

# Effect Of Mixed Green Beans Essences And Red Guava Of Haemoglobin Levels In Young Women Ages 13-16 Years Old

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**Abstract:** In Indonesia, in 2013 the prevalence of anemia in adolescent girls reached 57.1%. Many ways to prevent and treat anemia include consuming foods containing high iron and other nutrients that complement the formation of Haemoglobin, one by administering a mixture of juice of green beans and guava containing protein and iron is high enough that needed in the formation hemoglobin, as well as biological vitamin C produced red guava can increase the absorption of iron in food. This study was conducted to determine the effect of a mixture of green bean juice and guava against Haemoglobin levels in adolescent girls aged 13-16 years in the dorms Islamic Education Foundation Raudlatul Akbar Jember. The method in this study using the Pre Experiment with the design of the study one group pretest-posttest. A population of 45 people. Sampling using simple random sampling, in which a sample of 40 people. Of the 40 respondents performed blood sample is obtained as much as 28 respondents who are anemic. For the division as many as 14 respondents dick group and a control group of 14 respondents. The research instrument using digital Haemometer. Data analysis using t-test. The results of the study average hemoglobin level before treatment was 10,921gr / dl, and the control group was 11.450 g / dl. After treatment of a mixture of green bean juice and guava in the treatment group was 12,586gr / dl, while the untreated control group was 13.371 g / dl. There is a significant effect both for the treatment and control groups in the delivery of a mixture of green bean juice and guava against hemoglobin. Suggestions for this research's place was the mix of green bean juice and guava as an effort to prevent the occurrence of iron deficiency anemia in adolescents as the preparatory process of pregnancy and childbirth.

**Index Terms:** Mixed, Green, bean, Essence, Red, Guava, Haemoglobin, Levels, Young ,Women.

## 1 INTRODUCTION

The success of the national development of a nation is determined by the availability of human resources (HR) quality, namely human resources have physically tough, mentally strong and vibrant health in addition to the mastery of science and technology. One of the dominant factors in determining the potential and ability (physical and intellectual) is a human nutritional status and degree of health [10]. According Soekirman, quoted by Yuniswati [11] in his research, many international institutions such as UNICEF, WHO, the World Bank and Non-Government Organizations (NGO) states that "Iron deficiency is a serious global problem". According to their calculations, more than two billion people around the world suffer from malnutrition iron. In developing countries, more than half of sufferers are children and a woman of fertile age (WUS), at least a third suffering from severe anemia levels. Anemia in young girls is still quite high, according to the World Health Organization (WHO) (2013), the prevalence of anemia world ranges from 40-88%. The number of teen-age population (10-19 years) in Indonesia to 26.2% comprising 50.9% of men and 49.1% women [1]. According to data Riskesdas in 2013, the prevalence of anemia in Indonesia is 21.7% with anemia patients aged 5-14 years by 26.4% and 18.4% of patients aged 15-24 years. Data Household Health Survey (Household) in 2012 states that the prevalence of anemia in infants by 40.5%, amounting to 50.5% of pregnant women, postpartum mothers grew 45.1%, young women aged 10-18 years 57.1% and the age of 19- 45 years at 39.5%. Women have the highest risk of anemia, especially in young women [5].

Data from Jember District Health Office in 2013, data from nutritional anemia status in women of childbearing age, especially teenagers in boarding schools, in getting as much as 54.66% of 9828 adolescents experiencing anemia with hemoglobin levels <7 g% as much as 2.01% and Hb 7-11 g% as much as 52.65% [10]. Active group is youth and the future is the next generation expected high potential in national development. Physical psychic phenomena and adolescence is associated with puberty. Physical and psychological changes during puberty that drastically affect the need for nutrients during the youth. Adolescence is a period of growth of the reproductive organs into manhood. Young women have a greater risk of suffering from anemia compared to young men. This is because young women menstruation / menstrual periodical issued a number of iron each month and is in its infancy and thus require iron intake more. In addition, the imbalance of nutrient intake also causes anemia in adolescents. Young women are usually very concerned about body shape, so much that limit the consumption of food and many restrictions on food. When food intake is less then the iron reserves much dismantled. Circumstances such as these can accelerate the occurrence of anemia [2]. According to WHO, Anemia is a condition in which the number of erythrocytes (red blood cells) and the capacity is insufficient oxygen in the body. Anemia is defined as a low level of Haemoglobin (Hb) below normal with the normal range differ according to age and gender. The normal range for young men is Hb  $\geq$  13 g / dl, while for girls is  $\geq$  12 g / dl. The main cause of anemia is iron deficiency, along with other nutrients such as folic acid deficiency, vitamin B12 deficiency, Vitamin B6, Vitamin C, and protein . Other causes of anemia is an acute or chronic inflammation, destruction of red blood cells, severe bleeding, parasitic infections and irregular Haemoglobin synthesis. In healthy people, red blood grains contain Haemoglobin. Iron deficiency anemia can result in downsizing Haemoglobin, so the content of Haemoglobin low, followed by a reduction in the number of red blood cells primarily causing malfunctioning of the formation of Haemoglobin which is the

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transportation of oxygen and other nutrients such as vitamins and minerals to the body tissues, including brain tissue. With the reduction of hemoglobin or red blood, of course, the ability of red blood cells to carry oxygen throughout the body is reduced. Impaired oxygenation to the brain tissue causing a decrease in the ability and concentration during studying adolescent learning. Productivity, level of intelligence, comprehension towards learning and all their activities will be disrupted and eventually will result in decreasing achievement [3]. Figures nutritional needs for iron in adolescent and young adult women 19-26 mg per day. The food sources of iron are liver, red meat (cattle, goats, sheep), white meat (chicken, fish), nuts and green vegetables. Foods that can meet the nutritional needs of iron divided into two heme iron (animal / meat), namely iron binds to protein and non-heme iron (plant) is a complex inorganic iron compounds. But there are difficulties in meeting the needs of Fe. Fe is low absorption rate in the body, especially Fe vegetable sources is absorbed only 1-2% whereas Fe Source animal reaches 10-20%. This means that the source of animal Fe (heme) is more easily absorbed than vegetable sources of Fe (non-heme). But in reality, Indonesian people in general consume iron derived from vegetable food, which has a low absorption compared to animal food, ie 5% of the total consumption of iron. But the nutrient content of iron contained in vegetable Fe (non-heme) are also needed as a supplier of iron in the body. Foods that can increase iron absorption, especially non-heme Fe is Vitamin C [1]. Green beans contains iron is high enough and complete composition. Nutrient content in 100 g of green beans is 345 cal energy, protein 22.2 g, fat 1.2 g, carbohydrates 62.9 g, water 10 g, 125 mg calcium, phosphorus 320 mg, 6.7 mg iron, vitamin A 157 SI, vitamin B1 0.64 mg, 4.8 mg vitamin C [9]. The problem is that iron derived from plant foods (non-heme) has a low absorption rates. One attempt to solve the problem is accompanied by the consumption of foods containing vitamin C. Vitamin C is known to help increase the absorption of iron by the reduction of iron in food from the ferric form into ferro easier absorption [2]. Red guava fruit (*Psidium guava* L) is a fruit that contains vitamin C twice the amount of vitamin C in citrus fruits. So the fruit can be used as an alternative fruit supplier of vitamin C that can help increase the absorption of iron from mung bean (*Phaseolus radiatus*). Nutrient content contained in red guava fruit (100 grams) is 51 kcal of energy, Vitamin E 1.125 mg, 0.05 mg of Vitamin B1, Vitamin C 183.5 mg, 20 mg calcium, 11.88 grams carbohydrates, 25 mg phosphorus, 0.31 mg of iron, 0.82 grams protein, 0.6 grams fat and water 86.10 grams [8]. Islamic Education Foundation Raudlatul Akbar is one of the Education Foundation in Jember which facilitates its students living dorm, as well as students get dining facilities in the hostel, dinner menu is available each day rice with tempe or tofu and vegetables with 3 meals a day, a week students get a meal with a side dish of fish or eggs and milk. The hostel is only able to provide such dining facilities due to funding obtained from volunteers or donors who are willing to give assistance for students who live in dormitories average orphaned. Judging from the diet of nutrients obtained not meet the nutritional needs of young women every day. Based on preliminary studies conducted in the hostel Islamic Education Foundation Raudlatul Akbar Jember in January 2016, of the 10 students adolescents aged 13-16 years are 60% of students who belong to the mild anemia with hemoglobin levels from 10.2 to 11.7 g / dl and 40% of girls who experience

moderate anemia with hemoglobin levels from 7.3 to 9.6 g / dl, so there are still some students who complained of tiredness, fast asleep during the learning process and learning concentration decreases. The prevalence of anemia is high among adolescents if not handled properly will continue into adulthood and contribute greatly to maternal mortality, infant premature and babies born with low birth weight.

### 1.1 Research purposes

- 1.1.1. Identify hemoglobin levels prior to the treatment group and the control group
- 1.1.2. Identify Hb after the treatment group and the control group
- 1.1.3. Analyze the influence of Sari Mixed Green Beans and Red Guava

### 1.2 Benefits of research

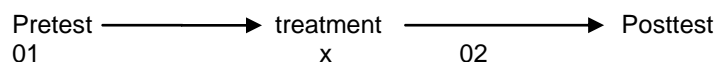
- 1.2.1. Improving the quality of health services for young women
- 1.2.2. Helping the community, especially to the young women
- 1.2.3. Improved healthcare

## 2 Research Method

### 2.1. Design

In this study using research methods Pre Experiment with the design of the study "One Group Pretest-Posttest". The treatment in this study was to measure the level of Haemoglobin respondent 1 day before by a mixture of juice of green beans and red guava, then given a mixture of juice of green beans 250 ml per day for 7 days and measured levels of Haemoglobin back on day 10 or three days after giving a mixture of green bean juice and guava last. The design of this study can be described as follows:

*Picture 1 : Conceptual framework*



Information:

- 01: Measurement of hemoglobin levels prior to the control group and treatment group  
 02: Measurement of hemoglobin levels after the control group and treatment group  
 X: The treatment provides a mix of green bean juice and guava in the treatment group

### 2.2. Population Research

The population in this study were all young women in a dorm Raudlatul Akbar Jember many as 40 respondents.

### 2.3. Samples and Sampling Techniques

Sampling was taken in a total of 40 respondents were all examined hemoglobin level is obtained as much as 28 respondents who are anemic. The sampling technique was determined by purposive sampling, with the division of 14 respondents as the treatment group and 14 respondents as the control group. While the criteria used as the sample respondents are:

1. Young women in Dormitory Raudlatul Akbar Jember is willing to become respondents, signed informed consent and cooperative
2. Living in Dormitory Raudlatul Akbar Jember
3. Aged 13-16 years old
4. There are menstruating and had normal menstrual cycles
5. Not being taking additional vitamins or supplements
6. Not having a chronic illness
7. Diet is in the hostel / foundation

#### 2.4. Data analysis

Analysis of the data in this study using the statistical test t-parametric statistical test that is used to test the hypothesis of comparative average of two samples when the data interval or intervals shaped.

### 3 Results

**TABLE 1.** Distribution Age 13-16 Years Young Women in Islamic Education Foundation Dormitory Raudlatul Akbar Jember 2016

Age	Amount	Percentage (%)
13	8	28,6 %
14	5	17,9 %
15	6	21,4 %
16	9	32,1 %
<b>Amount</b>	<b>28</b>	<b>100%</b>

According to the table 1. above shows that of the 28 teenagers who were respondents are 28.6% of adults 13 years of age, 17.9% was 14 years, 21.4% aged 15 years and 32.1% were 16 years old.

**TABLE 2.** Distribution Average Haemoglobin Levels in Young Women Ages 13-14 Years Boarding Islamic Education Foundation Raudlatul Akbar Jember 2016 Before Giving Mixed Green Beans Essences and Red Guava in the treatment group and the control group

Variable	Mean	SD	SE	pvalue	N
Hb levels before treatment in the treatment group	10,921	0,8711	0,2328	0,05	14
Hb without treatment in the control group	11,450	0,422	0,1128	0,05	14

Based on Table 2. Average hemoglobin levels before treatment administration mixture of green bean juice and red guava is 10.921 g/dl in the treatment group and 11.450 g/dl in the control group.

**TABLE 3.** Distribution of Average Haemoglobin Levels in Young Women Ages 13-16 Years Boarding Islamic Education Foundation Raudlatul Akbar Jember 2016 After Giving Mixed Green Beans Essences and Red Guavain the treatment group and the control group

Variable	Mean	SD	SE	pvalue	N
Hb levels after treatment in the treatment group	12,586	0,6608	0,1766	0,05	14
Hb without treatment in the control group	13,371	1,0403	0,2780	0,05	14

Based on Table 3. The average Hb after treatment administration mixture of green bean juice and red guava is the treatment group 12.586 g / dl and the control group 13.371 g / dl.

**TABLE 4.** Distribution of Average Haemoglobin Levels in Young Women Ages 13-16 Years Before and after administration of Mixed Green Beans Essences and Red Guavain the treatment group and the control group

Variable	Mean	SD	SE	T	N
The treatment group Hb	-1,6643	0,8679	0,2320	-7,175	14
Hb control group	-1,9214	0,9472	0,2532	-7,590	14

Based on the table 4, the average increase in hemoglobin levels before and after administration of a mixture of green bean juice and guava in the treatment group was 1,6643gr / dl with a standard deviation of 0,8679gr / dl. So the mean value for the increase in Hb levels teenage hostel Islamic Education Foundation Raudlatul Akbar after administration in the treatment group was 1.6643 gr / dl, while the average increase in hemoglobin levels before and after administration of the

mixture without the green bean juice and guava in the control group is 1,9214gr / dl with a standard deviation of 0,9472gr / dl. So the mean values for Hb levels rise dorm teens Akbar Islamic Education Foundation Raudlatul in the control group was 1,9214gr / dl Based on the statistical test using the Test paired samples t-test was calculated manually obtained probability value 0.000 <0.05 thus Ho is rejected and Ha accepted which means there is the effect of a mixture of green

bean juice and guava to the hemoglobin in young women ages 13-16 years old at the Islamic Education Foundation Dormitory Raudlatul Akbar Jember. This means that after the administration of a mixture of green bean juice and guava 250 ml per day for 7 days there is an increase in hemoglobin levels with the average increase 1,6643gr / dl in young women, whereas in the control group obtained probability value 0.000 <0.05 thus  $H_0$  rejected and  $H_a$  accepted which means although it is not given the treatment also contained elevated levels of hemoglobin with an average rise 1,9214gr / dl in young girls

#### 4 DISCUSSION

Haemoglobin levels Before Giving Mixed Green Beans Essences and Red Guava in Youth Ages 13-16 Years in Education Dormitory Raudlatul Akbar Jember in the treatment group and the control group Based on the results of the study, the average hemoglobin level prior to administration of a mixture of green bean juice and guava in young women 13-16 years old in the dorm Islamic Education Foundation Raudlatul Akbar Jember in the treatment group was 10.921 g / dl and the control group was 11.450 level the hemoglobin classified in mild anemia. The average hemoglobin after the administration of a mixture of green bean juice and guava in young women 13-16 years old in the dorm Islamic Education Foundation Raudlatul Akbar Jember in the treatment group was 12.586 g / dl and the control group was 13.371 hemoglobin level was classified in normal hemoglobin level. When viewed from an average hemoglobin, hemoglobin adolescents aged 13-16 years in the dorms Education Foundation Raudlatul Akbar is still below normal. In Indonesia, the limits of normal hemoglobin level is used as the threshold of anemia based on the Recommendation Letter of the Minister of Health, number: 736/Menkes/XI/1989 for various age groups and gender and maternal lactation is the same as that recommended by the WHO, which is 12, 0 g/dl. In theory, there are several factors that can affect the levels of hemoglobin in a person's body, which include age, food intake, component (ingredient), which comes from food, the ability of resorption of the small intestine to the necessary materials, as well as the absence of disease or disorder that can disrupt levels normal hemoglobin a person. According Adriani [1] that the incidence of anemia in adolescent girls, which is characterized by lack of hemoglobin is below normal, is influenced by several factors, namely the presence of infectious disease chronic, menstruation excessive bleeding sudden and amount of food or absorption of bad diet of iron, Vitamin B12, Vitamin B6, Vitamin C and copper. Not only that, the lack of rest generally cause body fatigue, because of the many activities of teenagers who drain energy while the intake of nutrients entering the body is not enough to meet the daily nutritional needs of adolescents. This can affect the absorption of nutrients that will also affect the formation of hemoglobin metabolism. Hemoglobin in young women aged 13-16 years in the dorms Education Foundation Raudlatul Akbar Jember after consuming 250ml juice mixture of green beans and guava for 7 days on average by 12,586gr / dl and adolescent girls without treatment or a control group of 13.371 g/dl. Mix of green bean juice and guava contain various elements forming hemoglobin. In 100 ml green beans are made from 100 grams of dried green beans and 600 ml of water containing 23.84 grams of protein, 7.01 mg Fe which is an essential ingredient forming hemoglobin and 188.3 mg of vitamin C and Vitamin B6 0.52 mg assist in the absorption of

Fe. Adriani [1] explains that the dietary needs of young women in the day for protein is 48-62 g, 19-26 mg of iron, vitamin B6 1.25 mg and vitamin C 60 mg. Fe is an essential ingredient in the formation of hemoglobin. Healthy human body contains  $\pm$  3.5 g Fe are almost entirely in the form of complex bonds with proteins. Approximately 70% Fe in the body is functional and 30% Fe rest is nonessential. Fe functional / essential is present in  $\pm$  66% of hemoglobin, myoglobin 3%, an enzyme that serves to transfer electrons (sitokromoksidase, succinyl dehydrogenase, xanthine oxidase) as much as 0.5% and 0.1% transferrin. Iron non-essential there as a backup in the form of ferritin and hemosiderin as much as 25% and in the parenchymal tissue of approximately 5%. Iron that has been absorbed in the form of ferrous ions will be converted into a ferric in the mucosal cells which will then be entered into with intermediaries plasma transferrin, ferritin will then be converted into and stored in the intestinal mucosa [10]. Vitamin B6 in the mix of green bean juice and guava function in the initial reaction of heme formation. Murray [6] in Muwakhidah [7] explains that vitamin B6 along with the enzyme Aminolevulenat change Succinyl-CoA synthase and glycine into aminolevulenat acid (ALA). Furthermore, ALA will be condensed by ALA dehydratase enzyme to form two molecules of water and one molecule of porphobilinogen. This porphobilinogen be synthesized to be protoporphyrin III. The involvement of iron in hemoglobin synthesis process is in the final stages of heme formation, where the merger of ferrous iron into protoporphyrin III catalyzed by the enzyme ferroketalase. Meanwhile, the protein also plays a role in the formation of hemoglobin. Protein, in the form of globulin called apotransferin in this process. This Apotransferin loosely binds with iron to form transferrin, an iron transport function of plasma into cells or vice versa during the synthesis of hemoglobin in progress [4]. Besides Fe is more easily absorbed by the body in the ferrous form, the amount of Fe is absorbed is also highly dependent on the presence of other substances, one of which is vitamin C. Atmosphere acids arising from the presence of vitamin C in guava and HCl in the stomach, will reduce ion ferric into ferrous and inhibit the formation of Fe with foods that are not soluble, so it becomes more optimal absorption of Fe [10]. Given some of the content on the mix of green bean juice and guava which has a role in the synthesis of hemoglobin, the consumption of a mixture of green bean juice and guava can help supply the nutrients needed. Giving mix of green bean juice and guava 250 ml per day in adolescents aged 13-16 years in the dorms Akbar Raudlatul Education Foundation aims to complement the needs of the day will be important nutrients for the body, so that all the metabolic processes in the body, including the process of the formation of hemoglobin that requires vital substances, is not disturbed. The process of formation of hemoglobin that will either help increase hemoglobin teenagers. After the measurement of hemoglobin levels before and after administration of a mixture of green bean juice and guava for 7 days in young women ages 13-16 years in the dorms Islamic Education Foundation Raudlatul Akbar Jember in 2016, showed an average increase in hemoglobin in the treatment group by 1,6643gr / dl and a control group of 1.9214. Based on the statistical test by using test t-test / sample paired t SPSS in the treatment group with a probability value (0.000 <0.05) was calculated manually obtained thus  $H_0$  is rejected and  $H_a$  accepted which means there is the effect of green beans and juice mix guava against hemoglobin in young

women aged 13-16 years in the dorms Education Foundation Raudlatul Akbar Jember. This means that after the administration of a mixture of green bean juice and guava are increased levels of hemoglobin in young women, whereas in the control group with a probability value (0.000 <0.05) showed  $H_0$  rejected and  $H_a$  received means there are increased levels of Hb though not given the treatment. Green beans and red guava useful addition to meet the nutritional needs of the body, is also beneficial for the prevention of anemia. That's because the green beans contain iron which is quite high which is one of the substances forming hemoglobin and red guava containing vitamin C twice the amount of vitamin C in citrus fruits which helps the absorption of iron, so that the consumption of green beans and red guava can increase iron intake, which in turn can help increase levels of hemoglobin [8]. Backup Fe in women only 200-400 mg, whereas in men  $\pm$  1 g. When the reserves in the body is high and the need for iron is low, then more Fe converted into ferritin and stored. If the reserve is low or needs increase, then the newly absorbed Fe will soon be transported from the mucosal cells to the bone marrow for erythropoiesis. Erythropoiesis could be increased to more than 5 times on anemia or hypoxia [10]. According Almatsier [2], when the body is in a state of iron deficiency, then the non-haem iron absorption can be increased by up to ten times. The content of Fe contained in green beans directly used by the body to meet the essential needs of Fe / functional because the body experiences a state of anemia, in which the hemoglobin is below normal levels. Fe is absorbed directly used in the synthesis process to form new hemoglobin, so that the levels of hemoglobin in the body will increase. The content of protein, vitamin B6, and vitamin C in the juice mixture of green beans and red guava also help speed up the process of synthesis of hemoglobin itself. With the availability of some essential micronutrients are quite beside Fe, the process of the formation of hemoglobin to be better than it would have no additional nutritional intake.

## 5 CONCLUSIONS

The average hemoglobin adolescents aged 13-16 years before giving the mixture of green bean juice and guava in the treatment group was 10,921gr / dl, while the untreated control group was 11.450 g / dl. The average hemoglobin adolescents aged 13-16 years following administration of a mixture of green bean juice and guava in the treatment group was 12,586gr / dl, while the untreated control group was 13.371 g / dl. There is a significant effect both for the treatment and control groups in the delivery of a mixture of green bean juice and guava against hemoglobin level means that there are increased levels of hemoglobin with an average increase 1,6643gr / dl and 1.9214 g / dl.

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