

EFFECTIVENESS OF CHICKEN EGGS (PULLUM) CONSUMPTION ON HEMOGLOBIN LEVELS IN ADOLESCENT WOMEN

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ABSTRAK EFEKTIFITAS KONSUMSI TELUR AYAM (PULLUM) TERHADAP KADAR HEMOGLOBIN PADA REMAJA PUTRI

Latar Belakang Anemia merupakan salah satu masalah yang dihadapi oleh remaja di Indonesia. Anemia di kalangan remaja perempuan lebih tinggi dibandingkan dengan remaja laki-laki, yang diakibatkan oleh kekurangan zat besi. Telur kaya akan protein dan zat besi. Anemia di kalangan remaja perempuan lebih tinggi dibandingkan dengan remaja laki-laki, yakni sekitar 12% remaja laki-laki dan 23% remaja perempuan yang mengalami anemia. Sebagian besar anemia pada remaja diakibatkan oleh kekurangan zat besi.

Tujuan Penelitian ini yaitu untuk mengetahui pengaruh konsumsi telur ayam ras terhadap kadar hemoglobin remaja putri kelas XI di SMA Spektrum Manado.

Metode Desain penelitian menggunakan quasi eksperimen dengan one group pre-test – post-test desain. Populasi penelitian ini yaitu 23 remaja putri kelas XI di SMA Spektrum Manado, dengan menggunakan total sampel yang berjumlah 20 sampel. Analisis bivariat menggunakan uji paired t test.

Hasil penelitian menunjukkan bahwa ada perbedaan rata-rata kadar hemoglobin remaja putri kelas XI di SMA Spektrum Manado sebelum konsumsi telur ayam ras yaitu sebesar 13,58 gr% dan rata-rata kadar hemoglobin sesudah konsumsi telur ayam ras sebesar 14,80 gr%. Hasil analisis bivariat menggunakan paired t test mendapatkan nilai p value = 0,001.

Kesimpulan terdapat pengaruh yang signifikan antara konsumsi telur ayam ras terhadap kadar hemoglobin remaja putri kelas XI di SMA Spektrum Manado.

Disarankan siswa perempuan untuk mengkonsumsi telur ayam ras rebus 1 butir/hari sebagai salah satu upaya untuk mencegah anemia.

Kata Kunci : Kadar hemoglobin, remaja putri, telur

ABSTRACT

Background: Anemia is one of the problems faced by adolescents in Indonesia. Anemia among adolescent girls is higher than that of male adolescents, caused by iron deficiency. Anemia among adolescent girls is higher than that of male adolescents, is about 12% of male adolescents and 23% of female adolescents with anemia. Most anemia in adolescents is caused by iron deficiency. In this case, eggs are rich in protein and iron.

Purpose to determine the effect of consumption of Purebred eggs on hemoglobin levels in adolescent girls of class XI at SMA Spektrum Manado.

Method: The study used a quasi-experimental one-group pre-test – post-test design. The population of this study was 23 adolescent girls in class XI at SMA Spektrum Manado, using a total sample of 20 samples. In addition, bivariate analysis employed paired t-test.

The results showed a difference in the mean hemoglobin level of class XI adolescent girls at SMA Spektrum Manado before consuming Purebred eggs of 13.58 gr% and the mean hemoglobin level after consuming Purebred eggs of 14.80 gr%. The bivariate analysis results using paired t-tests obtained a p-value = 0.001.

Conclusion: There was a significant effect between Purebred eggs' consumption on adolescent girls' hemoglobin levels in class XI at SMA Spektrum Manado.

Suggestion that female students consume boiled chicken eggs 1 egg/day to prevent anemia.

Keywords: Adolescent girls, eggs, hemoglobin levels

INTRODUCTION

Anemia is one of the problems faced by adolescents in Indonesia. Anemia among adolescent girls is higher than that of male adolescents, about 12% of male adolescents and 23% of female adolescents. Most anemia in adolescents is caused by iron deficiency (Kemenkes RI, 2018).

On the other hand, hemoglobin (Hb) is a dye in red blood useful for transporting oxygen and carbon dioxide in the body. Hemoglobin is also a bond between proteins, iron salts, and dyes. Here, iron is an essential element to form hemoglobin (Hb). Further, the Hb level is the most easily used parameter in determining anemia status on a wide scale (Merryana, 2016).

The prevalence of anemia in adolescents is 27% in developing countries and 6% in developed countries. One of the causes of anemia during pregnancy is anemia in adolescence that is not treated and handled properly (Sudargo, 2018).

Women of childbearing age tend to suffer from anemia because they experience menstruation every month, and it will be exacerbated if iron intake from daily food is low. Women who experience iron deficiency anemia will get sick easily because of a low immune system, so their work productivity is low (Kemenkes RI, 2016).

Data from Basic Health Research (Riskesmas) in 2013 revealed that the prevalence of anemia in Indonesia was 21.7% of the Indonesian population. Based on age group, the prevalence of age 5-14 years was 26.4%, age 15-24 was 18.4%, and women with anemia were 23.9%. Meanwhile, according to Riskesdas data in 2018, the prevalence of anemia in pregnant women was 48.9%, and pregnant women with anemia aged 15-24 years was 84.6% (Riskesdas, 2013).

Moreover, eggs have a high nutritional content of high-quality protein. The mean egg protein content is 12-16%, or about 7-8 grams of protein in one large egg. Eggs also contain a very important micro-mineral, namely iron, zinc, and selenium. In addition, eggs contain iron, which is quite good. The iron content of eggs is 1.04 mg in whole eggs and 0.72 mg in egg yolks (Sugita & Supiati, 2016).

Based on research by Karyati, there were differences in egg consumption on the increase in Hb levels in the intervention group and the control group after being given treatment (Karyati, 2016).

Further, the government's efforts in preventing and overcoming anemia in adolescent girls and women of childbearing age, according to WHO recommendations in 2011, are focused on promotion and prevention activities, namely

increasing consumption of iron-rich foods, supplementing blood-added tablets, increasing fortification of foodstuffs with iron, and treatment of participant disease. Professional organizations and the private sector are also expected to support comprehensive promotive and preventive activities to reduce the prevalence of anemia in adolescent girls and women of childbearing age (Directorate of Community Nutrition, Ministry of Health, RI).

Based on the Strategic Plan of the Ministry of Health for 2015-2019, the target of the nutrition and maternal and child health program is to increase the availability and affordability of quality health services for the entire community to achieve the strategic goal, namely improving the health status of the community, with one of the indicators of achieving the target being the percentage adolescent girls who received added-blood tablets by 30%.

The preliminary study conducted at SMA Spektrum Manado obtained data from the principle that the total number of students was 166, consisting of 53 female students and 113 male students. There were 11 female students in class X, 23 in class XI, and 19 students in class XII. The examination of hemoglobin levels on 23 adolescent girls revealed two students with <12 g%, included in the anemia category, and 21 other students with hemoglobin levels of 12 g%, included in the non-anemic category.

For this reason, this study aimed to determine the effect of consumption of Purebred eggs on the hemoglobin levels of adolescent girls in class XI at SMA Spektrum Manado.

RESEARCH METHODOLOGY

To prove the effect of Purebred eggs on the hemoglobin levels of class XI adolescent girls at SMA Spektrum Manado, the researchers used a quasi-experimental type of research. In this study, the researchers gave the consumption of Purebred chicken eggs to adolescent girls in class XI at SMA Spektrum Manado for 14 days.

This research design used one group pre-test – post-test design. The independent variable in this study was the consumption of Purebred eggs, while the dependent variable was the hemoglobin level of adolescent girls. The sample in this study was observed by measuring hemoglobin levels before being given treatment. Then, after being treated, the sample was observed again.

The population of this study was 23 adolescent girls in class XI at SMA Spektrum Manado, using a total sample of 20. The data analysis used was univariate in frequency distribution

and percentage, while bivariate analysis utilized paired t-tests.

This research has gone through the ethics commission by obtaining a certificate of ethical conduct.

RESEARCH RESULTS

Univariate Analysis

The description of the variables studied includes the category of anemia before and after the consumption of Purebred eggs in class XI adolescent girls at SMA Spektrum Manado, which can be seen in Table 1 below:

Before intervention

Table 1
Distribution of the Anemia Category for Adolescent Girls in Class XI at SMA Spektrum Manado Before Consumption of Purebred Chicken Eggs in 2019

Category	Frequency (f)	Percentage (%)
Anemia	2	8.70
No anemia	21	91.30
Total	23	100

Based on Table 1, it can be seen that the distribution of the initial anemia category (pre-test) before being given the consumption of Purebred eggs in class XI adolescent girls at SMA Spektrum

Manado was with hemoglobin levels mostly in the non-anemic category with a total of 21 respondents (91.30%).

After the intervention

Table 2
Distribution of the Anemia Category for Adolescent Girls in Class XI at SMA Spektrum Manado After Being Given Consumption of Purebred Chicken Eggs in 2019

Category	Frequency (f)	Percentage (%)
Anemia	0	0
No anemia	23	100
Total	23	100

Based on Table 2, it can be seen that the distribution of anemia category (post-test) after being given the consumption of Purebred eggs in class XI adolescent girls at SMA Spektrum Manado was a total of 23 respondents (100%) in the non-anemic category.

Bivariate Analysis

Paired T-Test Results

The bivariate analysis results to determine the effect of consumption of Purebred eggs on class XI female students at SMA Spektrum Manado are presented in the following table:

Table 3
Analysis Results of Hemoglobin Levels for Adolescent Girls in Class XI at SMA Spektrum Manado Before and After Consumption of Purebred Chicken Eggs in 2019

Variable	n	Mean	SD	Min	Max	P-value
Hemoglobin level before consumption of Purebred eggs	23	13.58	1.1186	11.9	12.5	0.001
Hemoglobin level after consumption of Purebred eggs	23	14.80	1.0969	12.5	15.8	

In Table 3, it is known that the minimum value before the intervention was 11.9 gr%, and the maximum value was 12.5 gr%, while after the intervention, the minimum value was 12.5 gr%, and the maximum value was 15.5 gr%. The respondent's hemoglobin level mean before consuming Purebred eggs was 13.58 gr%, and the mean hemoglobin level after consuming Purebred eggs was 14.80 gr%. It indicates a mean difference of 1.22 gr%. It denotes an increase in the mean hemoglobin level of the respondents before and after consumption of Purebred eggs.

The data analysis results using paired t-tests obtained a probability value smaller than the level of significant 5% (0.001 <0.05). Thus, it can be concluded that there was a significant effect of

consumption of Purebred eggs on the increase in hemoglobin levels in adolescent girls of class XI at SMA Spektrum Manado.

DISCUSSION

Univariate analysis showed the initial hemoglobin level examination results before giving the consumption of broiled chicken eggs to adolescent girls in class XI at SMA Spektrum Manado, with hemoglobin levels mostly in the value 12.1 -13.0 in seven respondents (30.4%). Meanwhile, the hemoglobin level examination after consumption of Purebred eggs in class XI adolescent girls at SMA Spektrum Manado revealed that hemoglobin levels were mostly in the value 14.1 - 15.0 in nine respondents (39.1%). Furthermore, the

mean hemoglobin level of the respondents before consuming Purebred eggs was 13.58 gr%, and the mean hemoglobin level after consuming Purebred eggs was 14.80 gr%. It means a mean difference of 1.22 g%, indicating an increase in the mean hemoglobin level of the respondents before and after consumption of Purebred eggs.

The bivariate analysis results to determine the effect of consumption of Purebred eggs on the hemoglobin levels of adolescent girls in class XI at SMA Spektrum Manado by using the paired t-test showed a p-value of $0.001 = <0.005$. It means a significant effect between Purebred eggs' consumption on adolescent girls' hemoglobin levels in class XI at SMA Spektrum Manado. The results of this study are in line with the research conducted by Batubara on 30 students of SMPN 15 Medan with the intervention of giving egg consumption for 21 days, concluding that there was a difference in hemoglobin levels before and after the intervention of giving eggs to students of SMPN 15 Medan, with a p-value of 0.000.

According to Santika (2020), the protein content in eggs is large enough to help the process of skin regeneration and healing by accelerating the granulation of injured skin after childbirth. In the intervention group with eggs, wound healing was good, with a score of 1-2, so it can be concluded that egg intervention was very effective in accelerating wound healing, but it would be even better if given for a long time. Based on the research results conducted by Ririn W (2019) at Puskesmas Teling Atas, Manado City, on 30 respondents for 14 days with the intervention of one boiled chicken egg/day, it was found that there was an effect of consuming boiled chicken eggs on increasing hemoglobin levels of pregnant women in the third trimester, with the results of the mean hemoglobin level being 10.1 g/dL for pre-test and 10.6 g/dL for post-test in the intervention group and pre-test of 9.7 gr/dL and post-test of 9.9 gr/dL in the control group (Suhendi, 2020).

The results of previous studies also showed an increase in hemoglobin levels, namely 0.26 (0.17) g/dl (95% CI 0.1375 – 0.3825). The statistical test results obtained a p-value of 0.001, which means an effect of egg consumption on increasing Hb levels in anemic adolescent girls in Tanjung Ratu Village, Central Lampung (Sari and Fitriyana, 2021).

Another study uncovered a difference in the mean hemoglobin level of class VIII female adolescents at SMP Muhammadiyah 1 Manado before being given the intake of boiled chicken eggs of 10.73 gr% and the mean hemoglobin level after consumption of Purebred eggs of 12.30 gr%. The bivariate analysis results using paired t-test obtained

a p-value = 0.001, smaller than the level of significant 5% ($0.001 < 0.05$). It signifies a significant effect between the intake of boiled chicken eggs on the hemoglobin level of adolescent girls in class VIII at SMP Muhammadiyah 1 Manado.

To measure the nutritional status of adolescents, BMI (body mass index) according to age was used, where BMI is known whether a teenager's weight is said to be underweight, normal, or overweight. BMI is known as body weight divided by 2 times height (Sofiah, 2020).

Lack of protein intake also occurred in female students at SMK Yamas, East Jakarta, mostly caused by female students' anxiety if they gained weight after consuming animal protein. Snacks at school also did not contain enough animal protein. Several stalls sold small amounts of vegetable protein in the form of tempeh, fried tofu, and boiled peanuts. Most stalls that sold high carbohydrates foods were seblak, various crackers, vermicelli soto, gado-gado, and ketoprak. In this case, to prevent a lack of protein intake, respondents should bring lunch from home. Respondents who did not like fish and beef could replace them by consuming more vegetable side dishes (Tania, 2018).

Research in Padang revealed that the mean hemoglobin before treatment was 11.107 g/dl, and after treatment was 13.040 g/dl. After the paired sample t-test was performed, the mean difference before and after treatment was 1.9333 g/dl with a p-value = $0.000 < 0.05$. Hence, there was an effect of consuming red guava juice and boiled chicken eggs on increasing hemoglobin levels in Midwifery DIV Study Program students, Poltekkes Kemenkes RI Padang (Putri, 2018).

Moreover, each milliliter of blood contains 0.5 mg of iron, and iron loss is estimated from 0.5 to 1 mg/day. In adolescent girls experiencing menstruation, the iron loss is around 15 to 28 mg/month. Insufficient amount of iron in the diet occurs because vegetables still dominate the food consumption pattern of Indonesian society as a source of iron that is difficult to absorb, and animal food is rarely consumed in rural communities (Almatsier, 2010). 2010).

In the study by Sari (2020), from the dependent t-test of hemoglobin levels in the intervention group, the p-value was 0.000, and the control group got a p-value of 0.000, while the p-value of cholesterol in the intervention group was 0.012 and the p-value of the control group was 0.003. Thus, it can be concluded that there was an effect of quail eggs on hemoglobin and cholesterol levels. The independent t-test results revealed a difference in hemoglobin p-value of 0.001 and a difference in

cholesterol p-value of 0.002, so it can be concluded that there was a significant difference between the consumption of quail eggs on hemoglobin and cholesterol levels (Sari, 2020).

Another study found that the mean hemoglobin level in young women before being given boiled free-range chicken eggs and papaya fruit was 13.5 g/dL, and after being given boiled free-range chicken eggs and papaya fruit was 14.2 g/dL, with a p-value of 0.000. In other words, there was an effect of giving boiled free-range chicken eggs and papaya fruit on increased hemoglobin levels in adolescent girls at the Tahfiz Alquds Putri Islamic Boarding School, Pekanbaru City. It is recommended to provide foods that contain lots of iron and vitamin C to avoid anemia in students because anemia will affect their interest and learning achievement (Risa, 2021).

Other data on iron consumption and nutritional knowledge were taken using a semi-quantitative food frequency questionnaire (FFQ). Data processing and analysis used the Chi-Square test. The prevalence of anemia in adolescent girls in Bogor City was 20.9% (36/172). Consumption of food sources of iron, such as chicken liver, eggs, fish, and meat, was still rarely consumed by adolescents from women. Almost all female students' nutritional adequacy of iron was still low (97%). In addition, consumption of vegetables and fruit sources of vitamin C as enhancers was also still very low (33.7%). However, the correlation analysis results stated that the consumption of iron, vitamin C, protein, and nutritional status were not associated with anemia status. Anemia status in Bogor City was in the moderate category, and there was no relationship between iron intake and the incidence of anemia (Permata, 2020).

Moreover, the paired sample t-test showed that the mean difference before and after treatment was 1.9563 gr/dL, with a p-value = 0.000 < 0.05. It was concluded that there was an effect of giving boiled chicken eggs and papaya fruit to increase hemoglobin levels in anemic female students. Suggestions for teachers of SMP Negeri 22 Kerinci students who experienced mild anemia to invite their students to consume boiled chicken eggs and papaya fruit as an alternative to overcoming mild anemia experienced by students (Susanti, 2019).

Hasil uji statistik dengan menggunakan Chi Square pada $\alpha=0,05$ didapatkan nilai P sebesar 0.00 ($p \leq 0,05$) yang

In addition, statistically, there was a significant relationship between nutritional status and the incidence of anemia in SMK Negeri 1 Rangkasbitung in 2018. Meanwhile, the OR value =

141 means that adolescents with non-ideal nutritional status have a 141 times greater risk of developing anemia than adolescents with ideal nutritional status (Yuhana, 2019). Here, eggs contain tons of vitamins and minerals that the body needs, including vitamin A, riboflavin, folic acid, B6, B12, choline, iron, calcium, and phosphorus. The nutritional content of eggs is also rich in high protein (Wirakusumah, 2015). The results of that study are in line with research conducted by Putri (2017) with the title of giving boiled chicken eggs to 19-year-old girls with iron deficiency anemia. The study results and observation found an increase in Hb levels from 9.3 g/dL (before administration) to 10.8 g/dL (after 15 days). The results also showed that boiled chicken eggs and additional vitamin C could increase hemoglobin (Hb) levels (Putri, 2017).

For this reason, chicken eggs can be an option to be used on a menu to increase hemoglobin. The iron content in eggs is actually not comparable to the iron content in red meat, but eggs are quite effective in reducing inflammation. It is because eggs have a beneficial composition of vitamin A, which works well enough to relieve inflammation. Eggs can also be highly recommended for people with inflammation or iron deficiency anemia (Sari, 2021). In addition, eggs are one of the foods with high-quality protein because eggs have a complete amino acid composition, so they are often used as a benchmark in determining the quality of protein from various other food ingredients.

On the other hand, hemoglobin in the blood consists of amino acids and iron and lipoproteins, which are composed of amino acids and fats. In this case, eggs also have a protein composition that is easily absorbed by the body. In addition, eggs are also a popular, inexpensive, and widely used food in the household or commercial bread making. Eggs also contain vitamin B complex and vitamins A and D (in egg yolks) and contain many nutrients that are very important for health and disease prevention (Karyati, 2016). In one chicken egg, there are several nutrients, such as 152 calories, 12.6 grams of protein, 1 gram of carbohydrates, and 11 grams of fat. One egg also contains 6.6 mg of iron, divided from 0.3 mg in egg whites and 6.2 in egg yolks. Likewise, Ze contained in one chicken egg is 6.1 mg, divided into 0.3 mg in egg yolks and 5.9 mg in egg whites. Besides, there is 5.9 mg of selenium in one chicken egg, divided into 1.7 mg in egg whites and 4.3 mg in egg yolks (D. P. RI, 2010 in Purba, 2020).

Furthermore, iron nutritional anemia is caused by the emptying of iron reserves in the body so that the formation of hemoglobin is disrupted. Hemoglobin is the part of red blood cells used to

determine anemia status. Meanwhile, iron is the main element needed for the formation of hemoglobin. Iron in the body is always related to protein because protein functions to transport iron throughout the body (Khatimah, 2017).

In this study, the nutritional content of eggs was proven to be rich in high-quality protein. The mean protein content of eggs is 12-16%, or about 7-8 grams of protein in one egg. Eggs also contain a type of micro-mineral that is very important, namely iron, zinc, and selenium. The increase in hemoglobin levels in respondents compared to before the intervention was due to the body getting its nutritional intake in the form of egg protein, where this protein could provide iron to the body, and during observation, respondents obeyed and regularly consumed chicken eggs for 14 days according to the recommendation, so hemoglobin levels in the respondent's body increased.

CONCLUSION

There was an effect of consumption of Purebred eggs on the hemoglobin level of adolescent girls in class XI at SMA Spektrum Manado, using a paired t-test with a p -value = 0.001 < 0.05.

SUGGESTION

For the research site, it is hoped that the SMA Spektrum Manado will coordinate with health workers/village midwives and the Puskesmas to provide information to female students about consuming boiled Purebred chicken eggs to prevent anemia. It is also hoped that the respondents can provide knowledge and experience about the effect of broiled chicken eggs on the hemoglobin levels of adolescent girls, and it is suggested to the respondents to consume boiled chicken eggs to prevent anemia.

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