



Changes in Hemoglobin Levels in Adolescent Girl with Anemia in Junior High School 1 Tanjung Sari that Received Nutritional Intervention

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Abstract

Anemia in adolescent girls if not treated can have long-term effects such as increasing the risk of stunted fetal growth, anemic baby, etc. Few ways to prevent and treat anemia in adolescent girls are giving supplements increasing knowledge, and food intake monitoring. Nutritional intervention to overcome anemia can be given as early as possible since early adolescence. This study aimed to determine changes in hemoglobin in adolescent girls who received nutrition education, Fe supplement tablets and food supervision by parents, and teachers. The type of research used is quasi-experimental with one group pretest and posttest design City. The sample of this study amounted to 38 students from Junior High School 1 Tanjung

Sari, South Lampung, using the formula for hypothesis testing on the average of two paired populations. Subject respondents will receive a nutritional intervention for 6 weeks consisting of nutrition education, Fe supplement, and food supervision by parents and teachers. Before and after the intervention program, before and after the intervention, measurements of hemoglobin were carried out. A paired sample t-test was used for data analysis $p < 0.05$ was considered statistically significant effect. Finally, data were collected and analyzed by the SPSS program. The statistical test results show that there is a significant difference in hemoglobin before and after the nutritional intervention ($p < 0.05$). There is a change in hemoglobin levels in adolescent girls with anemia who received nutrition education, Fe supplement tablets, parental and teacher eating supervision at Junior High School 1 Tanjung Sari, South Lampung Regency

Keywords: adolescent girl, anemia, haemoglobin, nutritional intervention

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Introduction

Anemia is an important health problem and has negative impact on mental and physical development during the growth period. Anemia is a condition which the number of red blood cells or the concentration of haemoglobin within them is lower than normal. Hemoglobin is needed to carry oxygen, and if you have too few or abnormal red blood cells, or not enough haemoglobin, there will be a decrease in capacity of the blood to carry oxygen to the body's tissues (WHO, 2020). Adolescent girls are the most vulnerable group to anaemia. Due to loss every month during menstruation, the desire to have a thin body, and do not pay attention to nutritional intake when eating and other factors. The incidence of anemia in adolescent girls in Indonesia reaches 27.2% (Laksmi and Yenie, 2018; Riskesdas, 2018). Anemia in adolescent girls if not treated can have long-term effects such as increasing the risk of stunted fetal growth, giving birth to anemic baby, giving birth to premature babies, and giving birth to babies with low birth weight and increasing infant mortality (IDAI, 2012; Hashim et al., 2018; Ministry of Health of the Republic of Indonesia, 2018b; Siregar, 2019). Few ways to prevent and treat anemia in adolescent girls are giving supplement, increasing knowledge and food intake monitoring (WHO, 2016; Kemenkes RI, 2018).

The provision of Fe supplements for adolescent girls is carried out once a week and 1 tablet every day during the menstrual period (Ministry of Health Republic of Indonesia, 2020; Taufiq, Ekawidyaning and Sari, 2020). In tackling anemia, giving Fe supplement tablets must also be accompanied by diet and education related to anemia and nutrition. In addition to Fe supplement tablets, diet also has an important role in preventing anemia. The more food you eat, the better your hemoglobin level will be (Nurdiana, 2015). Parental supervision is a factor that is quite influential on the diet of adolescents because family food is an important key to adolescent intake. In addition to parents, teacher support at school is also needed because adolescent girls spend more time at school every day than at home (Nuradhiyanti, Briawan and Dwiriani, 2017; Atmaka, Ningsih and Maghribi, 2020). Another factor that can affect hemoglobin is knowledge, which can be provided by health workers, teachers at school or family at home. Nutrition education in schools provided by teachers can make an important contribution to children's knowledge and eating habits (Nuradhiyanti, Briawan and Dwiriani, 2017; Cotton et al., 2020). Parental knowledge is a factor that affects children's knowledge about the food consumed (Romanos-Nanclares et al., 2018).

Nutritional intervention to overcome anemia can be given as early as possible since early adolescence. Adolescents in the early stages tend to have a strong desire to remain dependent on their parents, and at this stage there is no conflict over parental control, so that early-stage adolescents will be more obedient to their parents (Wulandari, 2014). This study aimed to determine changes in hemoglobin in adolescent girls who received nutrition education, Fe supplement tablets and food supervision by parents and teachers.



Methods

The type of research used is quasi-experimental with one group pretest and posttest design. This research was conducted at Junior High School 1 Tanjung Sari, South Lampung Regency. The time of the research was carried out from January to June 2022. The independent variable in this study was nutrition intervention, the independent variable was hemoglobin with a numerical measurement scale which was the primary data. The sample of this study amounted to 38 students from Junior High School 1 Tanjung Sari, South Lampung, using the formula for hypothesis testing on the average of two paired populations. Sampling in this study used the consecutive Sampling technique with the following criteria. The inclusion criteria consist of respondents with anemia, have already menstruated, registered as a student of Junior High School 1 Tanjung Sari, parents sign informed consent sheets, willing to follow the course of research.

The exclusion criteria consist of respondents did not complete the research procedure (did not follow all stages of the intervention and preliminary and final data collection), respondents who have certain diseases that can cause anemia (TB, helminth infections, thalassemia, HIV / AIDS), pregnant respondents and regularly took multivitamins or supplements (iron supplements, vitamin b komplek, zinc, folic acid supplements).

Primary data collection with HB measuring device. In this study, respondents will receive a nutritional intervention for 6 weeks consisting of nutrition education, giving blood tablets and food supervision by parents and teachers. This study began by measuring the initial hemoglobin levels in 38 respondents. Followed by the provision of training materials of trainees for parents and teachers who will supervise food intake and consumption Fe supplement tablet. The Training Of Trainers material is about anemia, balanced nutrition, how to calculate nutritional content, especially iron in food and how to prepare food. After that, respondents will receive nutrition education materials for 6 consecutive weeks with different materials and methods.

Table 1. Learning Materials and Methods for Nutritional Intervention in Junior High School 1 Tanjung Sari

Week	Learning Materials	Methods
1	Anemia and balanced nutrition	Provide short lesson with video and power point slides
2	Practicing weighing serving sizes for various food groups, making and preparing menus according to daily iron needs, assessing nutritional status	Practicing preparing and weighing food ingredients according to the serving size for each food group Discussion for the preparation of daily menu Practice of measuring height and weight, calculating and assessing nutritional status
3	Practicing processing complete menus	Practicing preparing 1 complete menu (fruits and vegetables, carbohydrates, protein food) for 1 meal



4	Practicing processing high-iron snacks (animal and plant sources)	Cooking crispy spinach and chicken liver nuggets
5	Understanding healthy snacks for teenagers and choosing foods that are iron sources around traditional markets and minimarkets.	Provide short lesson with power point slides (calculate the nutritional content of snack and iron source foods)
6	Repetition of learning materials	Quiz competition

Supervision is carried out by parents at home, ensuring that their children eat nutritious foods rich in iron and take blood-supplementing tablets while the respondent is menstruating at home. Teachers at school supervise the consumption of iron supplement tablets every week at school and remind respondents to consume nutritious and iron-rich foods through Whatsapp groups, each teacher is responsible for supervising 9-10 children. Supervision by parents and recorded in a control card containing records of consumption iron supplement tablets and iron-rich foods.

After being given the intervention for 6 weeks, the Hb measurement was repeated. The measurement results before and after the intervention were tested for normality. Due to the normal distribution, the bivariate test was carried out using a paired T test. This research has been approved by the health research ethics commission, Faculty of Medicine, University of Lampung with letter number no. 771/UN26.18/05.02.00/2022. This study uses humans as research subjects, therefore informed consent is needed from students who are respondents.

Results and Discussion

The characteristics of the respondents in this study can be seen in table 2. The age of the respondents ranged from 12-15 years. Most of the respondents were 13 years old (55.3%), 14 years old (36.8%), 12 years old (5.3%) and 15 years old (2.6%). Most of the nutritional status was normal (57.9%), while thin (39.5%) and obese (2.6%). The anemia status of the respondents was mostly moderate (55.3%) and the rest were mild (44.7%). Most of the respondents were not used to bring meal box (94.7%) and only 5.3% had the habit of bringing meal box.

Table 2. Subject distribution based on individual characteristic (number of participants and percentages)

Characteristic	n	%
Age		
12	2	5.3
13	21	55.3
14	14	36.8



15	1	2.6
Nutritional Status		
Thin	15	39.5
Normal	22	57.9
Obese	1	2.6
Anemia		
Mild	17	44.7
Moderate	21	55.3
Bring Meal box		
Yes	2	5.3
No	36	94.7

In this study, it was stated that as many as 73.3% of respondents with anemia had normal nutritional status. Nutritional status does not affect the incidence of anemia in adolescents because anemia is mostly caused by a lack of micronutrients such as iron or folic acid which has little energy content while the largest energy supply from the body is carbohydrates, fat and protein (Pou *et al.*, 2015).

This is reinforced by research conducted at Junior High School 4 Batang and Junior High School 9 Semarang which states that there is no relationship between nutritional status and hemoglobin levels (Indartati & Kartini, 2014; Sompie *et al.*, 2015). Respondents in this study were also not accustomed to carrying lunch so they were more likely to buy food at school without paying attention to the nutritional value. As many as 94.7% of respondents are not used to carrying lunch, thus enabling respondents to buy food at school which does not necessarily meet their nutritional needs with the pocket money they have (Rosyidah & Andrias, 2015; Zuraida, 2020). The statistical test results in Table 3 show that there is a significant difference in hemoglobin before and after the nutritional intervention ($p < 0.05$).

Tabel 3. Result in hemoglobin score before and after nutritional intervention

	Mean (g/dl)	Diff erence	CI 95%	p
Hb before	10.87	1.48	1.1	0.000
Hb after	12.35	- 1.8		

The number of respondents based on the anemia status before and after nutrition intervention can be seen in table 4. It can be seen that before the intervention was given, all children were diagnosed with anemia with mild anemia as much as 55.3% and moderate anemia as much



as 44.7%. After nutritional intervention, there were 61.4% of children who were not anemic with Hb above 12, 20.5% of children had mild anemia and 4.5% of children had moderate anemia.

Table 4. Anemia status distribution before and after nutritional intervention

Anemia	Before		After	
	n	%	n	%
Mild	17	44.7	9	23.7
Moderate	21	55.3	2	5.3
Not anemia	0	0	27	71.1

The increase in the average hemoglobin and the significant difference in hemoglobin before and after the intervention could occur due to the provision of nutrition education for 6 weeks, supervision of the type of food consumed by parents and teachers and the administration of Fe supplements tablets. Another study showed the same results, it was known that there was an increase in hemoglobin levels in adolescent girls who received nutritional intervention for 6 weeks (Sari et al., 2018). Another supportive study was conducted by Zuraida R (2020) which stated that there was a significant increase in Hb levels of 0.73g/dl with p value = 0.000 after being given nutritional intervention to adolescents in Bandar Lampung.

Nutritional interventions can be given to solve identified nutritional problems through planning and implementation related to behavior, individual health status, environmental conditions either in groups or communities by providing advice, education, or providing food components from a specific diet or meal plan that is tailored to individual nutritional needs. Soliman et al., 2022). Comprehensive nutrition education interventions for children can increase hemoglobin. Parents and teachers play a role in increasing children's hemoglobin levels by monitoring and educating the benefits of the food they eat. Giving blood supplement tablets is also one type of nutritional intervention that can be done in dealing with anemia. In addition, monitoring the type of food and diet can also help prevent anemia (Sofianita et al., 2018).

The recommended consumption of Fe supplements is 1 tablet every week and every day during menstruation. The implementation of the Fe supplements program in a way commonly used Puskesmas (Public health center), namely unsupervised socialization, will cause adolescent girl to disobey taking iron tablets. The collaboration of parents and teachers to motivate students plays an important role in increasing student compliance with Fe supplement consumption (Widiastuti et al., 2020; Boli et al., 2022). Based on the research conducted by Apriningsih (2019), it is known that parental supervision has a major influence on the compliance of adolescent girls taking iron tablets. Adolescent girl spend more time at school every day than at home. There needs to be support from teachers at schools who remind adolescent girl to consume Fe supplement and provide information about Fe supplement that can provide positive attitudes in adolescent girl who will also manifest positive behavior, namely obediently consuming Fe supplements tablets as recommended (Listiana, 2016; Nuradhiani et al., 2017).



Conclusion and Recommendation

There is a change in hemoglobin levels in adolescent girls with anemia who received nutrition education, Fe supplement tablets, parental and teacher eating supervision at Junior High School 1 Tanjung Sari, South Lampung Regency. Limitations in this study is the absence of a control group so that it cannot be seen the difference in hemoglobin levels between the group that was given the intervention and the group that was not given the intervention

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