THE EFFECT OF TEMPE BISCUIT CONSUMPTION ON INCREASING ANEMIA YOUTH HB LEVELS

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Abstract

Anemia occurs a lot in the community, especially in adolescents and pregnant women.Ministry of Health research on anemia prevalence in Indonesia is 21.7% with anemia sufferers aged 5-14 years 26.4% and 18.4% aged 15-24 years (Ministry of Health, 2014). Young women have ten times greater risk of anemia compared to young men. The most common cause of anemia is iron deficiency which includes 50% of all cases of anemia. One obstacle in giving TTD tablets to adolescents is that they are not consumed by teenagers for various reasons. One of the alternative efforts to treat anemia is Fe fortification. The research method used in this study is a type of experimental research. The research design used at the clinical trial stage was True Experimental and the product testing phase was quasi-experimental, with the design of the Two Group Pretest Posttest Design. The population in this study were students of the seventh grade of Tasikmalaya Middle School 9 with 178 people. Based on the calculation of the sample obtained a sample size of 43 people. The sampling technique uses purposive sampling technique. The results were analyzed using univariate and bivariate analysis with analysis of non parametric Wilcoxon test. The results of the study found that the organoleptic sample E test had a higher value than the other samples so that sample E was selected. The statistical test results of the treatment group pretest mean is 10.22 and the posttest mean is 10.35. For the median pretest 10.35 while the median posttest was 10.60. There was a significant increase from the results of the posttest pretest. Bivariate testing with the Wilcoxon test obtained a value of ρ 0,000 <0,05 so that it can be concluded that there was an effect of iron fortification and vitamin C on tempe biscuits on the levels of juvenile Hb anemia.

Keywords: anemia; adolescent; tempe biscuit

Introduction

Anemia in adolescent girls is still quite high. The World Health Organization (WHO, 2001) reports that the prevalence of anemia ranges from 40-88%. Based on research results from the Ministry of Health, the prevalence of anemia in Indonesia is (21.7%) with anemia sufferers aged 5-14 years (26.4%) and (18.4%) aged 15-24 years

(Kemenkes, 2014). Women have the highest risk of developing anemia, especially young women (RI, 2013).

Adolescent girls have a ten times greater risk of suffering from anemia compared to young men. This is because young women experience menstruation every month and are in a period of growth so they need more iron intake (Jakarta, 2010). Anemia in school-age children and adolescents is a health problem that can lead to a decrease in learning concentration, low ability to understand lessons, the risk of contracting infectious diseases and emotional depression because anemia affects the process of growth and development of brain cells (Agustian, 2010). The most common cause of anemia is iron deficiency, which accounts for (50%) of all cases of anemia. Lack of nutritional intake due to unhealthy lifestyles of adolescents can cause health problems, one of which is anemia.

Research conducted by (Novitasari, Endang Nur, St, Herawati, & KJ, 2014) in Surakarta stated that iron intake, protein intake, zinc intake and vitamin C intake greatly affect the formation of Hb levels. So if the intake is less it can cause anemia in adolescents. In West Java, adolescent girls aged 12-18 years who received blood supplement tablets (8.2%), this figure is still small when compared to the puskesmas that conducted health screening for class VII and X which amounted to (65.43%). One of the obstacles in giving TTD tablets to adolescents is that the tablets are not consumed by adolescents for various reasons, including feeling nauseous and bored. Efforts to improve nutrition through foods containing iron are also difficult to do because of the difficulty of changing eating habits and the high cost (Kemenkes, 2016).

The difficulty of changing eating habits, especially in adolescents, requires special strategies, especially through foods that are easy, inexpensive, and contain Fe. Adolescents generally like snacks, such as cakes/biscuits. Therefore, to facilitate the handling of anemia in adolescents, an approach according to the characteristics of adolescents is needed. One of the ingredients that can be used as processed food is tempeh, because tempeh is a daily food that almost everyone consumes, it is easy to get and cheap. Tempe is rich in dietary fiber, calcium, B vitamins and iron. Various kinds of content in tempeh have medicinal value, namely antibiotics. Tempe is also believed to prevent anemia and osteoporosis because it contains vitamin B12 and iron (uny.ac.id)

Research Methods

The type of research used in this study is a quasi-experimental research type. The research design used was a quasi-experimental with control at the product-to-sample trial stage with a two-group pretest posttest design. The tempe biscuits given to the respondents have been through the results of organoleptic tests, and their nutritional value has been tested in the laboratory.

The population in this study were all students of SMPN 9 Kota Tasikmlaya class VIII, as many as 178 people. The sample size was calculated using the sample calculation formula for numerical comparative analysis of 2 groups. Based on the calculation results obtained a sample of 43 people. This study was conducted on two

groups, namely the control and treatment groups, so the number of samples consisted of 43 people in the treatment group and 43 people in the control group. The sampling technique in this research is using purposive sampling technique. Data analysis used non-parametric statistical analysis with the Wilcoxon test (Arikunto, 2006). The instrument used was a checklist and the instrument used to measure the Hb levels of the samples before and after treatment was a digital Hb meter.

Results and Discussion
A. Result

In the implementation of the data used is primary data. The process of data collection was carried out by examining Hb levels in class VIII students in the control and treatment groups. In the treatment group, biscuits were given 3 times a day for 30 days. After 30 days, the Hb level was measured again. In the control group, pregnant women were given PMT biscuits from the health center once a day. After giving the tempeh biscuits, the Hb level was checked.

Respondents were given tempeh biscuits that had passed the organoleptic test. The ingredients for this tempeh biscuit are tempeh flour, banana kepok, green beans, eggs, sugar, butter, cocoa powder, and skim milk, red guava jam. Based on laboratory testing, the given tempeh biscuit contains the following nutritional values:

Table 1
nutritional content of tempeh biscuits

No	Parameter	Unit	Result
1	Calcium	Mg/100 g	104.04
2	Iron	Mg/100 g	4.88
3	Carbohydrate	%	52.76
4	Water content	%	7.92
5	Protein	%	16.26

1. Analisis Univariat

The following are the results of Hb levels before and after treatment in the control and treatment groups. Hb levels were seen as mean, median and minimum and maximum values. Shown in table 2 below:

Table 2
Pretest and posttest results for adolescent Hb levels

	Pretest				Posttest			
	Mean	Median	Min	Maks	Mean	Median	Min	Maks
Control	10,29	10,50	8	12	10,22	10,40	8	12
Treatment	10,22	10,50	8	12	10,35	10,60	8	12

Based on table 1, it can be seen that in the treatment group the mean pretest was 10.22 and the mean posttest was 10.35. The median for the pretest

was 10.35 while the median for the posttest was 10.60. This means that there is an increase in the mean and median values from pretest to posttest.

2. Analisis Bivariat

Bivariate analysis was carried out to measure the effect of giving tempeh biscuits on Hb levels of anemic adolescents, which can be seen in tables 3 and 4 below:

Table 3
Data on the effect of tempe biscuits on Hb . levels

		N	Mean Rank	Sum of Ranks
control_post - control_pre	Negative Ranks	10[a]	10,20	102,00
	Positive Ranks	7[b]	7,29	51,00
	Ties	28[c]		
	Total	45		
interv_post - interv_pre	Negative Ranks	3[d]	5,00	15,00
	Positive Ranks	30[e]	18,20	546,00
	Ties	12[f]		
	Total	45		

Table 4
Effect of tempe biscuits on Hb . levels

	Control_post - Control_pre	interv_post - interv_pre
Z	-1,211[b]	-4,812[c]
Asymp. Sig. (2-tailed)	,226	,000

Based on the test results, the t-count value is 0.000, if the two-way test results <0.05, it means that ho is rejected and ha is accepted. So it can be concluded that there is a difference between Hb before and after treatment.

B. Discussion

Anemia is a medical condition in which the number of red blood cells or hemoglobin is less than normal. Normal Hb level in adolescent girls is 12 g/dl. Adolescent girls are said to be anemic if the Hb level is < 12 g/dl (Proverawati, 2011). Teenage girls every month experience menstruation which automatically bleeds. That is why young women need iron to restore their body to its original state. (Merryana Adriani, 2016) said the factors driving anemia in adolescent girls are: Chronic infectious disease, excessive menstruation in adolescent girls, sudden

bleeding such as an accident, the amount of food or poor dietary absorption. Based on (Prastika, 2011), it was found that there was a relationship between the menstrual cycle (22-35 days) and menstrual duration > 6 days with the incidence of anemia.

Anemia has a negative impact on health, including decreased reproductive health, stunted motor, mental and intelligence development, decreased learning ability and concentration, interfered with growth, decreased physical and fitness levels, and pale faces. Given these consequences, anemia in adolescents needs to be addressed immediately.

One of the efforts to overcome anemia in young women is the provision of blood-added tablets (TTD). In its implementation, the provision of TTD has not met expectations so that there are still many young women who suffer from anemia. According to (Almatsier, 2004) how to prevent and treat anemia is to increase the consumption of nutritious food, increase the intake of nutrients by taking blood-added tablets, health education, surveillance of infectious diseases, and fortification of staple foods with iron. Based on the Recommended Daily Allowance (RDA), normal adult men (19 years and over) need iron as much as 8 mg/day, while women at reproductive age (19-50 years) need iron around 18 mg/day. Vitamin C intake set by the Recommended Daily Allowance (RDA) for adolescents aged 11-14 years is 50 mg/day and ages 15-18 years 60 mg/day.

Menurut (Poedyasmoro, 2015) shows that giving iron and vitamin C fortified biscuits increases hemoglobin levels and can reduce the prevalence of anemia in school-age children. Likewise, research by (Khuzaini & Santosa, 2016) found that baby porridge with the addition of fortifications resulted in higher iron levels so that iron adequacy in infants could be met. Iron is the most abundant micro mineral in the human and animal bodies, which is as much as 3-5 grams in the adult human body. Iron has several essential functions in the body; as a means of transporting oxygen from the lungs to body tissues as a means of transporting electrons in cells and as an integrated part of various enzyme reactions in body tissues (Almatsier, 2004). There are two types of iron in food, namely iron that comes from heme and non-heme. Animal foods such as meat, fish and chicken are major sources of heme iron. The iron that comes from haem is Hb. Non-heme iron is found in plant foods, such as vegetables, seeds, nuts and fruits (Wirakusumah & Bacharudin, 1999). Mung bean is a food that has a fairly high iron content, namely 7.5 mg, and soybeans contain iron 15.7 mg. Because of the high iron content, green beans and soybean-based foods (tempe) can used to treat anemia.

Guava is a fruit that contains high levels of Vitamin C, which is 302 mg/100 gr. Likewise with kapok bananas which contain Vitamin C of 17.1 mg/100 g. Ascorbic acid (vitamin C) is the main factor that promotes the absorption of iron known as Meat, Fish, Poultry Factory (MFP). Vitamin C has many functions in the body, namely: As a collagen synthesis, absorption and metabolism of iron. Prevent infection. because vitamin C is a reducing agent, iron (FE) in the intestine will be maintained in ferrous form so that it is more easily absorbed. Vitamin C also helps

transfer FE from the blood to the liver and activates FE-containing enzymes (Muchtadi, 2009). The main study et al found that the combination of iron and vitamin C was shown to increase hemoglobin levels significantly compared to iron alone.

Based on this, the iron fortification in this tempeh biscuit was chosen as green beans, and as a source of vitamin C it came from bananas and red guava. In this tempeh biscuit, there is a decrease in the nutritional content caused by the heating and cooking process. This is in accordance with research by (Astuti & Aryani, 2016) that there are differences in iron levels in tempeh after cooking with raw tempeh.

Based on the calculation of the univariate statistical test, the results obtained in the treatment group the mean pretest was 10.22 and the mean posttest was 10.35. The median for the pretest was 10.35 while the median for the posttest was 10.60. This means that there is an increase in the mean and median values from pretest to posttest. In bivariate testing, the value of 0.000 <0.05 means that there is a difference between Hb levels before and after treatment. Based on this, it can be concluded that there is an effect of consuming tempeh biscuits on the hemoglobin levels of anemic adolescents.

Conclusion

In general, the implementation of the research can go according to plan and run well, so it can be concluded as follows: a.) The treatment group the mean pretest was 10.22 and the mean posttest was 10.35. The median for the pretest was 10.35 while the median for the posttest was 10.60. This means that there is an increase in the mean and median values from pretest to posttest. b.) The results of the pretest and posttest Hb levels in the treatment group there are differences. c.) Bivariate testing obtained a value of 0.000 which means that there is a difference between Hb levels before and after treatment. So it can be concluded that there is an effect of consuming tempeh biscuits on increasing the hemoglobin levels of anemic adolescents.

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