Administering Tuna Fish Dimsum Mixed with Spinach on the Hemoglobin Levels of Adolescent Girls at State Senior High School 1 Tenga, North Sulawesi, Indonesia

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ABSTRACT

Anemia is one of the micronutrient problems that is quite serious because it causes various complications in groups and newborns and women. Adolescent girls who are menstruating lose twice as much iron as adolescent boys. Cod fish is a fish that has complete nutrients and is affordable. Cod fish has the advantage of high protein content and rich in omega 3 fatty acids and every 100 grams has a composition consisting of 1.50% fat, 25% protein, and 0.03% carbohydrates and contains several minerals such as calcium, phosphorus, iron, sodium, vitamin A, vitamin B. Spinach is a vegetable plant that has many benefits and nutritious content, Spinach contains vitamin C, dolic acid and iron which are good and can prevent anemia in adolescents. To determine the effect of giving cod fish dimsum mixed spinach on hemoglobin levels of adolescent girls at SMA Negeri 1 Tenga.

This study was carried out with the design of the one group pretest-posttest design, which is a research design that contains a pretest before being treated and a posttest after being given treatment, where observations are carried out twice, namely before and after the experiment for 14 days.

The results of this study showed that there was an effect of giving cod fish mixed spinach dimsum on the increase in hb levels, namely with the p-velue value (0.000 0.05) and there was a difference in hb levels before and after administration with an average value before 13.2 gr/dL and an average value after 15.8 gr/dL, this was strengthened by the p-velue value (0.002 0.05) which means that there was a difference between hb levels before and after hb levels.

Keywords: Anemia, Young Women, Cod Fish, Spinach

INTRODUCTION

According to WHO data in 2017, the prevalence of anemia in adolescents worldwide ranges from 40 to 88%. WHO data in 2018 shows that the incidence of anemia in adolescent girls in developing countries is around 57.3% of all adolescent girls. WHO 2017 shows that the prevalence of anemia in adolescents worldwide ranges from 40 to 88%. WHO data in 2018 shows that the incidence of anemia in adolescent girls in developing countries is around 57.3% of all adolescent girls.

The incidence of anemia in Indonesia is still quite high. Based on the 2018 Riskesdas data, the prevalence of anemia in adolescents was 32%, meaning that 3-4 out of 10 adolescents suffer from anemia. This is influenced by suboptimal nutritional intake habits and lack of physical activity (KEMENKES, 2018) (Riskesdas, 2018). Based on data from the North Sulawesi Health Office, anemia in adolescents in North Sulawesi province is 673 people. The highest incidence of anemia is in Talaud district with 444 adolescents, second in Minahasa Selatan district with 110 adolescents (Dinkes Sulut, 2022).

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Adequate intake of energy, protein, carbohydrates, fat, vitamin C and especially food sources containing iron and folic acid can prevent anemia. Several factors that play an important role in the occurrence of anemia, especially in adolescents, are. Adolescents generally experience a normal menstrual cycle between 21 and 35 days. The length of each adolescent's menstrual cycle is usually influenced by age, body weight, physical activity, stress levels, genetics, nutrition (Putu et al., 2022).

Dimsum is a food from China that is quite popular in Indonesia. Dimsum is served in the form of small snacks, either steamed or fried. Dimsum when steamed has a soft texture and when fried gives a crunchy texture, so dimsum is very popular with teenage girls (Ardana et al., 2024).

Tuna is a fish that has complete nutrients and is affordable. Tuna has the advantage of high protein content and is rich in omega 3 fatty acids and every 100 grams has a composition consisting of 1.50% fat, 25% protein, and 0.03% carbohydrates and contains several minerals such as calcium, phosphorus, iron, sodium, vitamin A, vitamin B (Diniarti et al., 2023).

Ways to prevent and overcome anemia in adolescents include increasing iron consumption. Iron, especially animal-based foods that are easily absorbed and also foods that contain a lot of vitamin C which helps the process of iron absorption and provides iron supplementation, especially during menstruation. Increasing iron consumption is done in various ways, including increasing adolescent nutritional knowledge. Good nutritional knowledge will make a person or group of people aware of the importance of nutrition for health (Fadhli et al., 2024).

One alternative to meet iron needs is to consume vegetables that contain iron. Iron can be found in vegetables, such as spinach (Amaranthus sp). Green vegetables such as spinach are a source of nonheme iron. Cooked spinach contains 8.3 mg/100 grams of iron. The iron contained in spinach is useful for the formation of hemoglobin in the blood (Suhada, 2019).

Red spinach is a plant that has many benefits and nutritious content, red spinach contains vitamin C, folic acid and iron which are good and can prevent anemia in adolescents(Zulmi et al., 2022) (Zulmi et al., 2022). There are two types of spinach, namely red spinach and green spinach, both of which contain vitamin C, but green spinach contains more vitamin A and red spinach contains more iron, the iron contained in red spinach is around 7 mg/100 grams more than other vegetables. Red spinach can be used as an alternative ingredient to prevent iron deficiency anemia. Something different is needed in processing red spinach so that people, especially adolescents, are willing to consume red spinach vegetables in a different form (Mardahlia & Desriyeni, 2017).

Spinach is a vegetable plant that has many benefits and nutritious content, spinach contains vitamin C, dolic acid and iron which are good and can prevent anemia in adolescents(Zulmi et al., 2022) (Zulmi et al., 2020). Fe functions to prevent anemia, immune system disorders, and can reduce the risk of cancer and hepatitis. Spinach has a high Fe content, which is 3.5 mg/100 g(Ruaida, 2020).

This study was conducted with the approval of the Health Research Ethics Committee of the Manado Ministry of Health Polytechnic No. KEPK.01/08/197/2024. The purpose of this study was to determine the effect of giving tuna dimsum on hemoglobin levels of female adolescents at SMA Negeri 1 Tenga.

METHOD

This type of research uses a pre-experimental approach. This research was conducted with the one group pretest-posttest design, namely a research design that contains a pretest before being given treatment in the form of givingtuna dim sumand posttest after being treated. Observations were carried out twice, namely before and after the experiment for 14 days. This study was conducted in May 2024 and implemented at SMA Negeri 1 Tenga. The independent variable in this study was the hemoglobin levels of female adolescents at SMA Negeri 1 Tenga, while the dependent variable was dimsum tuna mixed with spinach. The population of this study were all 10th grade female students of SMA Negeri 1 Tenga and the research sample were female

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students who had their hemoglobin levels checked. So the large sampling technique used was the Slovin formula. The number of samples obtained was 48 people. Measurement of hemoglobin levels on the existing samples was carried out 2 times, namely before treatment and after treatment. Organoleptic data were obtained from the organoleptic test formular. The data analysis used was frequency distribution, normality test and paired t-test with a confidence level of 95%.

RESULTS AND DISCUSSION

Organoleptic Test

Organoleptic testing is a description of consumer assessment of taste, namely taste, aroma, color and texture of tuna dimsum mixed with spinach products.

Flavor

Table 1. Shows the frequency distribution of the test on the taste of tuna dimsum mixed with spinach. A total of 17 panelists chose to like (80%). For more details, see table 1.

Table 1. Distribution of Organoleptic Tests for Taste

Flavor	n	%
Kinda dislike	2	6.7
neutral	2	6.7
Kinda like it	9	30
Like	17	56.7
Total	30	100

Color

Table 2. Shows the frequency distribution of the test on the color of tuna dimsum mixed with spinach. A total of 21 panelists chose to like (70%). For more details, see table 2.

Table 2. Distribution of Organoleptic Tests on Color

Color	n	%
neutral	4	13.3
Kinda like it	5	16.7
Like	21	70
Total	30	100

Aroma

Table 3. Shows the frequency distribution of the test on the aroma of tuna dimsum mixed with spinach. A total of 19 panelists chose to like (63.3%). For more details, see table 3.

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Table 3. Distribution of Organoleptic Tests for Aroma

Aroma	n	%
Kinda dislike	1	3.3
neutral	2	6.7
Kinda like it	8	26.7
Like	19	63.3
Total	30	100

Texture

Table 4. Shows the frequency distribution of the test on the texture of dimsum fish otngkol mix spinach. A total of 17 panelists chose to like (56%). For more details, see table 4.

Table 4. Distribution of Organoleptic Tests on Texture

Texture	n	%
Kinda dislike	0	0
neutral	4	13.3
Kinda like it	9	30
Like	17	56.7
Total	30	100

Respondent Overview

In the study, the respondents obtained were all female respondents. In this study, the female adolescents taken were female adolescents aged 15-16 years. Based on the age of the study, the most common sample age was 16 years old, which was 29 people, and the least was 15 years old, which was 19 people. In this study, the researcher chose to take adolescent respondents because adolescence is a productive age and in a fertile period, especially female adolescents who experience menstruation, which is one of the factors causing anemia if not balanced with a balanced diet.

Respondents Overview by Age

The frequency distribution of respondents shows that 60.4% of respondents in the study were 16 years old and 39.6% of respondents were 15 years old with a total of 48 respondents. For more details, see table 5.

Table 5. Distribution of Respondents by Age

Age (year)	Amount	
	n	%
15	19	39.6

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16	29	60.4
Total	48	100

Initial and Final Hemoglobin Level Overview

The students who had their hemoglobin levels measured at the beginning of the study found 81.2% of students with normal hemoglobin levels and 18.8% of students had hemoglobin levels below normal. For more details, see table 6.

Table 6. Frequency Distribution of Hemoglobin Levels Before and After Administration

Classification of Hb Level Status	Hb level (g/dL)	Before		After	
		n	%	n	%
Normal	≥ 12	34	70.8%	39	81.2%
Mild Anemia	11-11.9	7	14.6%	5	10.4%
Moderate Anemia	8.0-10.9	7	14.6%	4	8.4%
Total		48	100%	48	100%

Difference in Hemoglobin Levels Before and After Administration

To find out the difference in hemoglobin levels before and after administration, a paired sample t-test was conducted to obtain the average score of hemoglobin levels before administration of tuna dimsum mixed with spinach, namely 13.2312 and after administration of tuna dimsum mixed with spinach, namely 13.8062. In addition, based on the sig. (2-taled) value of 0.002 <0.05, it can be concluded that there is a real difference between hemoglobin levels in the data before and after the intervention of the effect of administering tuna dimsum mixed with spinach on hemoglobin levels. Hemoglobin levels after hemoglobin were found to increase, but this increase was not solely due to administration of tuna dimsum mixed with spinach but was also influenced by the respondents' food intake. For more details, see table 6.

Table 6. Differences in Hemoglobin Levels Before and After

Variables		Average Value	t	P
Hemoglobin Level	Before	13.2312	-3.206	0.002
	After	13.8062		

During the study, researchers conducted a 1x24-hour recall method 3 times, namely before administration, during administration and after administration to determine the intake of nutrients that entered each respondent. Most of the respondents' food intake was only 2x a day with a small amount and rarely for vegetable consumption.

The adequacy of iron intake is mostly severely deficient, which is <80%. This is because when conducting the recall, most of the menus consumed were not varied and the portions were small.

In this study, it was assumed that giving mixed tuna and spinach could contribute 1.72 mg of the daily iron intake requirement of 8-15 mg per day, so that it can help meet the additional iron intake needed by adolescent

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girls.

Tuna has a high protein content compared to other animal foods. According to (Jumilla-Lorenz et al., 2024) (Piranti et al., 2024), the protein in tuna meat contains complete essential amino acids so that it is easily digested by the body. Tuna is also rich in minerals such as calcium, phosphorus which the body needs for bone formation, and iron which helps the formation of hemoglobin in the blood (Palupi et al., 2024)(Inara, 2020).

Providing additional nutrition in the form of tuna nuggets can be a solution to improve the nutritional status of pregnant women and increase maternal Hb levels. Tuna is a food source that contains protein as an important component in the human life cycle. Protein is used as a building material for the body to replace and maintain damaged body cells, regenerate, digest food, and maintain normal processes in the body, especially during pregnancy. 100 grams of tuna contains 0.7 grams of iron (Fe). The iron content in tuna can help increase Hb levels and prevent anemia in pregnant women(Ruaida & Soumokil, 2020).

Anemia is a condition of low hemoglobin levels in the blood caused by low hemoglobin levels in the blood caused by a lack of nutrients needed for the formation of hemoglobin. One type of anemia is iron deficiency. Iron deficiency anemia is caused by low iron intake, inhibited iron absorption, increased iron requirements and iron loss. Iron loss can occur through the digestive tract, skin, urine, menstruation, and can also be caused by bleeding due to worm infections in the intestines.(Widyanthini & Widyanthari, 2021).

The results of this study are in line with a study by (Purba et al., 2021), the results of this study showed that in the spinach juice group there was an increase in Hb levels which before administration were 11.4 g/dL to 12.08 g/dL. The increase in Hb levels was statistically significant ($p < 0.05$).

The results of this study are also in line with research on Momongan et al., 2023, obtained significant differences in hemoglobin levels in respondents with a Sig. (2-tailed) value of 0.000 <0.05. The results of Hb measurements showed an average increase in Hb of 16.615 g/dl in the initial measurement of 17.085 g/dl in the final measurement.

CONCLUSION

The provision of tuna dimsum mixed with spinach to female adolescents at SMA Negeri 1 Tenga can be concluded that there is an effect of providing tuna dimsum mixed with spinach on hemoglobin levels in female adolescents by showing a significant value (p-value = 0.002 <significant value 0.05).

Conflict of Interest

The authors declare no conflict of interest.

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