

THE EFFECTIVENESS OF GIVING BEETROOT JUICE ON INCREASING HEMOGLOBIN (Hb) LEVELS OF ADOLESCENT WOMEN IN ISLAMIC BOARDING SCHOOL

(Efektivitas Pemberian Jus Buah Bit untuk Meningkatkan Kadar Hemoglobin pada Remaja Putri di Pondok Pesantren)

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ABSTRACT

Background: About 50% of cases of anemia are due to iron deficiency, Southeast Asian State was in the 2nd highest position for anemia compared to other countries. The incidence of anemia is at greater risk in women due to natural conditions such as menstruation, pregnancy and childbirth as well as the food consumed. The prevalence of anemia in Indonesia is 21,7% with a proportion of 20,6% in urban areas and 22.8% in rural areas. Purpose: The purpose of this study was to determine the effectiveness of giving beetroot juice to increase hemoglobin levels in the blood in adolescents women in Islamic boarding school. Method: This research was conducted using a pre-experimental method with one group pretest post-test design. The intake of 60 g of beetroot is consumed in the form of 200 ml/day of beetroot juice for 7 days. Result: There is a significant difference hemoglobin levels before and after giving beetroot juice in adolescent women at Islamic boarding school ($p=0.001$). Conclusion: Consumption of beetroot juice has an effect on increasing hemoglobin levels in adolescent women.

Keywords: adolescents, anemia, beetroot juice, hemoglobin

ABSTRAK

Latar belakang: sekitar 50% kasus anemia karena kekurangan zat besi, negara Asia Tenggara berada di posisi tertinggi ke-2 untuk anemia dibandingkan dengan negara lain. Gejala anemia adalah risiko yang lebih besar pada wanita karena kondisi alami seperti menstruasi, kehamilan, dan kelahiran serta mengkonsumsi makanan. Prevalensi anemia di Indonesia adalah 21,7% dengan proporsi sebesar 20,6% di daerah perkotaan dan 22,8% di daerah pedesaan. Tujuan: tujuan dari studi ini adalah untuk menentukan efektivitas memberikan jus beetroot untuk meningkatkan tingkat hemoglobin dalam darah wanita Remaja di sekolah asrama Islam. Metode: penelitian ini dilakukan menggunakan metode pra-eksperimental dengan satu kelompok yang pretest desain pasca-tes. Asupan 60 g beetroot dikonsumsi dalam bentuk 200 ml / hari jus beetroot selama 7 hari. Hasil: ada perbedaan tingkat hemoglobin yang signifikan sebelum dan setelah memberikan jus beetroot pada wanita Remaja di sekolah asrama Islam ($p=0.001$). Kesimpulan: Jus beetroot memiliki efek dari meningkatnya tingkat hemoglobin di Remaja wanita.

Kata kunci: Remaja Putri, anemia, jus buah bit, hemoglobin

BACKGROUND

Most people consider anemia as a blood deficiency disease that is prone to be experienced in all life cycles (Citrakusumasari, 2012). According to WHO data (2011) about two billion people in the world experience iron deficiency anemia and 50% of cases of anemia are caused by iron deficiency. Kotwal (2016) concluded that the Southeast Asian State was in the 2nd highest position for anemia compared to other countries. The incidence of iron deficiency anemia is very worrying because it increases the morbidity and mortality rate (Kotwal, 2016).

The incidence of anemia is at greater risk in women due to natural conditions such as menstruation, pregnancy and childbirth as well as the food consumed. The prevalence of anemia in Indonesia is 21.7% with a proportion of 20.6% in urban areas and 22.8% in rural areas. The prevalence of anemia in women (23.9%) was greater than that of men (18.4%). Based on the age group, anemia sufferers aged 5-14 years were 26.4% and those aged 14-24 years were 18.4%. Women have the highest risk of anemia, especially in adolescent women (Kemenkes, 2013).

Iron deficiency anemia is most common in adolescents worldwide. In adolescents who have anemia it can cause motor development problems, reduce productivity, the body becomes weak quickly and can reduce learning concentration (Hinton et al., 2015). Adolescent women experience growth that requires more lifestyle and food habits should be adjusted to ensuring nutrition requirements, while the proportion of anemia in nonpregnant women over the age of 15 is 22.7%, this condition is one of the consequences of iron intake from food only meets 40% of the needs (Kemenkes, 2013).

Anemia can be treated in various ways, one of which is by consuming iron supplements or blood booster tablets (TTD) and consuming foods that contain iron (Keshav S and Stevens R, 2017). One of the plants that is very beneficial for humans is beetroot (Astawan, 2010). Beetroot contain high levels of folic acid which is very good in improving brain function in babies (Stephana, 2017). Beetroot work by stimulating the circulatory system and helping in building red blood cells because the content of folic acid and vitamin B12 in beetroot are the most important ingredients needed in cellular metabolism and in the development of erythrocytes (Putri C *et al*, 2016).

Kenjale (2011) in his research stated that consuming beetroot in the form of juice can increase the concentration of plasma nitrate in patients with arterial disorders, where these patients experience failure to increase blood and oxygen supply during work, resulting in pain when walking. After consuming beetroot juice, the patient experienced an increase in plasma after three hours and was able to walk 18% longer before the onset of pain.

Setyaningsih (2020) in her research concluded that beetroot juice with a combination of lemon consumed by pregnant women for seven days can increase hemoglobin levels increased as much on mean 13,60 g/dL or 1,57 g/dL with a value of $p=0.000$ which indicates a significant change between hemoglobin levels of pregnant women before being given beetroot juice combination of lemon and hemoglobin levels before being given the treatment. Besides being able to be used to increase hemoglobin levels, beetroot juice can also help reduce systolic blood pressure in the elderly, with a value of $p=0,000$ (Dewi, 2020). This is because the nutritional content contained in

beetroot is very complex, including potassium, calcium, antioxidants and high iron. This nutrient content causes a decrease in blood pressure in the elderly.

METHOD

This type of research was a *pre-experimental* study, research design used was one group *pretest-posttest*, namely research which was carried out in one group only (Riyanto, 2011). Beetroot juice was given every day in a

row for one week at a rate of 200 ml. This research was used 30 sample of adolescent women in Islamic boarding school. The inclusion criteria is: adolescent women (ages 15-19 years), Already menstruation but not menstruating when carrying out data collection (checking hemoglobin levels), Willing not to consume tea, coffee, milk and chocolate when the intervention takes place. The intervention was given every days before lunch for a week.

RESULT AND DISCUSSION

Iron intake was calculated using the adequacy value of iron intake based on the 2019 RDA. The level of consumption of vitamins and minerals according to the RDA (2019) show that sufficient if the intake is $\geq 77\%$ and to be a deficit if the intake is $< 70\%$. The level of consumption of vitamins and minerals according to the RDA (2019) show that sufficient if the intake is $\geq 77\%$ and to be a deficit if the intake is $< 70\%$. Based on the table, it can be seen

that the value the adequacy of iron intake of respondents is mostly in the deficit category, which is 19 by the percentage 63,3%. it can be concluded that the majority of respondents were in the deficit category, which is 19 respondents by the percentage 63,6% of the respondents. It can be seen that the adequacy level of vitamin C intake of respondents is in the Deficit category, which is 26 respondents by the percentage 86,6% are in the Deficit category.

Table 1. Sufficient of intake category

Intake category	n	%
Iron intake		
Deficit	19	63,33%
Sufficient	11	36,67%
Protein intake		
Deficit	19	63,33%
Sufficient	11	36,67%
Vitamin C		
Deficit	26	86,67%
Sufficient	4	13,33%

Table 2. The Average Hemoglobin Level

Variable	mean \pm SD	p
Hemoglobin level before intervention (g/dl)	12,03 \pm 1,90	0,001
Hemoglobin level after intervention (g/dl)	13,60 \pm 1,67	

The mean hemoglobin level in the this research before being given treatment in the table of beetroot juice was $12,03 \pm 1,90$ g/dL. While the measurement of hemoglobin levels after treatment obtained $13.60 \pm 1,67$ g/dL. Based on the results of the paired t-test, the hemoglobin level before and after the intervention obtained $p=0.001$, which means that there is a significant difference between the hemoglobin level before and after the intervention of beetroot juice.

Intake of Iron, Protein and Vitamin C

The intake of iron, protein and vitamin C in this study based on the Food Record (recording with estimates) belongs to the mostly devicit category. Based on research by Solihah (2019), it was found that students with sufficient iron consumption had a 27.8% risk of developing anemia while students with deficit iron consumption were 75.0% at risk of experiencing anemia. This means that students with deficit consumption are at risk 276 times greater with a value of $p=0,002$ ($<0,005$).

Solicha (2019) in his research stated that iron consumption was associated with hemoglobin levels in adolescent womens with a p value = 0.005; $r = 0.635$ which indicates a strong relationship between iron intake and hemoglobin levels. This is also in line with Sholihah's research, *et al* (2019) which states that there is a significant relationship between the level of protein consumption and the incidence of anemia with a strong relationship with a positive pattern ($r=0.586$) and the result $p=<0.005$ with the result $OR=30.333$ ($CI=3,433-267,988$). The OR results

indicate that adolescent women have sufficient consumption levels, while the positive patterned relationship indicates that the higher the protein intake, the higher the hemoglobin level in the blood.

The frequency of protein intake of respondents in this study was classified as a deficit category because the percentage of consumption when compared to the protein adequacy rate of most of the samples was in the low category. This was proven when doing a food record, the menu served at the Islamic boarding school for the portion of animal side dishes was limited, causing the adequacy of protein intake to fall into the deficit category. It is estimated that most of the anemia that occurs in Indonesia is due to a lack of iron intake that comes from animal protein (*heme-iron*). Iron in animal food sources can be absorbed by the body between 20-30%.

Vegetable food also contains iron (non-heme), but the amount of iron that can be absorbed by the intestine is much less than iron from animal foods, namely 1-10%. Meanwhile, consumption of *heme* and *non-heme* iron simultaneously can increase iron absorption. The majority of respondents in this study consumed protein derived from plants (*non-heme*).

Hemoglobin levels

This research shows that hemoglobin levels in adolescents girl before giving beetroot juice are $12,03$ g/dl $\pm 1,90$, while after giving beetroot juice the *mean* is $13,60$ g/dl $\pm 1,67$. The hemoglobin level before and after the intervention obtained $p=0.001$, which means that there is a significant difference between the hemoglobin level before and after the

intervention of beetroot juice in adolescent girls in Islamic boarding school.

Beetroot is a type of tuber plant that is purplish red, which is most commonly found in North America and England. Beetroot have many benefits including increasing hemoglobin levels, preventing stroke, anti-cancer substances and destroying tumor cells and reducing cholesterol in the blood. Beetroot also contain very complex nutrients and are very good for regular consumption (Susianto, 2010).

Kenjale (2011) in his research stated that consuming beetroot in the form of juice can increase the concentration of plasma nitrate in patients with arterial disorders, where these patients experience failure to increase blood and oxygen supply during work, resulting in pain when walking. After consuming beetroot juice, the patient experienced an increase in plasma after three hours

and was able to walk 18% longer before the onset of pain.

Setyaningsih (2020) in his research concluded that beetroot juice with a combination of lemon consumed by pregnant women for seven days can increase hemoglobin levels with a value of $p = 0.000$ which indicates a significant change between hemoglobin levels of pregnant women before being given beetroot juice combination of lemon and hemoglobin levels before being given the treatment. Besides being able to be used to increase hemoglobin levels, beetroot juice can also help reduce systolic blood pressure in the elderly, with a value of $p=0,000$ (Dewi, 2020). This is because the nutritional content contained in beetroot is very complex, including potassium, calcium, antioxidants and high iron. This nutrient content causes a decrease in blood pressure in the elderly.

CONCLUSION

There is a significant difference hemoglobin levels before and after giving beetroot juice in adolescent women at Islamic boarding school.

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