MORINGA LEAF BUBBLE DRINK INCREASES HEMOGLOBIN LEVELS IN ADOLESCENT GIRLS

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ABSTRACT

Anemia is a common nutritional problem in the world, especially in developing countries. The proportion of anemia is more common in the female sex. This is because women experience menstrual cycles every month, causing blood loss. Consuming Moringa leaf powder can increase hemoglobin because it contains non-heme iron. Moringa leaf powder can be used as a drink such as bubble drink Moringa leaves. This study aims to determine the effect of giving Moringa leaf bubble drink on hemoglobin levels in adolescent girls. This research is an with a quasi-experimental design with a pretest-posttest design. The study was conducted on 51 samples taken by the stratified random sampling method. Moringa leaf bubble drink is given 2 times a week for 1 month.Data collection was obtained from the results of 24-hour food recall measurements, questionnaires, and hemoglobin levels. Data analysis using Paired t-Test and Anova. The results showed that giving Moringa leaf bubble drink could increase hemoglobin levels in adolescent girls. The increase in hemoglobin has an influence on adolescent girls to help meet the nutritional needs, especially iron (Fe). recommended for young women to be able to consume foods that contain iron more often, such as Moringa leaf burble drinks.

Keywords: Hemoglobin, iron (Fe), Moringa leaves, adolescent girls.

INTRODUCTION

Indonesia needs teenagers who are productive, creative, and critical for the progress of the nation. This can only be achieved if adolescents are healthy and have good nutritional status. Anemia is a common nutritional problem in the world, especially in developing countries. It is estimated that more than 30% of the world's population or 1500 million people suffer from anemia and most of them live in the tropics (Shariff and Akbar, 2018). Based on data from Riskesdas (2013), adolescent girls are one of the groups that are prone to suffering from anemia. Based on age group, patients with anemia aged 5-14 years were 26.4% and those aged 15-24 years were 18.4% (Kementerian Kesehatan RI, 2013).

The provision of blood-added tablets (TTD) to adolescent girls is carried out through School Health Enterprises in educational institutions (junior high school and high school). or the equivalent) by determining the day of taking the TTD together. The dose given is one tablet every week for a whole year. The coverage of giving iron tablets to adolescent girls in Indonesia in 2018 was 48.52%. This has met the 2018 Strategic Plan target of 25%. However, in North Sulawesi Province, it only reached 26.72%, not far from the 2018 target (Ministry of Health of the Republic of Indonesia. 2019), (Kementrian Kesehatan RI. 2019).

Iron intake can be obtained through food sourced from animal protein such as liver, fish, and meat. In addition to animal protein, vegetable protein also contains a lot of iron, for example in spinach and Moringa leaves (Paputungan et al, 2016). The addition of spinach to cupcake products shows that the higher the amount of spinach added, the higher the iron (Fe) content of the product (Sam, et al, 2018). Besides spinach, Moringa is also a plant that contains a lot of iron. Absorption of non-heme iron is affected by the body's iron stores and dietary

components. Because not everyone can consume these foods or foodstuffs, additional iron intake must be needed from blood-added tablets (TTD), (Kementrian Kesehatan RI. 2019).

Based on the data above, it is known that the incidence of anemia in adolescent girls is quite high and is caused by various factors, including inadequate iron intake and the provision of blood-added tablets has not been fully administered in all regions. One of the efforts that can be done is the provision of foods that are sourced from iron (non-heme) such as Moringa leaves which are made into Moringa leaf bubble drinks. This study aims to determine the effect of giving Moringa leaf bubble drink on hemoglobin levels in adolescent girls.

METHOD

This study used a quasi-experimental research design with a pretest-posttest design without a control group. The research was conducted in May and June 2021. The research location is in Kalawat Village, North Minahasa Regency. The population in this study were young women aged 12-17 years. Samples were taken by stratified random sampling method so that a sample of 51 people was obtained. The type of data collected is an examination of Hb levels, height, weight, and food consumption with a 24-hour recall form through interviews. Statistical analysis using Paired Sample t-Test and Anova. Moringa bubble drink made in one serving contains the following nutrients. Moringa leaf bubble drink is given 2 times a week for 1 month (8 times).

Table 1. Nutritional Content of Moringa Bubble Drink Formula in 1 Serving

Nutrients	Moringa Bubble Drink Formula
Energi	317,6 kkal
Carbohidrat	46,4 gr
Protein	2,5 gr
Fat	12,5 gr
Iron (Fe)	1,19 mg
Vitamin C	2,5 mg

RESULT

This study was conducted on young women aged 12-17 years who did not experience menstruation at the time of measuring Hb. More young women are 17 years old (60.8%). More details can be seen in table 2.

Table 2. Age Distribution of Adolescent Females

Age (years)	N	%
12	4	7,8
13	3	5,9
14	4	7,8
15	6	11,8
16	3	5,9
17	31	60,8
Total	51	100

The nutritional status of adolescent girls is generally normal (78.4%), but some are overweight (9.8%).

Table 3. Distribution of Nutritional Status of Adolescent Females

Nutritional Status	n	%
Normal	40	78,4
Overweight	5	9,8
Obesity	6	11,8
Total	51	100

The hemoglobin levels of adolescent girls before drinking were generally normal (83.4%) and those with mild anemia were 17.6%. After being given the drink, there was a change in the amount of mild anemia which was reduced by 5.9%.

Table 4. Distribution of Subjects According to Hemoglobin Level Status Before and After Intervention in Adolescent Girls

Classification of Hb Level Status	Hb Level (g/dL)	Before		After	
		n	%	n	%
Normal	>12 g/dL	42	82,4	48	94,1
Anemia	10-11,9 g/dL	9	17,6	3	5,9
Total		51	100	51	100

Changes in hemoglobin levels in each adolescent girl varies from -1.5 g/dl to 2.5 g/dl. The most changes were at 0 – 0.5 g/dl, which was 60.79%. More details can be seen in table 5.

Table 5. Distribution of Changes in Hemoglobin Levels

Changes in Hb Levels	Respondent	
	N	%
-1,5 - -1,1	2	3,92
-1,0 - -0,6	2	3,92
-0,5 – -0,1	2	3,92
0 – 0,5	31	60,79
0,6 – 1,0	9	17,65
1,1 – 1,5	4	7,84
1,6 – 2,0	0	0
2,1 – 2,5	1	1,96
Total	51	100

It is known that there are 6 people experiencing a decrease in Hb at the time of the intervention and 45 others experiencing a significant increase.

Analysis of the difference in hemoglobin levels before and after the intervention can show an increase that occurred during the intervention. These differences can be shown in the following table 6.

Table 6. Analysis of Differences in Hb Levels Pre-test and Post-test

Treatment	
N	51
Mean Pre-test Hb	13,002
Mean Post-test Hb	13,349
Sig. (2-tailed)	0,000

There is a significant difference in hemoglobin levels in respondents with a p value <0.05. The results of the Hb measurement showed that there was an increase in the average Hb of 13.002 g/dL at the initial measurement and 13.349 at the final measurement.

The average intake of Fe (iron) in the adolescent girls respondents still experienced an intake deficit. The severe intake deficit was 35.3%, and the moderate deficit was 19.6%. While the good as much as 35.3%. More details can be seen in table 7.

Table 7. Adequate Fe Intake of Adolescent Girls

Intake Fe	N	%
Weight Defisit	18	35,3
Medium Defisit	10	19,6
Mild Defisit	4	7,8
Well	18	35,3
More	1	2,0
Total	51	100

Adequacy of iron (Fe) in Moringa leaf burble drink at one time contains 4.07 mg. While the need for non-heme iron for adolescent girls is 3.75 mg/day. When compared with intake, the percentage of Fe adequacy is 108.5% in the good adequacy category.

DISCUSSION

Adolescent girls who are the subjects in this study are in the age range of 12-17 years, including in the adolescent age group. Hemoglobin is the pigment that makes red blood cells red, which in turn makes human blood red. According to its function, hemoglobin is a medium for transporting oxygen from the lungs to body tissues. Hemoglobin also functions to carry carbon dioxide as a result of metabolism from body tissues to the lungs for further expulsion when breathing (Adnani, 2011).

Anemia occurs due to several factors known as nutritional and non-nutritive factors. Nutritional factors are low food intake (nutrition), while non-nutritional factors are infection, blood loss (menstruation and bleeding), malabsorption, genetic disorders, metabolic disorders, socioeconomic, and type of family size (Patimah, 2017). In female respondents, it is known that 9 people have mild anemia and 42 people are normal. All respondents were given Moringa leaf bubble drink. After the intervention, there was an increase in hemoglobin levels in 45 people and 3 people who still had mild anemia despite an average increase of 0.1-0.5 g/dl from these 3 people. There were 6 teenage girls who initially experienced anemia turned normal after drinking Moringa leaf bubble.

From the intervention given, there were 45 people who experienced an increase in hemoglobin after giving the product. However, there were 6 other people who experienced a decrease in Hb due to irregular eating patterns so that adequate iron intake was included in the category of severe deficit. They prefer to consume instant noodles when compared to rice and almost every day they consume instant noodles. From direct interviews they also said that their sleep time was irregular and not enough. Of the 45 people who experienced an increase, it was proven that consuming Moringa leaf bubble drink can increase hemoglobin levels in the blood so that Moringa leaves are good for young women, especially those with anemia.

Moringa leaf flour has several hypotensive, anti-cancer, and antibacterial substances, including niacimicin and pterygospermin. Moringa contains iron as much as 28.2 mg/100 grams of dry leaves, 25 times more than spinach, 3 times more than almonds and 1.77 times more absorbed into the blood. In addition, Moringa leaves also have antioxidants, including sitosterol and glukopyranoside, Guevara et al. (Krisnadi, 2015). The Latin name for Moringa leaves is Moringa oleifera Lam. Common names of Moringa leaves known in the UK are Moringa, Ben-oil tree, Clarifier tree, and Drumstick tree (Krisnadi, 2015).

Treatment in the form of giving Moringa leaf bubble drink can increase hemoglobin levels in adolescent girls. Adolescent hemoglobin levels in respondents who consumed Moringa leaf bubble drink increased by 0-0.5 g/dL in 31 people, 0.6-1.0 g/dL in 9 people, 1.1-1.5 g/dL in 4 people, and 2.1-2.5 in 1 teenager. While the other 6 people experienced a decrease of 0.1-1.5 g/dL during the 1 month intervention.

Research from Ponomban, et al (2013) also stated that Hb levels after 12 weeks of treatment with Moringa leaf powder (500 mg) there were 19 pregnant women (54%) Hb levels increased by 2 g/dl, 14 respondents (40%) Hb levels increased by 1 g/dl and 2 respondents (6%) increased Hb levels by 3 g/dl. Yulianti's research, et al (2016) also proved that in the intervention group of high school students of Muhammadiyah Kupang who consumed Moringa leaf extract, it could increase hemoglobin levels in the blood, so it was best given to young women.

Anemia can occur in all life cycles, which of course has a negative effect on a person's health. Anemia has a detrimental impact on children's health in the form of impaired growth and development, decreased endurance and concentration power, and decreased learning ability, thereby reducing learning achievement in

school. In growth, the body requires nutrients in large quantities, and one of them is iron. If the iron used for growth is less than what the body produces, anemia will occur (Citrakesumasari, 2012).

From the theory above, the researchers saw the effect of increasing hemoglobin on young women. The results of the tests carried out showed that there was an effect of increasing hemoglobin levels on adolescent girls with a Sig value. 0.046 ($p < 0.05$). In Arini's research (2018), it was also found that there were differences between the intervention groups, so it can be concluded that there is an effect of giving Moringa leaf flour on hemoglobin levels.

CONCLUTION

Giving Moringa leaf bubble drink can increase hemoglobin levels in adolescent females. There is a significant effect on increasing hemoglobin levels in adolescent girls. Recomended for adolescent girls, it is expected that they can consume foods that contain iron more often, such as Moringa leaf burble drinks.

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