non-equivalent control group design is a form of research design in the quasi-experimental category. The experimental group, which receives the

treatment, and the control group, which does not receive the treatment (or receives the normal treatment), are the two groups that are compared in this design. However, the main difference with a pure experimental design is that the experimental and control groups are not randomly selected. This implies that variations between the two groups can result from more than just the treatment received. When randomization is not possible in quasi-experimental research, the non-equivalent control group design is frequently employed. Although there may be bias because of the groups' initial differences, researchers can use this design to compare the treatment effects between the experimental and control groups. Therefore, researchers need to be careful in interpreting the results and considering the interfering variables that may affect the results of the experiment (Sinaga & Piliang, 2024).

Purposive sampling, which is sampling based on specific considerations in accordance with the required criteria to be able to identify the number of samples to be analyzed, is the sampling technique used in this study. Pregnant women who have mild anemia (Hb: 10.0–10.9 gr/dL), are in the third trimester (28–32 weeks), do not take blood-boosting medications, are in good physical and spiritual condition, and are willing to participate are among the inclusion requirements for the sampling. Pregnant women who take blood-boosting medications, are in the first or second trimester, do not have anemia (Hb: 11 gr/dL), are ill, or do not want to participate were excluded.

Research bias that occurred when I conducted the initial sample determination on pregnant women in Trimester 2. However, with various conditions of pregnant women who still experienced nausea and vomiting and had difficulty consuming beetroot and lemon juice, I switched to pregnant women in trimester 3 who all had better conditions but had moderate Hb values. So that the determination of beetroot and lemon juice consumption can only be carried out for 7 days with a previous estimate of 14 days for pregnant women in Trimester 2. However, it is possible that the results of the study for 7 days have shown an increase in Hb in pregnant women who were given this treatment.

The Hb level measurement that I did using Hb Sahli is in accordance with The Regulation Of The Minister Of Health Of The Republic Of Indonesia Number 25 Of 2015 Concerning The Implementation Of Laboratory Examinations For Pregnant, Giving Birth, And Postpartum Women In Health Service Facilities And Their Service Networks In Chapter 2 article 3 number 3a.

3. Analysis and Results

Based on the respondent's answer above, the Hb level before and after being given beet juice in the table below:

Table 1
Distribution of Respondent Frequency Based on Hb Levels of Pregnant Women Before and After Being Given Beet and Lemon Juice at Tanjung Langkat Health Center in 2024

No.	Hb Levels	Pre-test		Post-test	
		f	%	f	%
1.	Improvement (Hb >11 gr/dL)	0	0	9	90,0
2.	No Improvement (Hb ≤ 11 gr/dL)	10	100	1	10,0
	Sum	10	100	10	100

Based on the table, the information collected on hemoglobin levels in pregnant women revealed that nine respondents (90.0%) had higher hemoglobin levels after consuming beetroot juice, while one respondent (10.0%) had no rise in hemoglobin levels.

Table 2
Test Data Normality Test

Tests of Normality				
Variable	Group	Shapiro-Wilk		
		Statistic	df	Sig.
Hb Levels	Pre_test	0,955	10	0,725
	Post_test	0,952	10	0,689

Based on the table above, According to the normalcy test results, the pre-test group's gis value was 0.725, whereas the post-test group's gis value was 0.689. The data on Hb levels for the pretest group and the posttest group are normally distributed since the sig value for the two groups > 0.05, which serves as the foundation for the normality test's decision-making process.

Table 3
Paired Sample T-test

Variable	*Mean*	N	*Sig. (2-tailed)*
Kadar Hb (*Pre-test*)	10,380	10	0,000
Kadar Hb (*Post-test*)	11,690	10	

If the data is not regularly distributed, you can use statistical analysis like Wilcoxon tests or paired t-tests to determine whether these differences are significant. This will give a clearer picture of whether the difference between the pre-test and post-test groups was due to the treatment or just chance.

This study supports a 2024 study on the impact of beet fruit juice on third-trimester hemoglobin levels in pregnant women by Fauziah et al. Prior to beetroot juice, the study's findings were 10.033 grams; following beetroot juice, the average maternal hemoglobin level was 11.3 grams. A p-value of 0.000 was found, and the difference in the average rise in maternal hemoglobin was 1.34 grams. This conclusion is strengthened when it is supported by data and statistical analysis, such as the paired sample t-test, which demonstrates a significant difference between hemoglobin levels before and after the administration of beetroot juice. Additionally, it implies that using beetroot juice as a non-pharmacological intervention to raise hemoglobin levels in expectant mothers can lower the risk of issues related to anemia during pregnancy (Fauziah et al., 2024).

The Effect of Beet Fruit Juice on Raising Hemoglobin Levels in Pregnant Women in the Second Trimester with Anemia at M Yusuf Hospital, Kalibalangan, North Lampung, is another study that supports the 2022 study by Setiana and Lailaturohmah. According to the study's findings, pregnant women with anemia in the second trimester may benefit from taking beetroot juice to raise their hemoglobin levels. The alternative hypothesis (H_a) was accepted and the null hypothesis (H_0) was rejected since the statistical test findings indicated that this effect was statistically significant, with the p-value being less than 0.05 (0.000). According to this study, beetroot juice may be a helpful treatment for pregnant women's anemia. Increasing hemoglobin levels and lowering the risk of anemia during pregnancy can be accomplished by adding beet juice to diet or supplements, particularly for pregnant women who are at risk for the condition in the second trimester (Setiana & Lailaturohmah, 2022).

According to Utami, K.S., and Yuyun Triani's study on the impact of beetroot juice on the rise in hemoglobin levels in expectant mothers at the Gatak Sukoharjo Health Center, pregnant women's average hemoglobin levels before treatment were mild anemia, with Hb 9.6 gr/dl, and after treatment, they increased to Hb 10.9 gr/dl. (Utami & Triani, 2024).

The disorder known as anemia is characterized by low or aberrant hemoglobin levels or erythrocyte counts in the blood. Hemoglobin circulates throughout the body for metabolic purposes and carries oxygen (oxyhemoglobin) (Kadir and Sembiring, 2021). Pregnant women's levels of anemia can be divided into four categories, specifically: Hb 11 % indicates no anemia, while Hb 9–10 % indicates mild anemia. mild levels of anemia 7-8 g% hemoglobin, severe anemia Hb is less than 7%. The term "potential danger to mother and child" refers to pregnancy anemia, which is why all parties involved in health services must give it careful consideration (Astuti & Ertiana, 2018).

Pregnant women should avoid anemia in order to avoid major problems that could harm both the mother and the fetus. The two primary methods that are employed are: pharmacological strategy to address increased nutritional requirements during pregnancy by administering iron and folic acid pills. a non-pharmacological strategy to promote the health of both the mother and the fetus by eating foods high in iron, folic acid, and other essential vitamins and minerals. These two approaches work well

together and are crucial for promoting the health of expectant mothers and developing fetuses. Pregnant women can enhance their health and avoid anemia by using the right products. Beets are one of the fruits that can help pregnant women avoid anemia out of all the others (Suralaga & Kurniyawati, 2022).

Vitamins, carbs, proteins, and lipids included in beetroot are beneficial to the body's health. Beet tubers also contain other minerals, including calcium (Ca), potassium (K), magnesium (Mg), phosphorus (P), iron (Fe), sodium (Na), and zinc (Zn). 10.2% vitamin C and 34% folic acid, which are found in red beets, help to repair and regenerate damaged cells (Moeljanto, 2002).

Prior to receiving beet juice, the researcher assumed that the majority of pregnant women had mild anemia, with a hemoglobin level of less than 11 grams per deciliter. All pregnant women, up to 10 pregnant women (100%), had low hemoglobin levels prior to receiving beet juice. Inadequate food intake, prior pregnancy, non-adherence to Fe tablet usage, and premature age are the main causes of anemia in pregnant women. Additionally, practically all pregnant women saw an increase in Hb levels after receiving beetroot juice. It claims that pregnant women with mild anemia might have their Hb levels raised by consuming beetroot juice. The study's findings also demonstrated that beet juice had an impact on pregnant women with anemia by raising their hemoglobin levels. This effect results from the presence of vitamin B9 (folic acid) in beetroot juice, which is crucial for the production of red blood cells. Because beets include folic acid and vitamin B12, which are essential for the proper formation of erythrocytes, beets stimulate blood flow and aid in the production of red blood cells. Additionally, beets strengthen and purify the circulation, enabling it to transport nutrients throughout the body and increase the quantity of red blood cells won't go down.

4. Conclusion

The findings of the Tanjung Langkat Health Center's 2024 study on the impact of beet and lemon juice on raising hemoglobin levels in pregnant women with anemia All 10 respondents (100%) did not have a rise in hemoglobin levels prior to receiving beet juice. According to the findings, giving beetroot juice to pregnant women who suffer from anemia significantly raises their hemoglobin levels. After consuming beetroot juice, the majority of responders displayed elevated hemoglobin levels, suggesting that beetroot juice may be a potential treatment for anemia in expectant mothers.

The research that I conducted is used as an additional source of important information for the entire community in the Tanjung Langkat Health Center environment. That beetroot which is very easy to get from fruit and vegetable sellers at a cheap price turns out to have very good properties for health, especially it can increase hemoglobin levels in the blood, starting from children to adults, especially pregnant women who cannot take blood-boosting drugs. But still given good information and education to accelerate the increase in Hb in the blood for pregnant women by continuing to consume 90 blood-boosting tablets, but if it is not enough, it can be helped by drinking sugar-free beetroot juice and can be given with lemon juice. Until now, there has been no community program that supports the use of beetroot to increase Hb levels in the blood because there are already many blood-boosting tablets that are widely distributed in the community. However, with the development of these results, prevention has been produced in an easy and cheap way that can be utilized by the community properly as a key to health that must be maintained. Pregnant women can also disseminate this information to prospective pregnant women to first consume beetroot and lemon juice when they are going to do a pregnancy program. In carrying out this research, I was assisted by a research assistant to really ensure that the informants consumed 250 ml of beetroot and lemon juice in the morning and evening. There were some informants who forgot to drink in the morning so we recommended drinking it during the day and evening. This made the efficacy of beetroot and lemon juice less than optimal. So for further researchers, it can be ensured that the respondents consume beetroot and lemon juice on time and according to the specified dosage and if necessary continue the research to recommend that prospective pregnant women consume this beetroot and lemon juice 3 months before planning a pregnancy for better results.

Specific recommendations to local service providers I don’t give because I know they have tried to educate the community regarding the fulfillment of consuming blood-boosting tablets. Monitoring of

local health centers is also carried out but there are still many pregnant women who do not pay attention to the importance of consuming blood-boosting tablets so that there are still some who experience anemia. So I am here as a researcher to provide specific information to the community if they are not used to consuming tablets, they can replace them by consuming beetroot and lemon juice while getting used to consuming blood-boosting tablets until the age of 9 months of pregnancy. So that the fulfillment of vitamin needs is maintained.

The limitation of this study is the small number of samples so that if other researchers can obtain more samples, the results of the study can be better. This limitation is due to the limited number of pregnant women in Trimester 3 in the Tanjung Langkat Health Center area. However, the researcher tried as much as possible to condition this study by utilizing what is available to achieve maximum results.

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