

How to Overcome Anemia in Adolescents Through Nutrition Education and Feeding Mung Bean Juice at Al Hadi Islamic Boarding School, Banten, Indonesia

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Article Info

Article history:

Received April 3, 2024

Revised April 15, 2024

Accepted May 3, 2024

Keywords:

Anemia
Mung Bean Juice
Nutrition Education

ABSTRACT

Adolescent girls require special attention in terms of iron requirements due to growth and the arrival of menstruation, so that adolescent girls are very susceptible to anemia. Prevention of anemia in teenagers can be done by providing education to teenagers about nutrition and increasing consumption of nutritious foods such as green bean juice drinks. This community service activity uses the Community Development (community empowerment) method. The activity was carried out in February 2024. The location of the activity is the Al Hadi Banten Islamic Boarding School with a target of 40 girl teenagers. This activity is a health examination, education about nutrition and giving mung bean juice. The post test scores showed changes in the form of increasing teenagers' knowledge about nutrition and increasing teenagers' Hemoglobin (Hb) levels after being given intervention in the form of mung bean juice. Providing education about adolescent nutrition and providing mung bean juice can effectively prevent anemia in adolescents.

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INTRODUCTION

Adolescent girls require special attention in terms of iron requirements due to growth and the arrival of menstruation, so that adolescent girls are very susceptible to anemia. Anemia is a condition where the number of red blood cells or the concentration of hemoglobin (Hb) in them is lower than normal. Hemoglobin is needed to carry oxygen and if there are too few or abnormal red blood cells, or not enough hemoglobin, there will be a decrease in the blood's capacity to carry oxygen to body tissues ^[1]. Anemia is a global public health problem that occurs in both developing and developed countries. The influence of anemia at all ages has major consequences for human health as well as the socio-economic burden. According to WHO, anemia is characterized by hemoglobin (Hb) levels of 12.0 g/dl in women and 13.0 g/dl in men ^[2].

According to WHO, anemia affects 1.62 billion people or the equivalent of 24.8% of the world's population. WHO in 2012 targets reducing the prevalence of anemia globally to 15% by 2025. More than 25% of teenagers in the Southeast Asia region (except Thailand) experience anemia with a prevalence reaching 50% in some countries ^[3]. The prevalence of anemia in Indonesia reaches 48.9%. The prevalence of anemia in adolescents aged 15-24 has continued to increase in the last 11 years from 6.9% in 2007 to 32.0% in 2018. Globally, the prevalence of anemia in adolescent girls is higher than in adolescent boys. The prevalence of

anemia in adolescent girls in Indonesia is 27.2%, 6.9% higher than the prevalence of anemia in adolescent boys^[4].

Indonesian teenagers suffering from anemia are faced with decreased immunity, concentration, learning achievement, youth fitness and productivity. Especially in young women who will later become mothers, anemia can also trigger pregnancy complications, such as premature birth, or babies born with low weight and the risk of death due to bleeding during childbirth^[4]. During adolescence, it cannot be separated from nutritional problems, namely chronic energy deficiency (CED), obesity and anemia. Adolescent girls are at higher risk of experiencing anemia compared to adolescent boys. There are several things that cause an increase in iron requirements, namely loss of iron during menstruation, behavior or habits in choosing the wrong foods^[5].

Anemia in adolescent girls has impacts for the present and the future, namely delayed growth, easily infected, easily weak and hungry, easily sleepy, decreased enthusiasm for learning or achievement (decreased grades on exams), disturbed concentration on learning, other impacts on anemic adolescents, namely when after marriage and producing the next generation of vulnerable people, it will have an indirect effect on the fetus that will be conceived by WUS which will later cause poor births, low birth weight babies, premature babies, stunting, as well as pregnancy and birth complications^[6].

Hemoglobin levels are said to be normal if the Hb level is > 12 gr%, mild anemia is 10 - 11 gr%, moderate anemia is 8 - 10 gr% and severe anemia if the hemoglobin level is < 8 gr%. According to the World Health Organization WHO, the incidence of anemia in adolescent girls in developing countries is around 53.7% of all adolescent girls^[7].

Treatment of anemia can be done in a pharmacological way, namely by consuming blood supplement tablets, but it can also be done in a non-pharmacological way, such as providing food which is expected to increase iron adequacy in teenagers, namely green bean juice, because green beans can prevent a decrease in hemoglobin levels. Nutrition and health interventions must be carried out at every stage of the life cycle to achieve optimal health, carried out continuously during the preconception, pregnancy, neonatal, infant, toddler, school-aged children and adolescent periods. Interventions for adolescent girls and WUS (Women of Childbearing Age) are very important because they will determine the quality of the next generation's human resources^[8].

Green beans (*Phaseolus radiatus* L.) are a food ingredient that contains substances needed for the formation of red blood cells so that they can overcome the effects of decreasing Hb. Green beans contain vitamins and minerals such as calcium, phosphorus, iron, sodium and potassium. Prevention of anemia can be done by increasing iron consumption in food. The iron content of 6.7 mg/100 g contained in green beans is believed to contribute to the prevention of anemia. Apart from being needed for the formation of hemoglobin which plays a role in storing and transporting oxygen, the nutrients in green beans are also found in several enzymes which play a role in oxidative metabolism, deoxyribonucleic acid synthesis, neurotransmitters and catabolism processes^[7].

Prevention of anemia in teenagers can be done by providing understanding and knowledge to teenagers about anemia and the impact it will experience on teenagers, increasing consumption of nutritious food, increasing the intake of iron into the body and treating diseases that cause or aggravate anemia. Therefore, iron supplementation in adolescent girls during menstruation is very important^[9].

Based on the explanation above, we created a nutritional education program about anemia for adolescent girls to provide education and increase female students' knowledge about anemia, as well as providing green bean juice drinks to increase hemoglobin (Hb) levels as one of the efforts to prevent and control anemia, especially in adolescent girls.

METHOD

Community service activities have been carried out at the Al Hadi Banten Islamic Boarding School which is located at Penggalang Village, Ciruas District, Serang Regency, Banten Province, Indonesia. The distance between the target partner and the university, namely Faletahan University, is approximately 13.05 km. Partner locations can be reached in approximately 40 minutes. The target location map can be seen in the image below:

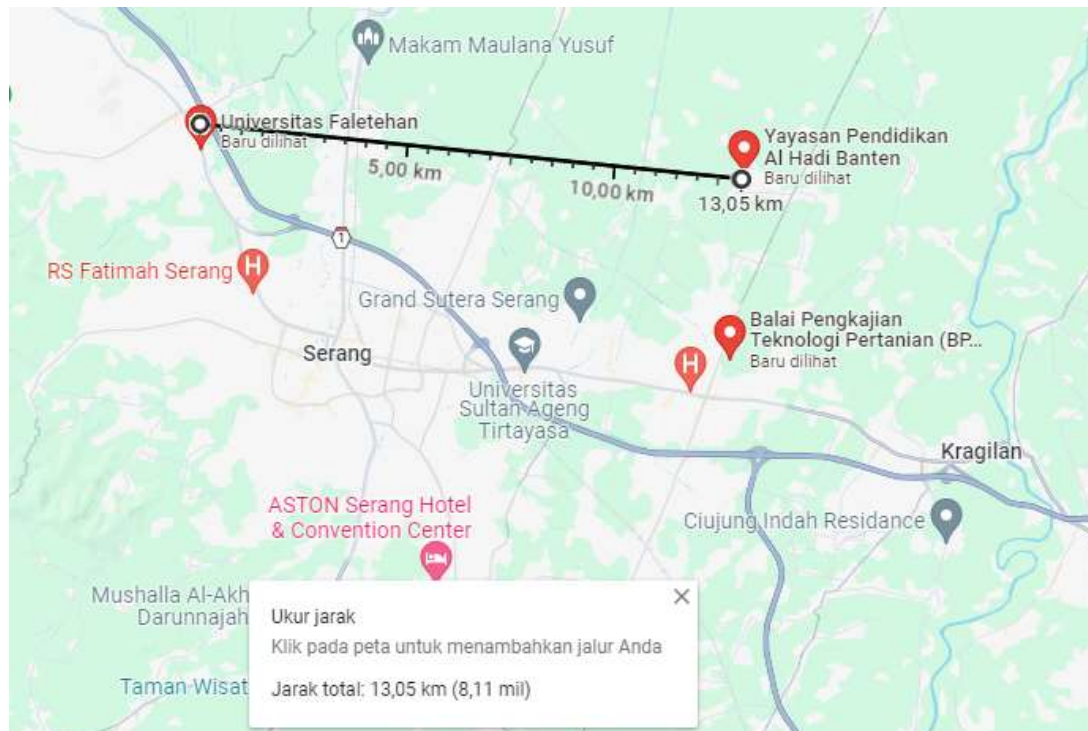


Fig 1. Location of community service activities

The activity was carried out on 1-14 February 2024. The location of the activity is at the Al Hadi Islamic Boarding School, Banten, Kp. Pandangan, Penggalang Village, Ciruas District, Serang Regency, Banten Province. The activity method is Community Development, which is an approach that is oriented towards efforts to develop community empowerment by making the community both the subject and object of development and involving them directly in various community service activities as an effort to increase their participation in development for their own benefit. The targets for this community service activity are 40 young women, consisting of 40 young women as targets for health check activities (nutritional status, Hb) and nutrition education, as well as 12 young women as targets for giving mung bean juice. Community service activities are carried out through health examination, nutrition education, and providing mung bean juice. The steps for Community Service activities consist of :

1. Planning
 - a. Preparation of leaflets/leaflets about nutrition for teenagers
 - b. Assessment and submission of permit application to Al Hadi Islamic Boarding School, Banten
 - c. Scheduling the implementation of community service together with the Islamic boarding school
2. Implementation
 - a. Carrying out a pre-test before providing education about nutrition and giving green bean juice drinks, namely measuring height and weight, checking hemoglobin (Hb) levels in adolescents, as well as measuring the level of knowledge of adolescents regarding nutrition.
 - b. Provide education about nutrition as an effort to prevent anemia in adolescents
 - c. Giving mung bean juice to teenage girls for 1 week
 - d. Carrying out hemoglobin (Hb) level examination posts for teenage girls, as well as measuring the level of knowledge of teenagers regarding nutrition.
3. Evaluation
 - a. Medical check-up : The nutritional status and hemoglobin (Hb) levels of 40 adolescent girls were known
 - b. Nutrition Education : The increase in adolescent girls' knowledge about nutrition increased by 8% and the average value of adolescent girls' knowledge was 88%
 - c. Giving mung bean juice : All young women who were given mung bean juice for 1 week experienced an increase in hemoglobin (Hb) levels and the increase in hemoglobin (Hb) levels in adolescent girls was 100%

4. Reporting
 - a. Preparing reports on community service activities
 - b. Preparation of publication manuscripts for community service activity journals
 - c. Reporting community service activities to research and community service institutions Universitas Faletahan

RESULTS

Table 1. Characteristics of adolescents

Characteristics of adolescents	Frequency	Percentage (%)
School Grade		
7	13	32,5
8	7	17,5
9	14	35
10	6	15
Age		
12	11	27,5
13	7	17,5
14	10	25
15	8	20
16	2	5
17	1	2,5
18	1	2,5
Nutritional status		
Poor	21	52,5
Normal	14	35
Over	5	12,5
Anemic status		
Anemic	9	22,5
Not Anemic	31	77,5

Table 1 shows that the majority of adolescents are in grade 7 (32.5%), the majority of adolescents are 12 years old (27.5%), the majority of adolescents have poor nutritional status (52.5%), and there are still adolescents who experience anemia (77.5%).

Table 2. Teenage knowledge

Teenage knowledge	Frequency	Percentage (%)	Mean (%)
Pre test knowledge			
Poor	8	20	80
Good	32	80	
Post test knowledge			
Poor	5	12,5	88
Good	35	87,5	

Table 2 shows that based on the pre-test results, the majority of teenagers have good knowledge about nutrition, namely (80%), but there are still teenagers who have poor knowledge about nutrition (20%). The post-test results showed an increase in the value of good knowledge by 7.5% from 80% to 87.5%, and a decrease in the value of poor knowledge by 7.5% from 20% to 12.5%. There was also an increase in the average knowledge score between the pre-test and post-test by 8% from 80% to 88%.

Table 3. Adolescent Hemoglobin (Hb) levels

Hemoglobin (Hb) levels	Mean	Mean difference
Pre test	14,32	0,8
Post test	15,12	

Based on table 3, it shows that the mean value of hemoglobin (Hb) levels for teenagers is greater in the post-test results, namely 15.12. There was an increase in the mean value of Hb levels in adolescents by 0.8.



Fig 2a and 2b. Nutrition education activities



Fig 3a, 3b, 3c, 3d. Medical examination



Fig 4. Closing of community service activities

DISCUSSION

Participants were very enthusiastic about the material provided, the leaflet about adolescent nutrition was very helpful so they could read it again at home. Based on the post test results, it shows that there is an increase in knowledge and Hb levels in young women. This shows that the intervention provided, namely in the form of education about adolescent nutrition and providing green bean juice drinks, is effective as an effort to prevent anemia in adolescents.

Anemia among adolescent girls is higher than among adolescent boys. Anemia in adolescents has a negative impact on reducing immunity, fitness and productivity. Apart from that, anemia specifically experienced by young women will have a more serious impact, considering that they are prospective mothers who will become pregnant and give birth to a baby, thereby increasing the risk of death for mothers giving birth to premature babies and low birth weight (LBW) babies ^[10].

One of the causes of anemia in teenagers is a lack of knowledge about anemia. The lack of knowledge among young women about anemia can be intervened by providing anemia education to young women. Knowledge is the result of knowledge obtained by a person after sensing through the five human senses certain objects. This educational activity about nutrition uses the lecture method using leaflet media. By increasing knowledge about nutrition, it is hoped that teenagers will be able to implement anemia prevention behavior in their daily lives, such as consuming mung bean juice ^[11].

Giving mung bean juice can increase hemoglobin levels in teenagers' bodies where the nutritional content of green beans is very complete, so that teenagers whose hemoglobin levels were previously low have increased which we can see in the difference in average hemoglobin levels before and after we give the mung bean juice intervention. Mung bean juice is a food ingredient that contains substances needed for the formation of blood cells and preventing anemia, because the content in mung beans is very complete so it can help the hemopoiesis process (the process of forming blood cells, erythrocytes, leukocytes and platelets). Green beans (*Phaseolus radiatus* L.) are a food ingredient that contains complete nutrients needed for the formation of red blood cells so that they can overcome the effects of decreasing hemoglobin ^[7].

Mung beans (*Phaseolus radiatus* L.) are considered a source of nutrient-dense food. Not only iron, but the amino acid content of mung bean seeds is quite complete, consisting of essential amino acids and also non-essential amino acids, as well as the protein, carbohydrate and fat content in mung beans, which supports the hemoglobin synthesis process. Mung bean juice can be needed for the formation of blood cells and preventing anemia, because the content in mung beans is very complete so it can help the hemopoiesis process (the process of forming blood cells, erythrocytes, leukocytes and platelets) ^[7].

Giving mung bean juice in the study which was given once a day for 7 consecutive days and for a short time did not show maximum results in giving mung bean juice and this study also did not look at inhibiting factors in the process of absorbing iron contained in foods such as polyphenolic compounds such as tannins contained in tea, caffeine and other inhibiting factors ^[7].

There was an increase in knowledge of young women after education about nutrition and increasing hemoglobin (Hb) levels in young women showed that this community service activity was effective and very important to carry out in efforts to prevent anemia in young women.

CONCLUSION

This community service provides many benefits for participants, namely young women, the real form of which is an increase in teenagers' knowledge about nutrition and an increase in teenagers' Hemoglobin (Hb) levels after being given intervention in the form of green bean juice drinks. Providing education about adolescent nutrition and providing green bean juice drinks can effectively prevent anemia in adolescents. It is necessary to develop and carry out routine education and assistance to teenagers about nutrition in schools, for example including nutrition material in extracurricular activities, School Health Business a.k.a Usaha Kesehatan Sekolah (UKS), and so on.

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