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Influence Orange Juice Consuming In Increasing Hemoglobin Levels In Teenage Girls At SMK Negeri 3 Medan In 2021

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ABSTRACT

The World Health Organization (WHO) in 2016 stated that about a third of the world's population (32.9%) was estimated to suffer from anemia. The population groups most vulnerable to anemia are children under five (42%) especially infants and children under the age of 2 years, adolescents (39%), and pregnant women (46%). This study aims to determine the effect of orange juice consumption on increasing hemoglobin levels in adolescent girls at SMK Negeri 3 Medan in 2021. This study is a quantitative study with an Analytical Experiment (Quasy Experiment) research design with a Randomized Pretest and Posttest with Control Group Design. The population in this study were young women aged 13-16 years, at SMK Negeri 3 Medan in 2021. The results showed the average hemoglobin level of the pre-test experimental group (10.14 g/dL), and the post-test results of the experimental group (10.51 g/dL) with a difference (0.37 g/dL). While the average pre-test hemoglobin level in the control group was (9.94 g/dL) with post-test results (9.86 g/dL) and the difference (-0.8 g/dL). Based on the Shapiro Wilk test, the A-Symp Sig value was 0.005 <.05. It can be concluded that the consumption of orange juice has an effect on increasing hemoglobin levels in adolescent girls at SMK Negeri 3 Medan in 2021. It is hoped that the results of this study can be an alternative non-pharmacological treatment of anemia.

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1. Introduction

Adolescents are human resource assets which are the backbone of the nation's next generation, therefore we must prepare human resources, one of which is by paying attention to adolescent health so that they can become more optimal human resources. One of the problems that often occurs in adolescents, especially young women, is anemia, anemia or more precisely, a deficiency (lack of) red blood cells due to low levels of hemoglobin in the blood. One of the constituent parts of red blood cells is hemoglobin. Hemoglobin is responsible for binding oxygen from the lungs and carrying oxygen throughout the body to meet the oxygen needs of all body tissues. Adolescent girls have a ten times greater risk of suffering from anemia than young men. This is because young women experience menstruation every month and are in their infancy so they need more iron intake. Various studies have shown the negative impact of anemia due to iron deficiency on the growth and development of children and adolescents. Anemia in school-age children causes growth and development that is not optimal and reduces learning achievement because it is easy to get tired, lose

enthusiasm and be unable to concentrate. Whereas in adolescents with anemia, as prospective mothers who will give birth to the nation's next generation, anemia will pose a high risk of giving birth to babies with low birth weight (LBW) who have a quality of life that is not optimal (Adrian & Dalimartha, 2013). Adolescent girls have a ten times greater risk of suffering from anemia than young men. This is because young women experience menstruation every month and are in a period of growth so they need more iron intake. Various studies have shown the negative impact of anemia due to iron deficiency on the growth and development of children and adolescents. Anemia in school-age children causes growth and development that is not optimal and reduces learning achievement because it is easy to get tired, lose enthusiasm and be unable to concentrate. Whereas in adolescents with anemia, as prospective mothers who will give birth to the nation's next generation, anemia will pose a high risk of giving birth to babies with low birth weight (LBW) who have a quality of life that is not optimal (Adrian & Dalimartha, 2013).

According to the World Health Organization (WHO) in 2016, about a third of the world's population (32.9%) is estimated to suffer from anemia. The population groups most vulnerable to anemia are children under five (42%) especially infants and children under the age of 2 years, adolescents (39%), and pregnant women (46%). The WHO Global Nutrition Targets on anemia aim to reduce anemia by 50% by 2025. Women are consistently at greater risk of developing anemia than men (Sulung & Kecantikan, 2018). The prevalence of anemia in Indonesia based on Basic Health Research data (Riskesdas, 2018) is still found in children aged 5-14 years at 26.4%, Various surveys of anemia in adolescents (school children) in Indonesia, the prevalence of anemia ranges from 36% - 43%. This figure is classified as a public health problem because the prevalence is 40% (Hari Risiko, 2018).

The percentage of women aged 10-49 years in North Sumatra in 2020 is 54.53 percent experiencing symptoms of anemia. The percentage of women who experience symptoms of anemia varies by district/city. In North Labuhan Batu Regency, the highest anemia rate reached 46.85 percent. Meanwhile, in Samosir Regency, it is very low at only 35.78 percent (Wigunantiningsih & Fakhidah, 2017).

Anemia or commonly known as lack of blood is a condition in which there is a decrease in the level of hemoglobin (Hb) in red blood cells which functions to transport oxygen throughout the body so that tissue oxygen needs are not met. Lack of blood is not a disease, but is a symptom or sign of a disease or disorder that must be watched out for. Because anemia is a symptom, the main cause or underlying cause must be sought so that the symptoms and causes of anemia can be treated immediately. Symptoms of anemia depend on the degree and speed of anemia. Symptoms of lack of blood appear due to reduced oxygen supply to the tissues so that the symptoms of anemia can appear in various systems/organs in the body. The main symptoms are pale, lethargic, weak, muscle cramps, shortness of breath during activities, palpitations and dizziness.

Seeing the enormous impact of anemia in reducing the quality of human resources, it is better to tackle anemia early, before the young women become pregnant women, so that the young women's physical condition is ready to become healthy mothers. Adolescent girls are a group that is prone to anemia, this is because the need for iron in women is three times greater than the needs of men. Women experience menstruation every month which means regular blood loss in considerable amounts, also the need for iron increases due to physical, mental and intellectual growth (Fitriany & Saputri, 2018).

Efforts can be made to increase hemoglobin levels, namely by getting iron, if the body lacks iron it will inhibit the formation of hemoglobin which results in inhibition of the formation of red blood cells. Intake of lost iron every day is needed to replace iron lost through feces, urine. and sweat. Iron losses in adult men are close to 0.9 mg and 0.8 mg for women, respectively. Iron can be obtained from daily food, by consuming foods rich in iron such as spinach, sweet potato leaves, mustard greens and others and also consuming foods rich in vitamin C such as oranges, tomatoes, guava, mango and others, because vitamin C can increase iron absorption (Aman, 2015).

One of the fruits that contain vitamin C for health is oranges. Oranges contain lots of vitamin C, every 100 grams of citrus fruit consumed contains 50 mg of vitamin C, besides being rich in vitamin C, oranges also contain other necessary substances such as vitamin B1, provitamin A, folic acid, pectin, tannins, phosphorus, calcium, carbohydrates, iron, citric acid, flavonoids, glucosides, alkaloids, and esters. Citrus fruits are rich in vitamin C. Keep in mind that vitamin C helps iron

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absorption by up to 30%. When the need for iron is high, vitamin C is needed to help the process of iron absorption (Wigunantiningsih & Fakhidah, 2017).

From the initial survey conducted by researchers in September 2020 at SMK Negeri 3 Medan, it was found 10 teenagers who had checked hemoglobin levels and were declared anemic, 6 of whom were young women. 3 people complained that they often felt dizzy, tired quickly, and felt dizzy. 2 people reported having difficulty concentrating while studying, getting sleepy easily, and having dark eyesight when standing up quickly. And 1 person said lack of appetite, often felt nauseous, dizzy, weak and tired.

2. Methods

The design in this study used a quasi-experimental method (Quasy Experiment) with One-Group Pretest posttest without control. The population in this study were 35 third trimester pregnant women. Sampling using purposive sampling technique so as to obtain as many as 12 pregnant women in the third trimester. Data collection in this study consisted of primary data obtained directly by starting direct interviews using Hb checks in pregnant women using a HB measuring instrument (digital) regarding the administration of beetroot juice to pregnant women with anemia, secondary data obtained from the clinical midwife at the Ministry of Health. works on pregnancy visits and tertiary data were obtained from published manuscripts such as the World Health Organization (WHO), IDHS (Indonesian Health Demographic Survey) and the North Sumatra Health Office (Sumantri, 2015). The analysis technique used is univariate data analysis and bivariate analysis with Paired T Test Research methods The design used in this study was Analytic Experimental (Quasy Experiment) with the design used was Randomized Pretest and Posttest with Control Group Design. In this design model, there are two groups selected at random, using an initial test (pre-test) then after being given treatment in the control group, post-test measurements are carried out to determine the effect of the treatment, and look for comparisons between the control group and the experimental group. So that the magnitude of the effect of the experiment can be known with certainty. Where in adolescent girls who have anemia, the hemoglobin level is measured first as a pre test, then the experimental group is given an intervention for 7 consecutive days. On the 7th day, the hemoglobin level was measured again as a post test for the experimental group and the control group. Then compare the results between groups, to find out if there is an effect from the results of the treatment given, this research was conducted at SMK Negeri 3 Medan. The reason the researchers chose this location was because there were many young women who had anemia in the area. This research was conducted in September-February 2021, namely initial survey, title submission, data collection, thesis consul, thesis trial acc to research. The population is a collection of elements that have certain characteristics in common and have the same opportunity to be selected as members of the sample. The population in this study were young women aged 13-16 years, at SMK Negeri 3 Medan in 2021 in September-February as many as 20 respondents. The sampling technique of this research is total sampling.

3. Results and Discussion

3.1 Research result

a. Univariate Analysis

TABLE 1.
CHARACTERISTICS OF YOUNG WOMEN RESPONDENTS BY AGE AT SMK NEGERI 3 MEDAN

Age (Year)	N	Persentase (%)
13	6	30
15	9	45
16	5	25
Total	20	100

Source: Primary Data Processed in 2021

Based on table 1, it can be seen that the majority of the sample aged 15 years were 9 people (45%).

TABEL 2.
DISTRIBUTION OF HEMOGLOBIN LEVELS BEFORE AND AFTER GIVING ORANGE JUICE TO INTERVENTION RESPONDENTS AND CONTROL GROUP

No	Intervention Group		Control Group	
	Before (g/dL)	After (g/dL)	Before (g/dL)	After (g/dL)
1	9,9	10,3	10,1	10,0
2	10,7	11,4	9,8	9,9
3	10,8	11,2	10,6	10,6
4	9,7	9,9	9,5	9,6
5	10,5	10,5	9,9	10,0
6	9,8	10,3	10,1	9,9
7	9,8	10,7	10,8	10,8
8	10,2	10,2	9,7	9,6
9	9,4	10,0	9,7	10,0
10	10,6	10,6	10,2	10,3

Based on table 2 above, it can be seen from the experimental group which amounted to 10 respondents, 7 people (70.0%) of them experienced changes in hemoglobin levels, and those who did not experience changes were 3 people (30.0%) with a pre test average of 10.08 g. /dL and the average post test 10.50 g/dL. In the control group, 5 people experienced an increase in hemoglobin levels (50.0%), and 5 people (50.0%). and the average post test result was 10.7 g/dL.

Bivariate Analysis

The data analysis technique used in this study was paired t-test analysis on paired sample t-test to determine differences in Hb levels before and after treatment. Meanwhile, the free t-test analysis or independent sample t-test was used to determine hemoglobin levels in the control group and the treatment group. The requirement to perform the T test is that the data must be normally distributed and homogeneous.

1. Data Normality Test

The normality test of the data in this study was calculated using Shapiro Wilk because the number of samples was less than 50. The data was said to be normally distributed if the significance value (P value) > 0.05. normality test results can be seen in the following table:

TABLE 3.
DATA NORMALITY TEST

Variable	P*value*	Conclusion
Pre-test control group	0.400	Normal Distribution
Post test control group	0,451	Normal Distribution
Pre-test experimental group	0,820	Normal Distribution
Experimental group post test	0,952	Normal Distribution

Based on the normality test of the data using Shapiro Wilk, it was found that all variables in the control and experimental groups were significantly greater than (0.05) so it was stated that they were normally distributed.

1. Homogeneity Test

Homogeneity test was conducted to find out that the data came from the same group (homogeneous). Homogeneity test is a requirement to do the independent T Test. The following are the results of the homogeneity test in the control and experiment during the pre-test.

TABLE 4.
HOMOGENEITY TEST

No	Group	N	P*value*
1	Control	10	0,341
2	Experiment	10	

Source: Primary Data Year 2021

Based on table 4, the P value (P value) = 0.341 (P>α(0.05)) can be concluded that the data come from the same group (homogeneous). Pre-Test and Post-Test Hemoglobin Levels in the Control and Experimental Groups

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TABLE 5.
RESULTS OF GROUP ANALYSIS AND EXPERIMENTS

Group	Variables	N	Mean ± Std.Deviasi	Difference g/dL	P*value*
Eksperimen	*Pre test*	20	10,14 ± 0,48	0,37 g/dL	0,005
	Post test	20	10,51 ± 0,48		
Control	*Pre test*	20	9,94 ± 0,42	-0,08 g/dL	0,104
	Post test	20	9,86 ± 0,36		

Source: Primary Data 2021

Table 5 presents the results of the paired t-test which was carried out in the control and experimental groups. The results obtained are the mean pre-test of the experimental group of 10.14 g/dL and the post-test of 10.51 g/dL, so the mean difference value is 0.37 g/dL with a P value of 0.005 (P <) so that it can be concluded there is a significant difference in hemoglobin levels in adolescent girls after consuming orange juice at BPM Rina Hanum. In the control group, the results obtained were the mean pre-test of 9.94 g/dL and the mean post-test of 9.86 g/dL with a P-value of 0.104 (P >) so that it was concluded that there was no significant difference in hemoglobin levels against adolescents in the control group. giving orange juice to adolescent girls as a control group.

3.2 Discussion

Characteristics of Respondents

Adolescence is a period of transition from childhood to adulthood, where at this stage a child will experience very rapid growth and development, both physically and emotionally. Rapid physical growth requires high energy and nutrients, but during adolescence there are many factors that affect the lack of fulfillment of nutrients, such as lifestyle. This causes adolescents to experience the risk of anemia (Murphy, 2014).

The sample of this study was 20 women with anemia in the working area of BPM Rina Hanum. Based on table 1.1, it shows that the majority of the samples in the 15 year age group are 9 people (45%). Adolescence is a period of growth and development, both physically, mentally, and activity, so that the need for food containing nutrients becomes quite large. The increased need for iron in adolescent girls occurs significantly when they start menstruating, which is one year after peak growth (Risnawati, Indanah, & Sukesih, 2021).

From the results of the univariate test, the mean hemoglobin level after the intervention in the control group post test, the mean result was 9.86 g/dL and the mean result for the experimental group was 10.51 g/dL. The respondent group experienced mild anemia on average.

Hemoglobin is made up of four protein molecules (globulin chains) linked together. Each globulin chain contains an important iron-containing porphyrin compound called heme. In heme compounds are iron which is very important in transporting oxygen and carbon dioxide in the blood. The iron contained in hemoglobin is also responsible for the red color of blood (Suryandari & Happinasari, 2014).

Sample Hemoglobin Level

Hemoglobin is an iron-containing molecule capable of transporting oxygen and is present in red blood cells. Gram Hb per deciliter of blood is an index that expresses the capacity of blood to carry oxygen. Measurement of Hb in the blood is the most widely used method as an anemia screening test (10). One of the factors that affect the formation of hemoglobin is iron intake, but with insufficient intake it will not directly affect hemoglobin levels because of the iron reserves in the body that are stored in the body in the form of ferritin and hemosiderin (in the liver). In addition to iron intake, hemoglobin levels are also affected by low iron absorption, interactions of iron with other nutrients, increased demand and blood loss (Anggraini & Saragita, 2020).

Anemia is one of the main nutritional problems in Indonesia, especially iron deficiency anemia. Cases of anemia are very prominent in school children, especially adolescent girls. Adolescent girls are at high risk of suffering from anemia, because at this time there is an increased need for iron due to growth and menstruation.

High school activities, lectures and various organizational and extracurricular activities will have an impact on irregular eating patterns, besides the habit of consuming beverages that inhibit iron absorption will affect a person's hemoglobin level. Anemia in adolescents is anemia which is mostly caused by lack of intake of nutrients needed for the formation of hemoglobin, namely iron (Fe), vitamin C. Iron is needed to form the heme part of hemoglobin, and vitamin C is also an essential element for the formation of hemoglobin(Pibriyanti & Safira, 2021).

Based on table 5, it shows that there is an increase in hemoglobin levels after giving orange juice for 7 consecutive days and consumed in the morning after breakfast, from 10 respondents who were given treatment 7 people (70.0%) experienced a change. This study is in accordance with research conducted by Neila, et al (2018) which states that there is an effect of consuming tomato juice and orange juice on increasing Hb levels in adolescent girls who experience anemia. Iron is a mineral needed to transport oxygen throughout the body. Iron is an essential microelement for the body, this substance is needed for hemoptopoesis (blood formation), namely the synthesis of hemoglobin.

There are several factors that facilitate and inhibit the absorption of iron in the body. Consumption of fruits containing vitamin C, one of which is Sunkis orange, plays a very important role in iron absorption by increasing the absorption of non-heme iron up to four times when vitamin C is present. Vitamin C plays a role in transferring iron from transferrin in the plasma to ferritin (Risnawati et al., 2021).

The Effect of Orange Juice Consumption on the Increase in Hemoglobin Levels in Adolescent Girls Based on the results of statistical tests using the Paired T-test, the p value = 0.001 which means that there are differences in hemoglobin levels before and after consuming orange juice. There was an increase in the average hemoglobin level before and after treatment of 0.37 g/dL.

The results of this study are in accordance with research conducted by Sunarsih, et al, (in 2018) regarding the difference between giving Fe tablets with orange juice and viatmin C on the increase in hemoglobin levels in pregnant women to the increase in hemoglobin levels in adolescent girls. Hemoglobin is a parameter used to determine the prevalence of anemia. Hemoglobin is the oxygen-carrying compound in red blood cells. Low hemoglobin levels indicate anemia (Wigunantiningsih & Fakhidah, 2017).

Consumption of fruits that contain vitamin C plays a very important role in iron absorption by increasing the absorption of non-heme iron up to four times. The absorption of iron is strongly influenced by the availability of vitamin C. The role of vitamin C in the process of iron absorption is to help reduce ferric iron (Fe3+) to ferrous (Fe2+) in the small intestine so that it is easily absorbed, the reduction process will be even greater when the pH in the stomach increases. sour. Vitamin C can increase acidity so that it can increase iron absorption by up to 30% (Suryandari & Happinasari, 2014).

One of the fruits that have vitamin C and compounds that are beneficial for health is sweet oranges, besides containing high vitamin C, sweet oranges are also a delicious fruit to consume. Every 100 grams of sweet oranges consumed contains 50 mg of vitamin C. In 1 glass (240 ml) of fresh orange juice contains 110 calories, 25.5 grams of carbohydrates, 0.5 grams of fiber, 125.8 mg of vitamin C, 28 mg of calcium, 20 mg of iron and a number of other minerals. (6) Based on Neila's research (2018) in the experimental group after being given tomato-orange juice combination therapy for 7 consecutive days there was a significant effect, so it can be concluded that the combination therapy of tomato-orange juice can increase hemoglobin levels in pregnant women with anemia.

4. Discussion

Based on the Shapiro-Wilk normality test in the control group, the pre test (0.820 > 0.05) obtained results, and the post test (0.952 > 0.05). While the results of the normality test in the experimental group before treatment (0.400 > 0.05) and after being given treatment (0.451 > 0.05) it was stated that the data were normally distributed. Can add insight and utilize orange juice in non-pharmacological treatment in increasing hemoglobin levels.

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