THE EFFECT OF MORINGA LEAF EXTRACT ON HEMOGLOBIN LEVELS OF PREGNANT WOMEN WITH ANEMIA

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ABSTRAK: PENGARUH EKSTRAK DAUN KELOR TERHADAP KADAR HEMOGLOBIN IBU HAMIL ANEMIA

Latar Belakang Anemia dalam kehamilan merupakan salah satu masalah nasional karena mencerminkan nilai kesejahteraan sosial ekonomi masyarakat. Angka kejadian anemia kehamilan di Indonesia pada tahun 2019 sebesar 48,9%, sedangkan pada tahun 2020 jumlah anemia kehamilan sebesar 62,1%.

Tujuan penelitian adalah pengaruh pemberian ekstrak daun kelor terhadap kadar hemoglobin ibu hamil anemia di Wilayah Kerja Puskesmas Tri Karya Mulya Tahun 2022.

Metode Metode penelitian tipe kuantitatif, Eksperimental Quasy design pendekatan two group pretest-posttest design, teknik total sampling. Responden pada penelitian ibu hamil dengan anemia ringan dan sedang dengan pemberian ekstrak daun kelor kemudian diamati Hemoglobin pada kontrol dan intervensi, populasi dan sampel penelitian sebanyak 62 ibu hamil TM III. Penelitian dilaksanakan pada bulan Maret-Agustus 2022 untuk Wilayah Kerja Puskesmas Tri Karya Mulya

Rata-rata hasil intervensi sebelum 10.010, SD 0.3534, SE 0.0635, kadar Hb minimal 8.9gr/dl, kadar Hb maksimal 10.5gr/dl, rata-rata setelah 12.200, SD 0.5379, SE 0.0966, kadar Hb minimal 10.8gr/dl, maksimal Kandungan Hb 13.0gr/dl. Rata-rata kelompok kontrol sebelum 9,817, SD 0,4755, SE 0,0854, kadar Hb minimal 8,7gr/dl, kadar Hb maksimal 10,7gr/dl. Rata-rata setelah 11926, SD 0,5756, SE 0,1034, kadar Hb minimal 10,9 gr/dl, kadar Hb maksimal 13,4gr/dl. Hasil uji t independent diperoleh nilai 0,000 < α (0,05) artinya H0 ditolak dan Ha diterima.

Kesimpulannya ada pengaruh ekstrak daun kelor terhadap kadar hemoglobin ibu hamil anemia di Wilayah Kerja Puskesmas Tri Karya Mulya Tahun 2022.

Saran Diharapkan agar responden lebih memahami tentang pentingnya mengkonsumsi tablet Fe selama masa kehamilan dan apabila ibu mengalami masalah anemia dapat dilakukan dengan kombinasi tablet Fe dengan ekstrak daun kelor atau olahan lauk daun kelor yang mudah didapatkan dan murah, yang dapat sangat membantu meningkatkan kadar HB pada ibu hamil. Dengan dilakukannya penelitian ini diharapkan ibu yang mengalami anemia dan tidak anemia selalu mengkonsumsi tablet Fe sesuai anjuran pemerintah.

Kata kunci : anemia, daun kelor, tablet Fe, kehamilan

ABSTRACT

Background Anemia in pregnancy is one of the national problems because it reflects the value of people's socioeconomic welfare. The incidence of pregnancy anemia in Indonesia in 2019 was 48.9%, while in 2020 the number of pregnancy anemia was 62.1%.

The purpose of the study was the effect of Moringa leaf extract on the hemoglobin level of pregnant women with anemia in the Work Area of the Tri Karya Mulya Health Center in 2022

Methods Quantitative type research method, Experimental Quasy design two group pretest-posttest design approach, total sampling technique. Respondents in the study of pregnant women with mild and moderate anemia by giving Moringa leaf extract and then observed Hemoglobin in control and intervention, population and study samples as many as 62 TM III pregnant women. The research was carried out in March-August 2022 for the Tri Karya Mulya Health Center Work Area

The average results of the intervention before 10.010, SD 0.3534, SE 0.0635, minimum Hb content 8.9gr/dl, maximum Hb content 10.5gr/dl, average after 12.200, SD 0.5379, SE 0.0966, minimum Hb content 10.8gr/dl, maximum Hb content 13.0gr/dl. Average of the control group before 9.817, SD 0.4755, SE 0.0854, minimum Hb content 8.7gr/dl, maximum Hb content 10.7gr/dl. Average after 11926, SD 0.5756, SE 0.1034, minimum Hb content 10.9 gr/dl, maximum Hb content 13.4gr/dl. The results of the independent t test obtained a value of 0.000 < α (0.05) meaning that H0 was rejected and Ha was accepted.

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The conclusion is that there is an effect of Moringa leaf extract on the hemoglobin levels of pregnant women with anemia in the Tri Karya Mulya Health Center Working Area in 2022.

Suggestion it is hoped that respondents will understand more about the importance of consuming Fe tablets during pregnancy and if the mother has anemia problems, it can be done with a combination of Fe tablets with Moringa leaf extract or processed Moringa leaf dishes that are easy to obtain and inexpensive, which can greatly help increase HB levels in pregnant women. By conducting this research, it is hoped that mothers with anemia and not anemia will always consume Fe tablets according to government recommendations.

Keywords : anemia, Moringa leaves, Fe tablets, pregnancy

INTRODUCTION

Pregnancy is a physiological condition, but in reality problems can arise during the pregnancy process, one of which is related to nutrition. The most common nutritional problem in pregnant women is anemia. Anemia during pregnancy is a nutritional disorder as a result of wrong eating patterns in pregnant women. Wrong/bad eating patterns result in a lack of nutrient intake (Prawirohardjo, 2016).

Anemia is a condition of reduced red blood cells (erythrocytes) in blood circulation or hemoglobin (Hb) mass so that they are unable to fulfill their function as carriers of oxygen to all tissues (Astuti, R. Y, in Hartanti, 2021).

Anemia in pregnancy is a national problem because it reflects the value of the socio-economic welfare of the community and has a very large influence on the quality of human resources. Anemia in pregnant women is called a potential danger to mother and child. That's why anemia requires serious attention from all parties involved in health services (Manuaba, 2013).

Data from the World Health Organization (WHO) for 2020, the prevalence rate of anemia is still high, that is, globally the prevalence of anemia in pregnant women worldwide is 48.9%. The prevalence of anemia in pregnant women is estimated in Asia at 49.9%, Africa 69.1%, America 39.1% and Europe 36.1%. In developing countries there are about 43% of maternal deaths related to anemia in pregnancy. Most anemia in pregnancy is caused by iron deficiency and acute bleeding, in fact, the distance between the two interacts (WHO, 2020).

The incidence of anemia in pregnancy in Indonesia in 2020 has increased from 2019 with the number of anemia in pregnancy 48.9% of pregnant women experiencing anemia during 2019 in the age group 15-24 years. Meanwhile, in 2020, the number of pregnant women with anemia of pregnancy is 62.1% (Ministry of Health Republic of Indonesia, 2020).

Anemia in pregnancy in Lampung Province is 11.67%, while the prevalence of anemia in pregnancy in Bandar Lampung is 23.37%. If a woman has anemia, it will be very dangerous during pregnancy and childbirth. Bleeding is one of the biggest causes of maternal mortality (Lampung Province Health Pocket Book 2018).

Anemia due to iron deficiency can increase the risk to the mother and baby. Supplementation is an important strategy in overcoming micronutrient deficiencies in women. Data on intake of micronutrients in women aged 15-49 years who gave birth to children in the 5 years prior to the survey based on background characteristics. The majority of women who gave birth during the five years prior to the survey received iron supplements during pregnancy for the delivery of their last child. Only one in three received iron tablets according to the recommendations more days. The likelihood of receiving/intake of iron for 90 days or more increases with age, educational level and wealth quintile. Urban women are much more likely to take iron pills for at least 90 days than rural women (IDHS, 2015).

The need for iron during the first trimester is relatively small, namely 0.8 mg a day, which then increases sharply during the second and third trimesters, namely 6.3 mg a day (Arisman, 2010). Especially during pregnancy, especially the third trimester, is a critical period when the need for nutrients increases. If iron in the blood is lacking, the hemoglobin level will decrease resulting in impaired fetal growth. Several studies state that Hb levels in the last trimester of pregnant women and the high rate of anemia in the third trimester can affect birth weight (Manuaba, 2013).

Anemia caused by a lack of food intake, increased need for Fe, impaired absorption of Fe. Anemia is usually caused by symptoms such as fatigue, lethargy, weakness, eyes feel like fireflies, face looks pale, conjunctiva is pale, lips are pale, lack of enthusiasm, and drowsiness. What usually has a dangerous impact on pregnant women such as abortion, prolonged labor, infection, premature parturition, and postpartum bleeding (Astria, 2019).

The main therapy for anemia is giving Fe supplements 200 mg every day, if Hb <5-6 gr% then blood transfusions are necessary (Manuaba, 2013).

Pregnant women who experience iron deficiency anemia are strongly advised to have a diet of foods that contain iron and fulfill adequate nutrition. Foods that are good for daily consumption include spinach, katuk leaves, broccoli, chicken liver and beans. In addition, processed foods that contain lots of iron, one of which is also found in Moringa leaves (Astuti, R. Y, in Hartanti, 2021).

Moringa leaves are a rich source of protein, iron, vitamin C and other essential nutrients. Moringa leaves have great benefits, are cheap and easy to get. 100 g of dried Moringa leaves contain 27.1g protein, 2.3g fat, 18.9mg vitamin A, 2.64 mg thiamin, 20.05 mg riboflavin, 7.3 mg vitamin C, 2.003 mg calcium, 205 cal calories, 38.2 g carbohydrates, 28.2 g iron, 3.29 mg zinc and other nutrients. Various comparisons of dried Moringa leaves, namely dried Moringa leaves are equal to ½ times the vitamin C in fresh oranges, equal to 10 times the vitamin A in carrots, 9 times the protein in yogurt and 25 times the sat of iron in spinach (Hendarto, D, 2019).

Moringa leaves are a type of food that grows a lot in Indonesia, including in Kendari City. Moringa contains nutrients that are good for the health of the body. Various research results show the efficacy of Moringa leaves, including as a hepatoprotector which is very good for diseases related to digestive problems, suitable for dealing with diseases with heat energy or excess energy such as inflammation or cancer. How to consume moringa preferably while warm, because the antioxidant effect is still strong when warm (Bora, 2017).

Research conductedHartati (2021).The research was conducted at the M. Mataram Health Center, Kab. South Lampung in February-August 2018. Data collection used observation sheets and the HB Test. Bivariate data analysis using t-test. Results: The average hemoglobin level of pregnant women in the third trimester before being given Moringa leaf extract with a mean of 9.642 and a standard deviation of 0.6103. After consuming Moringa leaf extract, the average HB level of pregnant women was 10.648 and the Standard Deviation was 0.9582. The statistical test results obtained a p-value of 0.000 <0.005.

Isnainy's research (2019) showed an average increase in Hb for pregnant women (30 people) after being given Moringa leaf extract + honey from 10.17gr% to 11.1gr%. Moringa leaf extract is put into capsules (per capsule 500 mg), dose 2 x 2 a day for 15 days, given together with honey. Iriani's research (2020) stated that giving Moringa leaves with extract or flour that is put into capsules still has useful properties to significantly increase the hemoglobin levels of anemic pregnant women, this is also the case if Moringa leaves are consumed directly as a vegetable. This is because Moringa leaves have a high content of iron and vitamin C so that they can help increase heme as a booster for hemoglobin in the blood.

The Trikarya Health Center is the 4th health center in order for the highest number of anemia cases in Mesuji Regency. The number of anemia cases at the Tri Karya Mulya Health Center during 2021 was 345 (42%) pregnant women, this number experienced a less significant decrease in 2022 with 311 (40%) pregnant women experiencing anemia in pregnancy. The category of anemia in pregnancy reached 110 pregnant women in the first trimester, 132 (40.5%) pregnant women in the second trimester and 62 (34%) pregnant women in the third trimester. While the first sequence of events of anemia in pregnancy was the Brabasan Health Center with 365 incidents, the second place was the Sungai Sidang Health Center with 345 incidents, and the third place was the Wira Laga Health Center with 324 incidents.

RESEARCH METHOD

The type of research used is quantitative, with a Quasy Experimental research design with a two group pretest-posttest design approach. The sampling technique in this study will use the total sampling technique. Respondents in this study were pregnant women with mild and moderate anemia with the goal of consuming moringa leaves and then observing how hemoglobin levels were in the control and intervention groups. This research was conducted in March-July 2022 in the Tri Karya Mulya Public Health Center Work Area.

RESEARCH RESULT
Characteristics of Respondents

Based on table 1 above it is knownRespondent characteristics based on the group given Moringa leaf extract and Fe tablets (intervention group)in the Work Area of the Tri Karya Mulya Health Center in 2022 based on age category with a vulnerable age of 25-30 years as many as 16 (15.7%) respondents, ages 31-40 years as many as 13 (41.9%) respondents, ages 41-43 years as many (6.5%) respondents. While the characteristics based on education with elementary education were 5 (16.1%) respondents, junior high school education were 7 (22.6%) respondents, high school education were 12 (38.7%) respondents and undergraduate education were 7 (22.6%) respondents.

While the characteristics based on the mother's occupation with the non-working category were 19 (61.3%) respondents, as traders as many as 6 (19.4%) respondents, as civil servants as many as

6 (19.4%) respondents. Characteristics of mothers based on parity or the number of children in the

primipara category were 14 (45.2%) respondents, multipara were 17 (54.8%) respondents.

Table 1
Characteristics of Respondents Based on Intervention GroupAgainst the Working Area of the Tri Karya Mulya Health Center in 2022

Characteristics of Respondents	N	Percentage
Mother's age		
205-30 years	16	51.7%
31-40 years	13	41.9%
41-42 years	2	6.4%
Mother's education		
SD	5	16.1%
JUNIOR HIGH SCHOOL	7	22.6%
SENIOR HIGH SCHOOL	12	38.7%
Bachelor	7	22.6%
Mother's job		
IRT	19	61.3%
Trader	6	19.4%
civil servant	6	19.4%
Total	31	100%
Parity		
Multipara	17	54.8%
Primipara	14	45.2%
Total	31	100%

Table 2
Characteristics of Respondents Based on the Control GroupAgainst the Working Area of the Tri Karya Mulya Health Center in 2022

Characteristics of Respondents	N	Percentage
Mother's age		
205-30 years	10	32.2%
31-40 years	17	54.8%
43-45 years	4	13.0%
Mother's education		
SD	5	16.1%
JUNIOR HIGH SCHOOL	5	16.1%
SENIOR HIGH SCHOOL	13	41.9%
Bachelor	8	25.8%
Mother's job		
IRT	18	58.1%
Trader	5	16.1%
Employee	4	12.9%
civil servant	4	12.9%
Parity		
Multipara	17	54.8%
Primipara	14	45.2%

Based on table 2 above it is knownRespondent characteristics based on the group given Moringa leaf extract and Fe tablets (intervention group)in the Work Area of the Tri Karya

Mulya Health Center in 2022 based on age category with a vulnerable age of 25-30 years as many as 10 (32.2%) respondents, ages 31-40 years as many as 17 (58.8%) respondents, ages 43-45 years as many

as 4 (13.0%) respondents. While the characteristics based on education with elementary education were 5 (16.1%) respondents, junior high school education were 5 (16.1%) respondents, high school education were 13 (41.9%) respondents and undergraduate education were 8 (25.8%) respondents.

While the characteristics based on the mother's occupation with the non-working category were 18 (58.1%) respondents, as traders as many as 5 (16.1%) respondents, as employees as many as 4 (12.9%) and as civil servants as many as 4 (12.9%) respondents. Characteristics of mothers based on parity or the number of children in the primipara category were 14 (45.2%) respondents, multipara were 17 (54.8%) respondents.

Data Normality Test

The Normality test is used to determine whether the sample taken comes from a normal distribution or not. Its function is to find out and provide confidence whether the data is around or close to the normal line. The normality test was carried out using the help of the SPSS program with the Kolmogorov-Smirnov formula used because the sample in this study was above 50. The proposed decision was:

a) If the Sig. Kolmogorov-Smirnov test ≥ 0.05, the data is normally distributed.
b) If the Sig. Kolmogorov-Smirnov test ≤ 0.05, the data is not normally distributed.

From the statistical tests that have been carried out, the results of the calculation of the normality test can be seen in the following table:

Table 3
Results of the Variable Normality Test after Treatment in the intervention group and the Test of normality control group

Test score value	Kolmogorov-Smirnov value
Hb levels before the intervention group	0.164
Hb levels after the intervention group	0.200
Hb levels before the control group	0.072
Hb levels after the control group	0.055

Based on research data, it is known that the Kolmogorov-Smirnov values before and after the intervention group were 0.164 and 0.200 > 0.05 and before and after in the control group were 0.072 and 0.055 > 0.05. Thus it can be concluded that the data for the two groups in this study were normally distributed.

Univariate analysis

Based on table 4 above, it can be seen from the number of 31 research respondents who were conducted to find outthe average hemoglobin level of pregnant women before being given treatment in the intervention group atTri Karya Mulya Community Health Center Work Area in 2022 with an average value before of 10.010, a standard deviation value of 0.3534, a standard error value of 0.0635, a minimum Hb value of 8.9 mg/dl, a maximum value of Hb level of 10.5 mg/dl.

Table 4
Average Hemoglobin Levels of Pregnant Women Before Intervention GroupWork Area of Tri Karya Mulya Community Health Center in 2022

Hb Levels of Pregnant Women	*Min*	*Max*	*Means*	*SD*	*SE*	*N*
Hb level before the intervention group	8,9	10.5	10,010	0.3534	0.0635	31

Table 5
Average Hemoglobin Levels of Pregnant Women After Intervention GroupWork Area of Tri Karya Mulya Community Health Center in 2022

Hb Levels of Pregnant Women	Min	Max	Means	SD	SE	N
Hb levels after the intervention group	10,8	13.0	12,200	0.5379	0.0966	31

Based on table 5 above, it can be seen from the number of 31 research respondents conducted to find outthe average hemoglobin level of pregnant women after being given treatment in the intervention groupwas 12.200, the standard deviation was 0.5379, the standard error was 0.0966, the minimum Hb level was 10.8gr/dl, the maximum Hb level was 13.0gr/dl.

Table 6
Average Hemoglobin Levels of Pregnant Women Before Control GroupWork Area of Tri Karya Mulya Community Health Center in 2022

Hb Levels of Pregnant Women	Min	Max	Means	SD	SE	N
Prior Hb levels in the control group	8,7	10,7	9,871	0.4755	0.0854	31

Based on table 6 above, it can be seen from the number of 31 research respondents who were conducted to find outthe average hemoglobin level of pregnant women before being in the control groupTri Karya Mulya Community Health Center Work Area in 2022 with an average value before of 9.817, a standard deviation value of 0.4755, a standard error value of 0.0854, a minimum value of Hb level 8.7gr/dl, a maximum value of Hb level 10.7gr/dl.

Average Hemoglobin Levels of Pregnant Women After Control GroupWork Area of Tri Karya Mulya Community Health Center in 2022
Based on table 7 above, it can be seen from the number of 31 research respondents who were conducted to find outthe average hemoglobin level of pregnant women after being in the control groupTri Karya Mulya Community Health Center Work Area in 2022 with an average after value of 11.926, a standard deviation value of 0.5756, a standard error value of 0.1034, a minimum Hb level value of 10.9 gr/dl, a maximum Hb level value of 13.4 gr/dl

Table 7
Average Hemoglobin Levels of Pregnant Women After Control GroupWork Area of Tri Karya Mulya Community Health Center in 2022

Hb Levels of Pregnant Women	Min	Max	Means	SD	SE	N
Hb levels after the control group	10,9	13,4	11,926	0.5756	0.1034	31

Bivariate Analysis
Bivariate analysis used the Independent sample t test to determine the effect of Moringa leaf extract on hemoglobin levels of pregnant women with anemia in the Working Area of the Tri Karya Mulya Health Center in 2022.The results of the bivariate analysis are displayed in table form as follows:

Table 8
The Effect of Moringa Leaf Extract on Hemoglobin Levels of Anemia Pregnant Women in the Work Area of the Tri Karya Mulya Health Center in 2022

Variable	N	Means	P Value
Hb levels of pregnant women before the intervention group	31	2.1903	
Hb levels of pregnant women after the intervention group			0.000
Hb levels of pregnant women in the control group	31	1.9323	
Hb levels of pregnant women after being in the control group			

Based on table.8, it can be seen that the results of the research that was carried out to determine the effect of Moringa leaf extract on hemoglobin levels of pregnant women with anemia in the Working Area of the Tri Karya Mulya Health Center in 2022 with the results of the independent test obtained a p value of 0.000 < α (0.05) meaning that H0 is rejected and Ha is accepted, which means that there is a significant relationship between the two variables.

DISCUSSION
Univariate analysis
Average Hemoglobin Levels of Pregnant Women Before Intervention GroupWork Area of Tri Karya Mulya Community Health Center in 2022

The average hemoglobin level of pregnant women before being given treatment in the intervention group atTri Karya Mulya Community Health Center Work Area in 2022 with an average value before of 10.010, a standard deviation value of 0.3534, a standard error value of 0.0635, a minimum Hb value of 8.9 mg/dl, a maximum value of Hb level of 10.5 mg/dl.

Anemia is a condition of reduced red blood cells (erythrocytes) in blood circulation or hemoglobin (Hb) mass so that they are unable to fulfill their function as carriers of oxygen to all tissues (Astuti, R. Y, in Hartanti, 2021).

Moringa leaves are a rich source of protein, iron, vitamin C and other essential nutrients. Moringa leaves have great benefits, are cheap and easy to get. 100 g of dried Moringa leaves contain 27.1g protein, 2.3g fat, 18.9mg vitamin A, 2.64 mg thiamin, 20.05 mg riboflavin, 7.3 mg vitamin C, 2.003 mg calcium, 205 cal calories, 38.2 g carbohydrates, 28.2 g iron, 3.29 mg zinc and other nutrients. Various comparisons of dried Moringa leaves, namely dried Moringa leaves are equal to ½ times the vitamin C in fresh oranges, equal to 10 times the vitamin A in carrots, 9 times the protein in yogurt and 25 times the sat of iron in spinach (Hendarto, D. 2019).

Research conducted by Hartanti (2021) with the title "Consumption of Moringa Leaf Extract in Increasing Hemoglobin Levels in Pregnant Women"This type of research is quantitative with a quasi-experimental research design and a one group pretest-posttest design approach. The population in the study were third trimester pregnant women. A sample of 33 people was obtained using a purposive sampling technique. The research was conducted at the M. Mataram Health Center, Kab. South Lampung in February-August 2018. Data collection used observation sheets and the HB Test. Bivariate data analysis using t-test. Results: The average

hemoglobin level of pregnant women in the third trimester before being given Moringa leaf extract with a mean of 9.642 and a standard deviation of 0.6103. After consuming Moringa leaf extract, the average HB level of pregnant women was 10.648 and the Standard Deviation was 0.9582. The statistical test results obtained a p-value of 0.000 <0.005.

According to researchers, Hb levels in pregnant women are the most worrying problem because if pregnant women experience problems with low Hb levels, there will be problems with pregnancy complications. The results of the research conducted above show that there are problems in pregnant women before being given the consumption of Moringa leaf extract, therefore mothers are advised to drink Moringa leaf extract once a day for 1 week which is useful to help increase the mother's HB levels due to the high content of Iron in Moringa Leaf Extract 32.5 mg as well as Vitamin C 220 mg which is known Vitamin C can help in the absorption of iron. Thus mothers who consume kelornantinya leaf extract in the hope that Hb levels can increase properly and the problem of anemia in pregnancy can be overcome.

Average Hemoglobin Levels of Pregnant Women After Intervention GroupWork Area of Tri Karya Mulya Community Health Center in 2022

The average hemoglobin level of pregnant women after being given treatment in the intervention groupis 12.200, the standard deviation is 0.5379, the standard error is 0.0966, the minimum Hb level is 10.8gr/dl, the maximum Hb is 13.0gr/dl

Moringa leaves are a type of food that grows a lot in Indonesia, including in Kendari City. Moringa contains nutrients that are good for the health of the body. Various research results show the efficacy of Moringa leaves, including as a hepatoprotector which is very good for diseases related to digestive problems, suitable for dealing with diseases with heat energy or excess energy such as inflammation or cancer. How to consume moringa preferably while warm, because the antioxidant effect is still strong when warm (Bora, 2017).

In line with research conducted byIsnainy (2019) showed an average increase in Hb for pregnant women (30 people) after being given Moringa leaf extract + honey from 10.17gr% to 11.1gr%. Moringa leaf extract is put into capsules (per capsule 500 mg), dose 2 x 2 a day for 15 days, given together with honey. Iriani's research (2020) stated that giving Moringa leaves with extract or flour that is put into capsules still has useful properties to significantly increase the hemoglobin levels of anemic pregnant women, this is also the case if

Moringa leaves are consumed directly as a vegetable. This is because Moringa leaves have a high content of iron and vitamin C so that they can help increase heme as a booster for hemoglobin in the blood.

According to researchers, consuming Moringa leaf extract can help absorb iron tablets in the body because Moringa leaves contain high levels of vitamin C which is useful in absorbing iron tablets. EMoringa leaf extract contains approximately 300 grams in 1 Moringa leaf extract capsule.The micronutrient content is 7 times the vitamin C of oranges, 4 times the vitamin A of carrots, 4 cups of calcium in milk, 3 times the potassium of bananas, and protein in 2 yoghurts. Therefore, Moringa has the potential as a probiotic drink for health drinks, or added to food as a fortifier to enrich its nutritional value. According to researchers, the increase in maternal hemoglobin levels varies due to other factors that are not controlled by researchers related to other nutritional intake.

According to the researchers, the research results obtained after being given Moringa leaf extract for 1 day once showed the result that there was an increase in Hb levels of pregnant women, which means that the content of Moringa leaf extract consumed really affects the increase in HB levels of anemic pregnant women in the Work Area of the Tri Karya Mulya Health Center. In this study, mothers experienced an increase in Hb levels well because mothers always consumed Fe tablets before consuming Moringa leaf extract so that mothers received more iron intake than before, and the content of Vitamin C in Moringa leaf extract really helps the absorption of iron in the mother's body.

Average Hemoglobin Levels of Pregnant Women Before Control GroupWork Area of Tri Karya Mulya Community Health Center in 2022

The average hemoglobin level of pregnant women before being in the control group atTri Karya Mulya Community Health Center Work Area in 2022 with an average value before of 9.817, a standard deviation value of 0.4755, a standard error value of 0.0854, a minimum value of Hb level 8.7gr/dl, a maximum value of Hb level 10.7gr/dl.

The roles and functions of iron include: elements of hemoglobin, myoglobin and several oxidative enzymes. Found in all cells of the body, but stored as ferritin in the liver, spleen and bone marrow, and especially in the reticuloendothelial tissue in the body, iron functions to transport oxygen and electrons and is an integral part of various enzyme reactions such as in the respiratory chain. Iron is the most abundant micro mineral in the body,

which is around 3-5 grams or 40-50 mg/kg body weight (BB) for adult men and 35-50 mg/kg for adult women.

Research conducted by Hartanti (2021) with the title "Consumption of Moringa Leaf Extract in Increasing Hemoglobin Levels in Pregnant Women"This type of research is quantitative with a quasi-experimental research design and a one group pretest-posttest design approach. The population in the study were third trimester pregnant women. A sample of 33 people was obtained using a purposive sampling technique. The research was conducted at the M. Mataram Health Center, Kab. South Lampung in February-August 2018. Data collection used observation sheets and the HB Test. Bivariate data analysis using t-test. Results: The average hemoglobin level of pregnant women in the third trimester before being given Moringa leaf extract with a mean of 9.642 and a standard deviation of 0.6103. After consuming Moringa leaf extract, the average HB level of pregnant women was 10.648 and the Standard Deviation was 0.9582. The statistical test results obtained a p-value of 0.000 <0.005

According to the researchers, it can be seen that Hb levels before consuming Fe tablets routinely experienced problems in decreasing them because every time I was asked why the mother did not take Fe tablets because she forgot and was lazy to take Fe tablets because after taking Fe tablets her mouth would taste bitter, not infrequently the mother also felt nauseous. Fe tablets are always recommended to be consumed during pregnancy to help increase the mother's Hb level and minimize the incidence of pregnancy and birth complications.

The results of the research that has been done show that there is a problem with Hb levels in pregnant women because mothers feel bored if they have to take Fe tablets every day and for 9 months of pregnancy. The mother also said that after taking the iron tablets, the tongue felt bitter and nauseous, so after taking the Fe tablets, they drank tea or drank milk.

Average Hemoglobin Levels of Pregnant Women After Control GroupWork Area of Tri Karya Mulya Community Health Center in 2022

The average hemoglobin level of pregnant women after being in the control group atTri Karya Mulya Community Health Center Work Area in 2022 with an average value before of 9.817, a standard deviation value of 0.4755, a standard error value of 0.0854, a minimum value of Hb level 8.7gr/dl, a maximum value of Hb level 10.7gr/dl. While the average value after is 11926, the standard deviation value is 0.5756, the standard error value is 0.1034,

the minimum Hb level is 10.9 gr/dl, the maximum Hb level is 13.4gr/dl

Anemia due to iron deficiency can increase the risk to the mother and baby. Supplementation is an important strategy in overcoming micronutrient deficiencies in women. Data on intake of micronutrients in women aged 15-49 years who gave birth to children in the 5 years prior to the survey based on background characteristics. The majority of women who gave birth during the five years prior to the survey received iron supplements during pregnancy for the delivery of their last child. Only one in three received iron tablets according to the recommendations more days. The likelihood of receiving/intake of iron for 90 days or more increases with age, educational level and wealth quintile. Urban women are much more likely to take iron pills for at least 90 days than rural women (IDHS, 2015).

The need for iron during the first trimester is relatively small, namely 0.8 mg a day, which then increases sharply during the second and third trimesters, namely 6.3 mg a day (Arisman, 2010). Especially during pregnancy, especially the third trimester, is a critical period when the need for nutrients increases. If iron in the blood is lacking, the hemoglobin level will decrease resulting in impaired fetal growth. Several studies state that Hb levels in the last trimester of pregnant women and the high rate of anemia in the third trimester can affect birth weight (Manuaba, 2013).

In line with Fadina's research (2017)The research sample was 66 people who were third trimester pregnant women who made visits and lived in the working area of the Air cold Health Center. The results showed that most pregnant women were aged between 20-35 years and were in the preterm phase (gestational age 28-33 weeks). Statistical test results using the chi-square test obtained p <0.05 (p value = 0.000), meaning that there is a significant relationship between Fe tablet supplementation and hemoglobin levels in third trimester pregnant women. The conclusion of this study is that there is a relationship between Fe tablet supplementation and hemoglobin levels in third trimester pregnant women.

According to the researchers, taking Fe tablets according to the program and dosage determined by the government will help reduce the incidence of anemia in pregnancy. The increasing problem of anemia in pregnancy is influenced by several factors, especially the compliance of pregnant women in consuming Fe tablets, other factors that influence the occurrence of anemia due to economic factors and consumption of nutrients during and before pregnancy.

The results of the research conducted showed that there was an increase in Hb levels of pregnant women after consuming Fe tablets regularly because mothers increasingly understood the importance of Fe tablets for pregnant women's needs. Mothers also increasingly understand the risk of anemia in pregnancy so that during the study in the control group, pregnant women consumed Fe tablets every day according to the Government's recommendations so that the Hb level examination results showed an increase.

Bivariate Analysis

The results of the independent t test obtained a p value of 0.000 < α (0.05) meaning that H0 is rejected and Ha is accepted, which means that there is a significant relationship between the two variables.

Anemia is a medical condition in which the number of red blood cells or hemoglobin is less than normal. Normal hemoglobin levels are generally in men and women. For men, anemia is usually defined as a hemoglobin level of less than 13.5% gram/100 ml and in women as hemoglobin less than 12.0 gram/100 ml.(Supriyatiningsih, 2016).

Moringa leaves (Moringa oleifera lam.) is a plant rich in vitamin A, vitamin C and minerals, one of which is iron (Faizal, 2014). The vitamin and mineral content of Moringa leaves (Moringa oleifera lam.) has also been studied and reported by Leone Alessandro et al., and published in the International Journals of Molecules Science (2015).

Moringa leaves contain a lot of iron (Fe), vitamin C and vitamin A as sources that affect hemoglobin, hematocrit, and RBC levels in iron deficiency anemia. Vitamin A helps maintain bone health while vitamin C can accelerate the absorption of iron (Fe) (Krisnadi, 2015). Previous research was conducted on pregnant women who were given kiwi fruit as vitamin C by giving it together with iron supplements, which resulted in significant differences in the increase in iron and hemoglobin levels. Increased absorption of iron in the body, assisted by vitamin C, will increase hemoglobin levels in the blood (Deck et al, 2011 in Aminah 2015).

Iron contained in Moringa leaves will be absorbed by the body through the duodenum with the help of DMT1 receptors to enter enterocytes. Iron will be forwarded to ferroportin which is the exit to the body's interstitial fluid. Before being released into the body's interstitial fluid, iron will be oxidized to Fe^{3+} by HEPH. After being oxidized, iron will be released into the interstitial fluid and binds to Transferrin (Aminah 2015).

In line with research conducted byBora (2017) with the title "Correlation between Moringa Leaf Consumption Patterns and Hemoglobin Levels of Pregnant Women in the Working Area of the Kandai Health Center, Kendari City, Southeast Sulawesi Province in 2017" was a cross-sectional study design with a population of 113 people. The research sample was pregnant women in the working area of the Kendari Public Health Center at the time the research was conducted. The sampling technique used a purposive sample of 55 people. The results of the research on consumption patterns of Moringa leaves in pregnant women in the working area of the Kendari Public Health Center, the majority often consume it at 90.9% and 9.1% rarely consume it. Hemoglobin levels of pregnant women 87.3% had normal hemoglobin levels (> 11gr%) and 12.7% had less hemoglobin levels (<11gr5. Chi-square test results p=0.012, which means p<0.05 and x²hit=11.065>X²table=3.831.

Research conducted by Atika (2020) with the title "Effect of Moringa Leaves (Moringa Oleifera Lam) on Hb Levels of Pregnant Women at Pmb Zummatul Atika"This type of research was quantitative, using a non-probability purposive sampling technique with 22 pregnant women as respondents who met the inclusion and exclusion criteria, the research design used was a paired T-Test, namely observations made 2 times, namely before the experiment and after the experiment, and for data processing using Editing, Coding, Scoring, Tabulating, and analyzed with the Wilcoxon SPSS Version 16 test. The results of this study stated that the analysis of the effect of Moringa leaves on hemoglobin levels with a P value of Paired T-Test is 0.0 00 with an average difference in HB levels of 0.6054 gr%, the results of a comparison test of hemoglobin levels before and after being given Moringa leaves using a paired t-test showed a significance value (p) of 0.000. Therefore, The results showed that there was a significant effect of giving Moringa leaves on hemoglobin levels of pregnant women. This is in line with the results of research by Rahmawati M and Menik (2017) on pregnant women in the 2nd and 3rd trimesters, as well as the results of Fauziandari EN's research (2019).

According to researchers, the increase in Hb levels in anemic pregnant women in the Tri Karya Mulya Health Center area was not very significant in the intervention group because this was only done in 1 week, which means that if it is done routinely in daily life, Moringa leaf extract can really help increase Hb levels in anemic pregnant women significantly. Then, the increase in Hb levels of pregnant women is different because there are other factors that are not controlled by researchers, for example, nutritional factors for pregnant women every day, such as mothers diligently eating fruit, drinking juices or vegetables that are high in vitamin C which can also help absorb iron. From the characteristic data it is also obtained that pregnant women with undergraduate education, the increase in HB levels is greater, meaning that the education factor can also affect the level of knowledge of pregnant women

CONCLUSION

The results of the independent t test obtained a p value of 0.000 < α (0.05) meaning that H0 is rejected and Ha is accepted, which means that there is a significant relationship between the two variables.

SUGGESTION
For Respondents

By conducting this research, it is hoped that respondents will understand more about the importance of consuming Fe tablets during pregnancy and if the mother has anemia problems, it can be done with a combination of Fe tablets with Moringa leaf extract or processed Moringa leaf dishes that are easy to obtain and inexpensive, which can greatly help increase HB levels in pregnant women. By conducting this research, it is hoped that mothers with anemia and not anemia will always consume Fe tablets according to government recommendations.

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