



THE EFFECT OF PURPLE SWEET POTATO (IPOMOEA BATATAS) ON ELEVATED HEMOGLOBIN LEVELS IN PREGNANT WOMEN MID AND LATE PREGNANCY IN A WORKING AREA TABIR LINTAS HEALTH CENTER MERANGIN DISTRICT

Donna Harriya Novidha¹, Zuriah²

¹Pendidikan Profesi Bidan Stikes Merangin

²S1 Kebidanan FIK Unaja

Email : donnaharriyanovidha@gmail.com

ABSTRACT	Keywords
The occurrence of anemia in Tabir Lintas Health Center from January to August, the cumulative number of pregnant women is 88, with only 51 examined, and 37 pregnant women who have not been tested for hemoglobin. The purpose of this study is to determine the effect of purple sweet potato (Ipomoea Batatas) on increasing hemoglobin levels in pregnant women in the second and third trimester in the working area of Tabir Lintas Health Center in Merangin district in 2023, the study design is a quasi-experimental with one group pretest-posttest design, the total sample size was 20 pregnant women, data collection was done using observation sheets, and data analysis was done using t-tests. According to the study results, the mean hemoglobin levels before administration of purple sweet potato (Ipomoea Batatas) were 8.8 gr/dl at the lowest, 10.4 gr/dl at the highest, 10.6 gr/dl at the lowest and 11.8 gr/dl at the highest. In conclusion of the study results, the effect of purple sweet potato (Ipomoea Batatas) on hemoglobin levels of Trimester II and III pregnant women had a p-value of $0.000 < (0.05)$. It is hoped that midwives counseling and using purple sweet potato during pregnancy as an alternative means of increasing hemoglobin levels in pregnant women will increase mothers' knowledge and insight in the prevention and treatment of anemia.	Hemoglobin, Purple Sweet Potato, Pregnancy

INTRODUCTION

Maternal mortality is a global health issue that serves as an indicator of the success of maternal health programs as well as a measure of the extent of public health. According to the World Health Organization (WHO) in 2019, an estimated 303,000 maternal deaths worldwide, or about 216/100,000 births (Paridah Y et al., 2021).

According to WHO data, maternal deaths in developing countries are caused by anemia during pregnancy in 40%, eclampsia

in 34%, disease in 26%, and infectious diseases in 12% (Paridah Y et al., 2021).

The number of maternal deaths collected from the records of the Family Health Program of the Ministry of Health has been increasing every year. In 2021, there were 7,389 deaths in Indonesia. This figure represents an increase compared to 4,627 deaths in 2020. Based on cause, the majority of maternal deaths in 2021 were related to COVID-19 2,982, hemorrhage 1,330, and hypertension during pregnancy 1,077 (Kementerian Kesehatan RI, 2022).

Worldwide, the prevalence of anemia in pregnant women is 41.8%. About half of the incidence of anemia is due to iron deficiency. The prevalence of anemia in pregnant women in Africa is 57.1%, 48.2% in Asia, 25.1% in Europe, and 24.1% in the United States (Ramadhini D & Dewi SSS, 2021).

The prevalence of anemia in pregnancy in Indonesia in 2019 was 48.9%, this figure is considerably higher and increased compared to Riskesdas results of 37.19% in 2013. Anemia in pregnancy, the most common form of anemia in Indonesia, is caused by iron deficiency, which is 62.3% and can lead to miscarriage, premature delivery, uterine inertia, prolonged delivery, and uterine atony, which can cause bleeding and shock. The effects of iron deficiency anemia in pregnant women are said to be 12-28% fetal mortality, 30% perinatal mortality, and 7-10% neonatal mortality (Ramadhini D & Dewi SSS, 2021).

According to data from the Merangin District Health Center in 2022, there were 1540 cases of anemia in all working areas of the Health Center in Merangin District (Dinkes Merangin, 2022).

Anemia is defined as a maternal hemoglobin (Hb) level of less than 12gr%. While anemia in pregnancy is the condition of the mother with hemoglobin levels below 11 g% in the first and third trimesters or <10.5 g% in the second trimester. The most common anemia in pregnancy is anemia due to iron deficiency due to a lack of iron intake in food. Impaired absorption, increased need for iron or because too much iron comes out of the body, for example in bleeding (Priyanto S et al., 20202)

According to initial survey data from researchers on the occurrence of anemia at the Tabir Lintas Health Center, from January to August, the cumulative number of pregnant women was 88, only 51 were examined, there were 8 cases of pregnant women, and 37 pregnant women were not checked for hemoglobin (Puskesmas Tabir Lintas, 2022). Purple sweet potatoes may be given to pregnant women as an ingredient to increase hemoglobin levels. Sweet potatoes (*Ipomoea Batatas*) are herbaceous plants that grow underground and produce tubers (Tombokan SGJ et al., 2021).

In line with the study conducted by Yuliandani et al. (2017) on the effect of sweet potato consumption on hemoglobin levels in pregnant women in the third trimester of pregnancy, the results show that sweet potato consumption has an effect on the increase of hemoglobin levels in pregnant women, indicated by a p-value of 0.000 (Yuliandani et al., 2017).

The study stated that sweet potato is one of the crops that could be developed to diversify food consumption, and that it is a type of tuber that is relatively resistant to storage, and the longer it is stored, the sweeter it becomes. Since sweet potatoes contain 4 mg of iron in 100 g, the use of sweet potatoes can increase the hemoglobin concentration in red blood cells, prevent anemia, and can be consumed by pregnant women (International Labour Organization, 2013; Syarfaini et al., 2017; Widowati S, 2011).

Based on this background, the researchers are interested in conducting a study entitled "Effect of Purple Sweet Potatoes (*Ipomoea Batatas*) on Increased Hemoglobin Levels in Trimester II and III Pregnant Women in the Work Area of Tabir Lintas Health Center, Merangin District, 2023".

METHOD

This study aims to analyze the effect of giving purple sweet potatoes (*ipomoea batatas*) to increase hemoglobin levels in pregnant women in the work area of Tabir Lintas Health Center, Merangin District in 2023. The population of this study is all 20 pregnant women with anemia. The sampling technique for this study was total sampling. The dependent variable is giving sweet potatoes to pregnant women and the independent variable is increasing the hemoglobin concentration of pregnant women. Data were collected using observation sheets and analyzed using univariate and bivariate analysis.

RESULTS

Table 1 Characteristics of Respondents

Characteristics of Respondents	f	%
1. Age		
20-30 th	15	75
< 20 th or >35 th	5	25
2. Gestational Age		
Trimester II	10	50
Trimester III	10	50
3. Hemoglobin levels		
Mild Anemia	20	100
Moderate Anemia	0	0
Severe Anemia	0	0
Total	20	100,00

Based on table 1, the results show that the age of the most respondents is 20-30 years with 15 respondents (75%) and the least age is > 35, namely 2 respondents (10%). Respondents in Trimester II and III are both 10 respondents (50%). All respondents experienced mild anemia as much as 100%

Table 2 Average Hemoglobin Levels of Pregnant Women Before and After Giving Purple Sweet Potato (Ipomoea Batatas) 1.

Categ ory	N	Me an	Stand ar Devia si	M in	Ma x	p- valu e
Pre- test	20	9.7	0.48	8.8	10.4	0.000
Post- test	20	11.2	0.34	10.6	11.8	

Table 2 shows that the mean hemoglobin value of pregnant women before giving purple sweet potato (Ipomoea Batatas) is 9.7gr/dl, standard deviation is 0.4824, and the lowest hemoglobin value is 8.8gr/dl. 8gr/dl, the highest hemoglobin value was 10.4gr/dl, and after feeding purple sweet potato (Ipomoea Batatas) the mean value was 11.2gr/dl, standard deviation was 0.3387, the lowest hemoglobin value was 10.6gr/dl and the highest hemoglobin value was 11.8gr/dl. Statistical tests with paired simple T-test analysis showed a p-value = 0.000 < 0.05,

meaning that purple sweet potato (Ipomoea Batatas) affects hemoglobin levels in pregnant women in the second and third trimesters of pregnancy.

Table 3 Effect of Purple Sweet Potato (Ipomoea Batatas) on Hemoglobin Levels in Trimester II and III Pregnant Women

Hemoglobin Levels	Purple Sweet Potato		p-value
	Before	After	
Mild Anemia	20 (100%)	4 (20%)	0.000
Not anemia	0(0%)	16(80%)	

Table 3 shows that 20 (100%) respondents experienced mild anemia before giving purple sweet potato stew, and after giving purple sweet potato, 4 (20%) had mild anemia and 16 (80%) had no anemia, with a p-value of 0.000 < 0.05, which means that in 2023, the Merangin District Tabir Lintas Health Center In the working area, it means that the effect of giving purple sweet potatoes (Ipomoea Batatas) to increase hemoglobin levels in pregnant women in Trimester II and III.

DISCUSSION

Characteristics of Respondents

The study population consisted of all pregnant women who experienced anemia in the Tabir Lintas Health Center, a total of 20 individuals, who met the inclusion and exclusion criteria. Based on Table 1, it was found that the highest number of respondents were between 20 and 30 years of age, i.e. 15 (75%), and the lowest number of respondents were over 35 years of age, i.e. 2 (10%). All respondents experienced mild anemia about 100% of the time. Both the second and third trimester had 10 respondents (50%), indicating that the distribution of pregnant women is balanced between the second and third trimester.

Research from Dewi (2021) Anemia in pregnancy can be influenced by the gestational age factor. According to Tadesse, et al in Padmi stated that pregnant women in the first trimester are twice as likely to experience anemia than in the second trimester. Meanwhile, pregnant women in the third trimester are almost three times more

likely to experience anemia than in the second trimester (Dewi HP & Mardiana, 2021). In line with Research by Herawati (2018) Judging from the frequency of the ages of pregnant women 20-35 years, many experience anemia. The results of this study are in accordance with the results of a study conducted by Lulu, in which visitors to antenatal care at the Pasar Minggu District Health Center, South Jakarta, stated that there was no significant difference between the ages of mothers aged <20 years and >35 years and mothers aged between 20-35 years (Herawati Y & Rusmiati D, 2019).

Gestational age affects anemia, increasing gestational age is caused by physiological changes in pregnancy that begin at the 6th week, namely an increase in plasma volume and reaches a peak at the 26th week resulting in a decrease in Hb levels (Herawati Y & Rusmiati D, 2019). In addition, as the physiological age of pregnancy increases, mothers who are approaching delivery will tend to experience stress which results in a lack of appetite so that poor nutritional intake can be one of the factors causing anemia. Pregnant women in the third trimester of pregnancy are almost three times more likely to experience anemia. anemia than in the second trimester. Anemia in the third trimester can be caused by the increased need for nutrients for fetal growth and the sharing of iron in the blood to the fetus which will reduce the mother's iron reserves (Dewi HP & Mardiana, 2021)

Reproductive age is still experiencing ovulation, ovulation that is not fertilized will become menstruation. During the menstrual process, every woman will bleed an average of 33.2 ± 16 cc in one cycle so that if not supported by good nutrition it can cause anemia (Herawati Y & Rusmiati D, 2019).

According to the researchers' assumptions, the age of the mother who experienced anemia was the age of the majority of respondents who were 20-30 years old with 15 respondents (75%). The recommended reproductive age is 20-35 years old. Because at reproductive age they are still ovulating, ovulation that is not fertilized will become menstruation. In the process of menstruation, every woman will bleed in one cycle so that if it is not supported by good nutrition it can cause anemia. In the

second and third trimesters of pregnancy, the frequency of anemia is the same, in the second and third trimesters the nutritional needs of pregnant women are increasing, if not accompanied by balanced nutrition it causes anemia.

2. Average Hemoglobin Levels of Pregnant Women Before and After Giving Purple Sweet Potato (Ipomoea Batatas)

The results showed that the mean hemoglobin level of pregnant women before being given Purple Sweet Potato (Ipomoea Batatas) was a mean value of 9.7gr/dl, with the lowest hemoglobin level being 8.8 gr/dl and the highest hemoglobin level being 10.4gr/dl, after being given Purple Sweet Potato (Ipomoea Batatas) to a mean value of 11.2 gr/dl, with the lowest hemoglobin level being 10.6 gr/dl and the highest hemoglobin level being 11.8 gr/dl. Statistical tests showed that there was an effect of giving purple sweet potato to hemoglobin levels in Trimester II and III pregnant women with a p value <0.001.

The results of this study are the same as the research conducted by Ramadhini, 2021 on 10 pregnant women, it was found that 7 pregnant women had anemia, consisting of 6 people with mild anemia (hemoglobin level between 8-11 gr%) and 1 mother had moderate anemia (hemoglobin level 7.8 g%) (Ramadhini D & Dewi SSS, 2021). The reason pregnant women experience anemia is due to their irregular eating patterns and the food menu served is sober. This is because the economic situation is not adequate while the prices for all necessities are expensive, Fe tablets are consumed irregularly and pregnant women check their pregnancies only because they have complaints such as dizziness, nausea, not based on the Antenatal Care (ANC) schedule. In line with the study of Tombokan et al (2021), it can be concluded that purple sweet potato has an effect on increasing the hemoglobin of third-trimester pregnant women at the Ranomut Health Center in Manado City, and can meet the iron needs of pregnant women during pregnancy. Iron is needed in the formation of hemoglobin, so if the body lacks iron it will inhibit the formation of hemoglobin. As a result, the formation of red blood cells is inhibited

resulting in anemia. The way to overcome iron deficiency in the body is by consuming 6.3 mg of Fe per day and increasing intake of food sources of Fe (Tombokan SGJ et al., 2021).

According to Manuaba, anemia is relatively common in pregnancy because pregnant women experience hemodelution (dilution) with an increase in volume of 30% to 40%, which peaks at 32 to 34 weeks of gestation. The amount of increase in blood cells is 18% to 30% and hemoglobin is around 19% (Priyanto S et al., 20202).

Iron is a mineral that the body needs for the formation of red blood cells (hemoglobin), iron also plays a role as a component in forming myoglobin (a protein that carries oxygen to muscles), collagen (a protein found in bone, cartilage and connective tissue), as well as enzymes. Iron also functions in the body's defense system, how to overcome iron deficiency in the body by consuming 6.3 mg Fe/day and increasing intake of food sources of Fe (Tombokan SGJ et al., 2021). Sweet potatoes have high nutritional value, rich in vitamins and minerals. Consumption of sweet potatoes has an effect on increasing hemoglobin levels in pregnant women, and is able to increase hemoglobin levels in pregnant women after being given sweet potatoes as much as 0.58%. Sweet potato contains 0.61 mg of iron in 100 grams so that the use of sweet potato can be consumed by pregnant women to increase hemoglobin levels in red blood cells, can prevent and treat anemia because it is rich in iron (Sinaga R et al., 2020).

According to the researchers' assumptions, anemia that occurs in pregnancy is caused by a lack of iron intake by the body, coupled with the body's response during pregnancy to blood dilution which causes a decrease in hemoglobin levels in pregnant women. If this is not overcome by increasing consumption of iron, it will be fatal to the mother and the baby in the mother's womb. Purple sweet potatoes contain lots of vitamins and minerals, especially iron, which is needed to form hemoglobin. In addition, purple yams contain vitamin C which can increase iron absorption in the body, so if we consume purple yams, the process of absorption of iron in purple yams will be more easily absorbed by the body which causes sufficient iron in the

body so that the mother's hemoglobin level increases. pregnant can increase.

3 Effect of Purple Sweet Potato (Ipomoea Batatas) on Hemoglobin Levels of TMT II and III Pregnant Women

The results showed that before being given purple sweet potato stew as many as 20 respondents (100%) experienced mild anemia while after being given purple sweet potato, 4 respondents (20%) had mild anemia and 16 respondents (80%) were not anemic. Statistical tests showed that there was an effect of purple sweet potato (Ipomoea Batatas) on increasing hemoglobin levels of pregnant women in the second and third trimesters with a p value <0.001.

In line with the research conducted by Tombokan, 2021 from the results of the independent test sample t test, the sig value was obtained. (2-tailed) of $0.000 < 0.05$. So it can be concluded that there is a difference in the average hemoglobin level of 12.2 in the intervention group after consuming purple sweet potato. Thus it can be concluded that, there is an effect of purple sweet potato on increasing the hemoglobin of third trimester pregnant women at the Ranomut Health Center in Manado City, and being able to meet substance needs (Tombokan SGJ et al., 2021).

According to Varney, anemia occurs during pregnancy because the mother's total blood volume increases by around 30-50% in single pregnancies and 50% in twin pregnancies. Total blood volume is a combination of plasma volume which increases 70% and red blood cell volume which also increases 33% from pre-pregnancy values. All of this causes hemodilution which is seen at low hematocrit levels which is known as physiological anemia in pregnancy and often occurs at 24-24 weeks of gestation. 32 weeks. The increase in total blood volume begins at the beginning of the first trimester, then increases rapidly until mid-pregnancy and then slows down towards the 32nd week (Yuliandani FA et al., 2017).

According to the assumption of the researchers, the increase in hemoglobin levels occurs because purple sweet potatoes contain lots of vitamins and minerals, especially iron, which is needed to form hemoglobin. In addition, purple yams contain vitamin C

which can increase iron absorption in the body, so if we consume purple yams, the process of absorption of iron in purple yams will be more easily absorbed by the body which causes sufficient iron in the body so that the mother's hemoglobin level increases. pregnant can increase. Purple sweet potato is very easy to obtain in rural areas, besides that consumption of purple sweet potato does not cause nausea, dizziness and constipation, so it is very suitable for iron fulfillment in pregnant women. There are still 4 people with hemoglobin levels that are still below normal, due to research limitations, namely the intervention was only carried out for 7 days. It is expected that pregnant women will continue to consume purple sweet potatoes, so that they do not experience anemia.

CONCLUSIONS

There is an effect of purple sweet potato (Ipomoea Batatas) on the hemoglobin level of pregnant women in the second and third trimesters. It is expected that midwives will provide counseling, increase knowledge and insight of mothers in preventing and treating anemia by using purple sweet potato in pregnancy as an alternative to increase hemoglobin levels in pregnant women.

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