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Analysis of Bitma Juice (Beetroot and Honey) on Increasing Hemoglobin Levels in Pregnant Women

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ABSTRACT

Background: Anemia in pregnant women is generally caused by unmet iron needs. The impact of anemia in pregnant women includes, BBLR (Low Birth Weight), IUGR (Intrauterine Growth Restriction), premature birth and postnatal death.

Purpose: This study aims to determine the effect of giving BitMa juice (beetroot juice and honey) on increasing hemoglobin levels in pregnant women in PMB Caecilia Yunita Rahayu Malang City.

Methods: The design of this study used a quasi-experiment with a pre-test and post-test control group design. The sample of this study was 32 pregnant women with a purposive sampling technique, have Hb levels <11 g/dL, are willing to be research respondents and cooperate by consuming BitMa juice during the research process, are willing to undergo Hb examination during the pre-test and post-test. The independent variable of this study was beetroot juice and honey, the dependent variable of this study was an increase in hemoglobin levels. The analysis used the Independent Sample T-Test.

Results: The results of the study showed that the average Hb level of respondents before receiving BitMa juice treatment was 10.24 gr/dL. The average Hb level of pregnant women who were given BitMa juice was 12.85 gr/dL. The results of the Independent T-Test statistical test showed p = 0.000 <0.05, which means that there is an effect of BitMa juice (Beetroot and Honey) on increasing hemoglobin levels in pregnant women with a significant increase in hemoglobin levels of 20%.

Conclusion: Giving BitMa juice (Beetroot and Honey) is effective in increasing hemoglobin levels in pregnant women, because of the iron, folic acid, and vitamin C content in beetroot and honey. So pregnant women with anemia are advised to consume BitMa juice.

Keywords: anemia, beetroot, hemoglobin, honey, pregnant women

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BACKGROUND

The high Maternal Mortality Rate (MMR) in Indonesia is the main focus of solving health problems in Indonesia. The main causes of high maternal mortality are postpartum hemorrhage, infection, and preeclampsia or eclampsia. Anemia in pregnant women is the main cause of bleeding and infection, which are the main maternal mortality factors. Currently, the rate of anemia in pregnant women is still high, data from the World Health Organization (WHO), 20% of the 515,000 deaths worldwide are caused by anemia. Based on the 2018 Riskesdas data, the prevalence of anemia in pregnant women was 48.9%, meaning that 4-5 out of 10 pregnant women suffered from anemia (Kemenkes RI, 2018a). Then the prevalence of anemia by age is known to be 84.6% occurring at the age of 15-24 years (Kemenkes RI, 2021). Meanwhile, the incidence of anemia in East Java in 2020 was 19.6%, meaning that 1-2 out of 10 pregnant women suffered from anemia (Dinkes Jatim, 2020).

Then for the incidence of anemia in Malang City in 2021, there were 1,977 pregnant women with anemia or 23.3% (Profil Kesehatan Kota Malang, 2021). Based on data from PMB Caecilia Yunita Rahayu, the number of pregnant women in July 2023 was 90 pregnant women and 47 (52.2%) pregnant women were anemic. From the results of brief interviews in preliminary studies that have been conducted pregnant women say they only consume the desired food without paying attention to its nutritional value and rarely consume fruits and vegetables. So that the need for iron has not been fulfilled because of bad eating habits which are suspected of causing pregnant women to experience anemia. Anemia that occurs in pregnant women will have an impact on the mother and her baby. The impacts include LBW (low birth weight), IUGR (Intrauterine Growth Restriction), abortion, low or premature birth age and postnatal infant mortality (Farhan & Dhanny, 2021).

Efforts to increase hemoglobin levels of pregnant women in accordance with government recommendations are usually through 2 ways, namely pharmacology and non-pharmacology. Pharmacological efforts are given Fe tablets every day during pregnancy or at least 90 tablets (Kemenkes RI, 2018b). However, taking Fe can cause side effects in pregnant women such as indigestion. This is in accordance with the research of (Hardiyanti & Suparni, 2018) that the effects of taking Fe tablets, namely epigastric pain, nausea, vomiting, consipation, diarrhea and abdominal pain. Thus, non-pharmacological interventions are needed to increase Hb levels which are easily obtained, cheap, safe and do not cause side effects so that pregnant women and fetuses live well (Napisah, 2023). As for non-pharmacological ways of treating anemia and preventing it, one of them is by consuming beetroot (Anggraini & Noveni, 2019).

Therefore, pregnant women should consume foods rich in iron such as green vegetables, dried beans, and dried fruits. Among all fruits, beet is one of the fruits that is high in folic acid content, which is 108 mg of other fruits. Beet, known as beet root or red beetroot, is a type of plant from the Amaranthaceace group and has the Latin name Beta Vulgaris. Beet have a fairly high content of folic acid and iron, both of which are needed in the formation of new red blood cells and hemoglobin in the body (Liawan et al., 2020).). This is supported by research conducted by Indah (2021), with the results that beet juice can increase the hemoglobin level of pregnant women with anemia, the average value of hemoglobin before consuming beet juice is 9.50 while for the average after giving beet juice the hemoglobin level of pregnant women increases by 11.27.

Honey contains many minerals such as sodium, calcium, magnesium, aluminum, iron, phosphorus, and potassium, plus the content of vitamins in it such as ascorbic acid (C), folic acid and vitamin K. The magnesium mineral in honey is the same as the magnesium content in blood serum. In addition, the iron content in honey can increase the number of erythrocytes

so that it can increase haemoglobin levels (Nurfaidah, 2020). When honey is consumed daily, people with anemia can see a significant increase in energy levels, then honey helps increase calcium absorption, hemoglobin count and treat or prevent anemia due to nutritional factors (Cholifah, 2018). This is in line with research with the results of the effect of honey administration on haemoglobin levels (Ririn Rianti et al, 2021). Based on the background description above, researchers are interested in conducting research on the analysis of BitMa juice (Beetroot and honey) on increasing hemoglobin (Hb) levels in pregnant women at PMB Caecilia Yunita Rahayu Malang City.

OBJECTIVE

This study aims to determine the effect of BitMa juice (Beetroot and Honey) on increasing hemoglobin levels in pregnant women at PMB Caecilia Yunita Rahayu Malang City.

METHODS

This research design uses quasy experiment with pre-test and post-test control group design. Based on ethical clearance Number : 000472/EC/KEPK/I/10/2023, the sampling technique used was purposive sampling with inclusion and exclusion criteria, have Hb levels <11 g/dL, are willing to be research respondents and cooperate by consuming BitMa juice during the research process, are willing to undergo Hb examination during the pre-test and post-test. Respondents continue to consume Fe tablets and eat nutritious food. The sample amounted to 32 respondents, namely 16 control groups and 16 intervention groups. The research location was at PMB Caecilia Yunita Rahayu, Malang City. Analysis using univariate and bivariate analysis, before the bivariate test is carried out, the data normality test is carried out as a prerequisite for parametric tests using the Shapiro-wilk test by looking at the sig value (2-tailed) with the results of data normality in the pretest obtained p-value> 0.05, so the results can be normally distributed. Then the statistical test used is the parametric test, namely the Independent Sample T-Test. Permission was obtained between the researcher and the midwife at PMB Caecilia Yunita Rahayu, Malang City, while also determining the time for conducting the research. Grouping research samples that fall into the inclusion criteria. Dividing samples into test groups and control groups. Making informed consent to all samples and explaining the research procedure to all samples that will participate in the research. Measuring Hb levels in pregnant women with the Easy Touch Testing System (GCHb) and Easy Touch Hb strips which are carried out before treatment. Conducting research by asking the test group to consume 250 ml of BitMa Juice (Beetroot and Honey) once a day for 7 days and keep consuming Fe tablets and balanced nutritious food. Measuring Hb levels in pregnant women with the Easy Touch Testing System (GCHb) and Easy Touch Hb strips which are carried out after treatment. After the data is collected, data processing is carried out.

RESULTS

Univariate Analysis

Table 1. Respondent Characteristics

No	Characteristics	f	%
	Age		
	<20 Years	4	12.5%
1	20-35 Years	25	78.1%
	>35 Years	3	9.4%

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TOTAL			**32**	**100.0%**
	Occupation			
	Housewife	22	69%	
2	Self-employed		6	19%
	Private		4	13%
	Civil servant		0	0%
TOTAL			**32**	**100%**
	Trimester			
	TM 1		11	34%
3	TM 2		15	47%
	TM 3		6	19%
TOTAL			**32**	**100%**
	Gravida			
	Gravida 1		10	31%
4	Gravida 2		16	50%
	Gravida >2		6	19%
TOTAL			**32**	**100%**

Based on table 4.1 above, it is known that almost all respondents are at the reproductive age of 20-35 years, namely 25 (78.1%) respondents. While in terms of work, most of the respondents were housewives, namely 22 (69%) respondents, seen from the trimester of pregnancy, almost half of the respondents were in trimester 2, namely 15 (47%) respondents. When viewed based on the gravida level category, most respondents were in gravida 2 or it could be interpreted that the mother was in her second pregnancy, as many as 16 (50%) respondents.

Bivariate Analysis

Table 2. Distribution of Hemoglobin Levels Before and After in Control Group and Intervention Group Respondents

Treatment	**Respondent Code**	**Hb Level (gr/dL)**			
		Pre	**Mean Pre**	**Post**	**Mean Post**
Control Group (Fe only)	R1	10.3	10.20	11.2	11.00
	R2	10.9		11.9	
	R3	10.1		11.0	
	R4	10.6		11.7	
	R5	10.5		10.9	
	R6	10.2		11.0	
	R7	9.2		9.9	
	R8	10.4		11.3	
	R9	10.6		11.7	
	R10	9.3		9.9	
	R11	9.8		10.6	
	R12	9.9		10.1	
	R13	10.3		10.7	

	R14	10.2		10.9	
	R15	10.8		11.8	
	R16	10.1		11.4	
Intervention Group (Fe and BitMa Juice)	R17	10.1	10.24	13.1	12.85
	R18	10.2		12.7	
	R19	10.9		12.5	
	R20	10.7		13	
	R21	10.4		13.4	
	R22	10.2		13.6	
	R23	9.8		12.6	
	R24	10.3		13.2	
	R25	10.2		13.7	
	R26	9.6		11.4	
	R27	10.2		11.7	
	R28	10.6		12.9	
	R29	10.7		13.4	
	R30	9.9		13	
	R31	9.6		11.6	
	R32	10.5		13.8	

Table 2 shows the average (mean) pre-test results of the control group were 10.20 gr/dL with the lowest hemoglobin level of 9.2 gr/dL and the highest of 10.9 gr/dL. The average post-test was 11.00 gr/dL with the lowest hemoglobin level of 9.9 gr/dL and the highest of 11.9 gr/dL. While the average (mean) results of pre-test hemoglobin levels in the intervention group were 10.24 gr/dL with the lowest hemoglobin level of 9.6 gr/dL and the highest of 10.9 gr/dL. The average post-test was 12.85 gr/dL with the lowest hemoglobin level of 11.4 gr/dL and the highest of 13.8 gr/dL.

Table 3. Hemoglobin Level Pre Test and Post Test of Control Group

Variable	Category	Frequency (n)	Percentage (%)	Mean ± SD	Difference Mean	Increase in Hb (%)	Sig
Hemoglobin	Normal	0	0				
Pre-test	Mild	12	75	10,200 ± 0.476			
	Moderate	4	25		- 0.800	7 %	0,000
Hemoglobin	Normal	9	56.3	11,000 ± 0.643			
Post-test	Mild	6	37.5				
	Moderate	1	6.3				

Table 3 shows the results of pre-test Hb levels of 12 (75%) respondents with moderate anemia and 4 (25%) respondents with moderate anemia. The post test results of the control group obtained 9 (56.3%) respondents with normal haemoglobin levels, 6 (37.5%) respondents with mild anemia and 1 (6.3%) respondent with moderate anemia. The mean difference between pre-test and post-test hemoglobin levels in the control group who only consumed Fe tablets showed a result of - 0.800 and p value showed 0.000 (<0.05) with an increase in hemoglobin levels by 7%.

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Table 4. Hemoglobin Level Pre Test and Post Test of Intervention Group

Variable	Category	Frequency (n)	Percentage (%)	Mean ± SD	Difference Mean	Increase in Hb (%)	Sig
Hemoglobin *Pre-test*	Normal	0	0	10,244 ± 0.386	- 2,606	20 %	0,000
	Mild	12	75				
	Moderate	4	25				
Hemoglobin *Post-test*	Normal	16	93.8	12,850 ± 0.740			
	Mild	0	0				
	Moderate	0	0				

Table 4 shows that in the pre-test 12 (75%) respondents had mild anemia and 4 (25%) respondents had moderate anemia. Hb post test results 16 (100%) respondents have normal criteria. The difference between the mean pre-test and post-test Hb levels of the intervention group that had been given BitMa juice showed a negative value of -2.606, thus there was an increase in the mean value of hemoglobin levels after giving BitMa juice pudding of 2.606 and the p value showed 0.000 (<0.05), thus it can be decided that there is an effect of giving BitMa juice (Beet Fruit and Honey) on increasing haemoglobin levels with an increase in hemoglobin levels by 20%.

Table 5. Independent Sample T- Test Results

Variable	Mean ± SD	Difference Mean	Sig.
Control	800 ± 0.292		
Intervention	2,656 ± 0.597	-1,856	0,000

Table 5 shows that there is an average or mean value in the control group of 800 and 2,656 in the intervention group. This value can be interpreted that the average of the Intervention group is higher when compared to the average of the control group. The results of the research analysis on the analysis of the administration of BitMa juice on increasing Hb levels in pregnant women based on statistical tests using the Independent T- Test test obtained the results of p = 0.000 <0.05 then H0 is rejected and H1 is accepted which means there is an effect of BitMa juice (Beet Fruit and Honey) on increasing hemoglobin levels in pregnant women at PMB Caecilia Yunita Rahayu Malang.

DISCUSSION

Identify hemoglobin levels before giving BitMa juice (Beetroot and Honey)

Pregnant women are very susceptible to iron deficiency anemia because in pregnancy the oxygen demand is higher, triggering an increase in erythroprotetin production. As a result, plasma volume increases and red blood cells (erythrocytes) increase. However, the increase in plasma volume occurs in a greater proportion when compared to the increase in erythrocytes, resulting in a decrease in hemoglobin (Hb) concentration due to hemodilution.
Beet have various ingredients that can increase hemoglobin levels in the body, iron content in beet and folic acid which plays an important role as a hemoglobin shaper that is needed by pregnant women (Sembiring, Julina Br and Kadir, 2021). Beet can be used to prevent and treat anemia in pregnant women, it contains 7.4% iron which functions to overcome anemia (Risnawati et al, 2021). This theory is in line with research conducted by (Liesmayani &

Elisa, 2022) which found that there was an effect of giving beet juice to pregnant women on increasing hemoglobin levels.

Honey contains many minerals such as sodium, calcium, magnesium, aluminum, iron, phosphorus, and potassium, plus it contains vitamins such as ascorbic acid (C), folic acid and vitamin K. Honey has been known for its amazing nutritional and healing properties. When honey is consumed daily, people with anemia can see a significant increase in energy levels, then honey helps increase calcium absorption, hemoglobin count and treat or prevent anemia due to its nutritional factors (Cholifah, 2018). This is in line with research (Wardiyah & Ervina, 2020) found that there is an effect of giving honey on increasing Hb levels in third trimester pregnant women at UPTD Puskesmas Peniangan, Marga Sekampung District, East Lampung Regency in 2019.

Based on preliminary studies that have been carried out, the problem of anemia in pregnant women is caused by unmet iron needs due to poor eating habits, as well as consumption of Fe tablets which can cause side effects of indigestion such as nausea and vomiting. Therefore, it can be concluded that to overcome the problem of anemia in pregnant women, researchers provide BitMa juice (beetroot and honey) as an alternative to increase hemoglobin levels because the content of iron and folic acid in beetroot and the content of minerals, iron, vitamin C, and folic acid from honey is expected to help increase hemoglobin levels and by remaining obedient, taking Fe tablets.

Identification of hemoglobin levels after being given BitMa juice (Beetroot and Honey)

Beet can be used to prevent and treat anemia in pregnant women, it contains 7.4% iron which functions to overcome anemia (Risnawati et al, 2021). In the research of Ikawati and Rokhana (2018), the results of the intervention of giving beet juice as much as 250 ml / day which was carried out for 7 days could increase the hemoglobin levels of adolescent girls with anemia, from the average hemoglobin level before being given beet juice, which was an average of 10.6 g / dl. After consuming beets, the average Hb level was 11.9 g/dl. So that there is an increase in hemoglobin levels on average 1.3 g / dl.

Based on the theory that when honey is consumed daily, people with anemia can see a significant increase in energy levels, then honey helps increase calcium absorption, the amount of hemoglobin and treat or prevent anemia due to nutritional factors (Cholifah, 2018). This is in accordance with the research of Ririn Rianti, et al (2021) Of 30 pregnant women before and after being given honey, the hemoglobin level increased by 1.79. Before being given honey, the average hemoglobin level (mean) was 10.29 and after being given honey the average (mean) was 12.08. In this study, the p-value result was 0.000 <0.05. This means that there is an effect of giving honey to the hemoglobin levels of third trimester pregnant women. In the opinion of the researcher based on the results of the study, the hemoglobin levels in pregnant women are different, this is due to the habits of pregnant women while fulfilling the nutrition of pregnant women they consume in a day.

Beetroot can be used to prevent and treat anemia in pregnant women, it contains 7.4% iron which functions to treat anemia (Risnawati et al, 2021). In research by Ikawati and Rokhana (2018), the results of the intervention of giving beet juice as much as 250 ml/day carried out for 7 days could increase the hemoglobin levels of adolescent girls with anemia, from the average hemoglobin level before being given beet juice, which was the average 10.6 g/dl. After consuming beets the average Hb level was 11.9 g/dl. So there was an increase in hemoglobin levels by an average of 1.3 g/dl.

Based on the theory, when honey is consumed every day, anemia sufferers can see a significant increase in energy levels, then honey helps increase calcium absorption, hemoglobin levels and treat or prevent anemia due to nutritional factors (Cholifah,

2018)(Cholifah, 2018). This is in accordance with research by Ririn Rianti, et al (2021). Of 30 pregnant women before and after being given honey, hemoglobin levels increased by 1.79. Before being given honey the average hemoglobin level (mean) was 10.29 and after being given honey the average (mean) was 12.08. In this study, the results obtained were a p-value of 0.000 <0.05. This means that there is an effect of giving honey on the hemoglobin levels of pregnant women in the second trimester because because in the second trimester hemodilution occurs so that hemoglobin levels in pregnant women tend to be lower than in the first and third trimesters.

According to the researcher's opinion based on research results, hemoglobin levels in pregnant women vary, this is caused by the habits of pregnant women in fulfilling the nutritional needs of pregnant women that they consume every day and depends on the compliance of pregnant women in consuming Fe tablets.

Analysis of Bitma Juice (Beetroot and Honey) on Increasing Hemoglobin (Hb) Levels in Pregnant Women at PMB Caecilia Yunita Rahayu Malang

Anemia in pregnancy is a condition where haemoglobin levels are below 11 g/dl, if pregnant women experience anemia indirectly it can be life threatening because anemia is one of the causes of death of pregnant women. To prevent anemia during pregnancy, it is necessary to increase the intake of foods that contain iron, folic acid and vitamin B12. The iron content in beetroot has a fairly high content of folic acid and iron, which reactivates and regenerates red blood cells and supplies oxygen that is useful for the health of red cells. Beetroot also contains vitamin C which will make it easier for the body to absorb iron, which means that if iron can be absorbed properly the formation of new red blood cells will also occur properly and smoothly (Wenda et al, 2016).

Anemia that occurs in pregnant women can also harm the fetus. The threat posed by anemia to the fetus is the risk of intrauterine death, the risk of abortion, low birth weight, the risk of congenital defects, increased risk of infection in infants to perinatal death, or low levels of infant intelligence (Pratami, 2016). Nutrients that play a role in hemopoiesis are protein, various vitamins and minerals. The vitamins are folic acid, vitamin B12, vitamin C, and vitamin E, while the minerals needed are Fe, CU (Ikawati.K, 2018).

Based on the analysis of the unpaired t test (independent sample t test) in the intervention group, the P value is 0.000 so that there is an effect of giving beet juice and honey on increasing hemoglobin levels in pregnant women at PMB Caecilia Yunita Rahayu Malang with an increase in the average value of pretest and posttest hemoglobin levels in the intervention group which is 2.85 mg/dL, there is an increase in hemoglobin with an increase of 20%.

The iron content in beetroot has a fairly high content of folic acid and iron, which reactivates and regenerates red blood cells and supplies oxygen that is useful for the health of red cells. Beetroot also contains vitamin C which will make it easier for the body to absorb iron, which means that if iron can be absorbed properly the formation of new red blood cells will also occur properly and smoothly (Wenda et al, 2016). Beetroot (Beta Vulgaris) has a folic acid content of 109 mg, and vitamin C of 10.0 mg. Honey contains many minerals such as sodium, calcium, magnesium, aluminum, iron, phosphorus, and potassium, plus the content of vitamins in it such as ascorbic acid (C), folic acid and vitamin K. Honey has been known for its amazing nutritional and healing properties.

In the research of Liesmayani and Elisa (2021) the results showed the average hemoglobin level before treatment was 10.147 and after treatment was 12.333. After conducting a paired sample t test statistical test in the treatment group, the P value = 0.000 <0.05 so, there is an effect of giving beet juice to pregnant women on increasing hemoglobin

levels with an increase of 18%. In line with the research of Nursela, et al (2021) which states that there is an effect of giving beet juice on increasing hemoglobin levels in pregnant women. Hemoglobin levels before giving beet fruit juice 9,835, hemoglobin levels after giving beet juice 11,771, with a difference of 1,936. obtained p-value = 0.000 < α = 0.005 with an increase of 20% after consuming beet juice.

Sundari & Happinasari's research (2014) on the comparison of the increase in Hb levels in pregnant women who were given Fe and beetroot fruit there was a difference after being given Fe and Fe + beetroot fruit in the South Purwokerto Health Center area by consuming 500ml for seven consecutive days with the results of p value = 0.009 with an increase in haemoglobin levels of 6%. Research was also conducted by Wenda (2016), at the University of Riau, Nursing Science Study Program on the effectiveness of giving beets to the hemoglobin levels of anemic pregnant women. Based on research that has been conducted in the Pekanbaru City Health Center work area, the results of statistical tests using the independent t test obtained p (0, 000) < α (0, 05). It is said that there is a significant difference between the mean haemoglobin levels of pregnant women with anemia in the experimental group and the control group after being given beet juice so it can be concluded that the administration of beet juice is effective on haemoglobin levels of pregnant women with anemia.

In the research of Ririn Rianti, et al (2021) of 30 pregnant women before and after being given honey, hemoglobin levels increased by 1.79. Before being given honey, the average hemoglobin level (mean) was 10.29 and after being given honey the average (mean) was 12.08. In this study, the p-value result was 0.000 <0.05. This means that there is an effect of giving honey to the hemoglobin levels of third trimester pregnant women with an increase in hemoglobin by 10%.

According to the researchers after the intervention of giving BitMa juice as much as 250 ml once a day for 7 days in the morning there was a significant increase in the mean haemoglobin level of the intervention group which was 2.85 mg/dL, with an increase of 20%. This is due to the iron and folic acid content in beetroot and the combined mineral, iron, vitamin c, and folic acid content of honey that can increase hemoglobin levels. So it can be concluded that there is an effect of giving BitMa juice on increasing the haemoglobin level of pregnant women at PMB Caecilia Yunita Rahayu Malang. However, it is possible that the increase in haemoglobin can be influenced by various factors such as other intake consumed and Fe tablets consumed by respondents.

CONCLUSION

The average Hb level of respondents before receiving BitMa juice treatment was 10.24 gr/dL. The average Hb level of pregnant women after being given the treatment of giving BitMa juice as much as 250 ml once a day for 7 days in the morning is 12.85 gr/dL with a percentage increase of 20%. The results showed that there was an effect of BitMa juice (Beetroot and Honey) on increasing hemoglobin levels in pregnant women at PMB Caecilia Yunita Rahayu Malang City. For future researchers, for further researchers, it is hoped that this research can be continued by adding other interventions besides beetroot and honey and the administration time will be continued until delivery, including the need for further research regarding the time of giving the intervention with the same time and paying attention to other intake consumed by respondents outside the treatment that can affect haemoglobin levels, calculating how much content in one administration of the intervention, and further researchers can develop other interventions that can be given to the community to increase hemoglobin levels or prevent anemia from occurring.

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CONFLICTS OF INTEREST

The limitations of this study that the researcher only used 32 respondents who were then divided into two groups. Suggestions for future researchers could be to use more respondents.

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