

The Relationship Between Protein Consumption and Hemoglobin Levels of Female Students of Universitas Teuku Umar

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ABSTRACT

Anemia is a condition of the body where the hemoglobin (Hb) level in the blood is lower than the normal value, resulting in pallor, weakness, fatigue, dizziness, lack of appetite, decreased fitness, decreased work ability, decreased immunity and impaired wound healing. Protein plays a role in the storage and transportation and absorption of iron. Inadequate protein intake can lead to disturbances in iron metabolism which can affect hemoglobin formation, causing anemia. Adolescent girls are one of the groups that are prone to anemia because adolescent girls experience the menstrual cycle every month. In addition, the condition will be even worse if a woman is married and pregnant, because pregnancy requires more iron for the growth and development of the fetus, which has an impact on infant mortality, abnormal births, low birth weight, and maternal mortality. The purpose of this study was to determine the relationship between protein consumption and hemoglobin levels in adolescent girls. This study used a cross-sectional design and was descriptive analytic. The results of this study showed about 52.7% of respondents had insufficient protein consumption and 60% were anemic. There is a relationship between protein consumption patterns and hemoglobin levels with the value of chi-square statistical test results obtained p value <0.05, namely 0.001.

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Introduction

Anemia is a condition of the body where hemoglobin (Hb) levels in the blood are lower than normal values (Taufiq, 2020). Normal levels of female hemoglobin are 12 - 16 grams / dl. Iron is an important micro mineral in the formation of hemoglobin which functions in the transport, storage and utilization of oxygen. Therefore, iron deficiency generally results in pallor, weakness, fatigue, dizziness, lack of appetite, decreased body fitness, decreased work ability, decreased immunity and impaired wound healing (Purnamasari et al., 2020).

Adolescent girls are one of the groups that are prone to anemia because adolescent girls experience the menstrual cycle every month. During menstruation, it requires more nutrient intake (iron) to replace iron loss during menstruation (Khobibah, et al 2021). In addition, the condition will be even worse if a woman is married and pregnant, because pregnancy requires more iron for the growth and development of the fetus, which has an impact on

infant mortality, abnormal births, low birth weight, and maternal death (Akma, 2020).

The World Health Organization (WHO) in the world health statistics in 2021 shows that the prevalence of anemia in women of reproductive age (15-49) in the world in 2019 ranges as much as 29.9%, the incidence on the African continent is 44.4%, the Asian continent is 25% to 33% and the smallest on the North American continent is 7.6%, thus anemia is one of the health problems in various countries in the world, especially developing countries such as Indonesia. Anemia mostly occurs in adolescent girls and pregnant women, with the prevalence increasing every year.

The results of the 2018 Riskesdas show that the prevalence of anemia in Indonesia is 23.7% with a proportion of 22.7% in urban areas and 25.0% in rural areas and 23.9% of women. Based on age groups, anemia sufferers at the age of 15 - 24 years were 32.0%, and in adolescent girls and women of childbearing age 13 - 49 years were 22.7% each. In

Aceh, the number of adolescents experiencing anemia is 32%.

Protein is a nutrient that is very important for the body, because it functions as a source of energy, building and regulating substances. The protein requirement for adolescent girls aged 16-29 years is 65-75 grams/day. The proportion of vegetable protein intake is 60-80% and animal protein is 20-40% of protein needs. The human body cannot store excess protein, if excess protein intake will be stored by the body in the form of triglycerides (Febriani, 2019).

Animal protein sources are the largest contributor to iron compared to vegetable protein sources (World Health Organization, 2018). Protein plays a role in the storage and transportation and absorption of iron. Inadequate protein intake can lead to disturbances in iron metabolism which can affect hemoglobin formation, causing anemia (Mulyati, 2017).

According to the Ministry of Health (2018) anemia occurs for various reasons, such as lack of protein intake, iron (Fe), vitamin C, folic acid and vitamin B12. The thing that underlies anemia in adolescent girls is the lack of knowledge about the importance of intake containing protein and Fe and vitamins that increase iron absorption, one of which is vitamin C, which makes the prevalence of anemia in adolescents even higher. Diverse intake plays an important role in overcoming anemia, intake that is not diverse can make adolescents more susceptible to anemia.

Pratiwi (2016) states that protein also has an important role in iron transportation in the body. Lack of protein intake will result in delayed iron transportation so that iron deficiency will occur which will cause anemia.

A study shows that protein intake is associated with anemia in adolescent girls with a pvalue of 0.031 (Farinendya et al, 2019). Some studies show that protein affects the incidence of anemia due to the lack of protein intake consumed by adolescents, causing anemia as in research (Soedijanto et al, 2015).

Based on research by Nugroho, 2015, the results of chi square analysis showed that there was a significant relationship between vegetable protein intake and the incidence of anemia ($p=0.002$). The conclusion of this study is that vegetable protein intake plays a role in the risk of anemia in vegan WUS.

Based on the above background, the researcher wants to know the relationship between protein consumption and hemoglobin levels in Teuku Umar University students.

Method

This research is an analytic observational study that uses a cross sectional study design. The research was conducted at Teuku Umar University, with a research sample of 55 people selected by simple random sampling method. Data collection was carried out in January 2022. The independent variable of this study is protein intake and the dependent variable is hemoglobin levels in students. Primary data sources were collected directly from the sample through interviews and laboratory examinations. The data interviewed, namely protein intake data, was carried out using a 24-hour recall form questionnaire for three days. The data collected includes data on food and beverages consumed in detail (both raw and cooked, processing methods, types, food consumed is processed food). To determine hemoglobin levels by using a digital hemoglobinometer (easy touch) which is done directly to the respondent.

Results

Table 1. Frequency distribution of protein intake in Teuku Umar University students

No	Protein intake	Amount	
		n	%
1	More	3	5,5
2	Normal	23	41,8
3	Less	29	52,7

Based on table 1 above, it is known that the average protein adequacy is 48 grams with the minimum protein adequacy is 31 grams and the maximum value is 67 grams.

Table 2. Frequency distribution of hemoglobin levels in Teuku Umar University students

No	Hemoglobin level	Amount	
		n	%
1	Anemia	33	60
2	Not anemic	22	40

Based on table 2 above, it is known that the average hemoglobin level is 11 with the minimum hemoglobin level is 8 and the maximum value is 13.

Table 3. Analysis of the relationship between protein consumption patterns and hemoglobin levels in Teuku Umar University students

No	Protein intake	Hemoglobin level				Amount	%	P
		Anemia		Not Anemic				
		n	%	n	%			
1	Less	29	52,7	0	0	29	52,7	0,001
2	Normal	3	5,5	20	36,4	23	41,9	
3	More	1	1,8	2	3,6	3	5,4	
Amount		33	60	22	40	55	100	

Based on table 3 above, it is known that as many as 29 (52.7%) anemic respondents with insufficient protein consumption patterns, 3 (5.5%) respondents with normal consumption patterns, and 1 (1.8%) respondent with more categories. As for respondents who were not anemic with a consumption pattern of less 0 (0%), as many as 20 (36.4%) respondents with normal consumption patterns and 2 (3.6%) respondents with more categories. The results of the chi-square statistical test obtained a p value <0.05, so there is a significant relationship between protein consumption patterns with hemoglobin levels.

Discussion

Adolescent girls generally have unhealthy eating habits and eating patterns that are wrong such as not consuming balanced meals, eating irregularly, often consuming fast food, and a low-nutrient diet by limiting food intake that ignores sources of protein, fat, carbohydrates, vitamins, and minerals. These eating habits can cause adolescents to be unable to fulfill the diversity of nutrients, which will result in a lack of various nutrients needed by the body (Suryani, 2016).

In early adolescence, the protein needs of adolescent girls are higher than boys, because adolescent girls enter the growth period faster (Mamidi, 2016). As they age, adolescent girls will gain weight by tending to accumulate fat while adolescent boys gain weight by increasing muscle and skeletal mass (Carrasco, 2018). Thus, the protein requirement in adolescent girls is lower compared to adolescent boys.

Adolescent girls who have inadequate levels of protein intake over a long period of time can cause retardation of linear growth and sexual maturation, decreased muscle mass, organ function and immunity, inhibited iron transport as well as a reduction in fat-free body mass (Ozdimer, 2016).

Various factors affect hemoglobin levels including nutritional intake, excessive bleeding, infectious diseases, nutritional status, and chronic diseases such as tumors and spinal cord destruction, kidney disease, sickle cell disease, and heart failure (Sherwood, 2011). Hemoglobin is an iron-rich protein. Globin from hemoglobin is broken down into amino acids for use as protein in tissues iron in hemoglobin is removed for use in the formation of red blood cells. Protein also functions to transport iron through transferring. Lack of protein intake can lead to impaired iron transport as well as hemoglobin and red blood cell formation, which can eventually lead to iron deficiency anemia. This study is in line with Pratiwi's research in 2016 and Solicha in 2018 which shows protein intake and anemia in adolescent girls are related. Adequate protein intake will help the process of iron transport for hemoglobin formation so that there is no iron deficiency which will cause anemia. Respondents have protein intake that is still lacking. If protein intake is lacking, the absorption of iron in the body

will be inhibited and over time it will cause iron deficiency.

This study is in line with research conducted by Soedijanto (2015), which states that there is a significant relationship between protein consumption and the incidence of anemia. This study is also in line with research conducted by Mulyati (2017) which states that the most influential factor on the incidence of anemia is protein intake.

This study is not in line with research conducted by Andarina (2017), which states that the absence of a relationship between protein intake and hemoglobin levels in the study is likely due to protein intake itself being influenced by several factors such as body weight, age, and protein quality in food consumption patterns. The composition and number of amino acids will affect the quality of protein. Animal protein has more essential amino acids and is more complete than vegetable protein so that the quality of protein in animal food is better than vegetable food.

Conclusion

This study concluded that there is a relationship between protein consumption patterns and hemoglobin levels with the value of the chi-square statistical test results obtained a p value <0.05, namely 0.001. This is because the average protein consumption of respondents in the less category where it can affect a person's hemoglobin levels. If this is not handled immediately, it is feared that it will have a negative impact on young women who will become prospective mothers later. Therefore, researchers recommend that it is necessary to increase health promotion efforts to the community about the risk of anemia and young women should pay attention to food intake by choosing healthy, diverse, and nutritious types of food in order to meet their nutritional needs.

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Author Contribution and Competing Interest

The author's contribution to this research includes designing a research project, collecting data or analyzing results, and preparing or revising scientific papers.

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