



# The Effect of Nutrition Education Using Pocketbook Media on Iron and Protein Intake

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## Abstract

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**BACKGROUND:** The provision of nutrition education for teenage girls is an alternative to increase protein and iron intake to prevent anemia.

**AIM:** This study aims to determine nutrition education's effect using pocketbook media on protein and iron intake in teenage girls.

**METHODS:** The research design used was quasi-experimental with a control group pre- and post-test design. Sampling was done by the purposive sampling method – statistical analysis using paired samples t-test, Wilcoxon, independent samples t-test, and Mann–Whitney.

**RESULTS:** This study indicates an influence of nutrition education using pocketbook media on protein intake ( $p = 0.000$ ) and iron ( $p = 0.000$ ) in the treatment group. There is no effect of nutrition education using PowerPoint on protein intake ( $p = 0.326$ ) and substances iron ( $p = 0.52$ ) in the control group. Statistically, there was a significant difference between the treatment and control groups' protein intake ( $p = 0.000$ ) and iron ( $p = 0.001$ ).

**CONCLUSION:** It is recommended that UKS and students conduct nutrition education routinely so that the nutrition information delivered can be given to all students in the school to prevent nutritional anemia.

## Introduction

Adolescence is a time of rapid change in terms of physical, cognitive, and psychosocial growth. These changes affect nutritional needs [1]. Rapid growth in adolescents has consequences for increasing dietary requirements to keep up with the growth.

Teenage girls are prone to nutritional problems, and the problem is anemia [2] because they have menstruation every month and cause the number of iron nutrients lost during menstruation. The lack of iron intake is also the cause of anemia [3]. Teenage girls are usually very attentive to body shape, limiting food consumption and many dietary restrictions. If the food intake is less, many iron reserves are dismantled, accelerating anemia [4].

A lack of protein and iron will result in a person experiencing iron deficiency anemia. Protein plays a key role in the synthesis of hemoglobin and the transportation of iron in the body. Lack of protein intake will result in iron transport being hampered, so there will be iron deficiency [5].

According to data from Riskesdas (Basic Health Research) in 2018, shows that the prevalence of anemia

in women in Indonesia is 27.2%, with anemia aged 5–14 years of age 26.8% and patients aged 15–24 years by 32% [6]. Factors behind the high prevalence of anemia include social conditions, behavior, lack of iron intake, and knowledge of anemia [7].

Septiani's research in 2019 stated that the intake of protein and iron of teenage girls is still classified as less than 60% RDA [8]. Total Diet Survey 2014 of Indonesia showed, the average protein intake of adolescent girls aged 13–18 years in the urban province of West Java is 54.6% [9].

Increasing the intake of protein and iron requires good knowledge for adolescents. One of the most important factors in improving knowledge is conveying information tailored to the target's needs using suitable health promotion media. Good nutritional understanding is expected to indirectly affect adolescent eating habits to impact the level of nutritional adequacy of adolescents [10].

The role of nutrition education is necessary to increase adolescent nutrition knowledge regarding the selection of food consumed to prevent deviations in eating behavior. Efforts to reduce iron nutrition anemia are by increasing knowledge through nutrition education

using pocketbook media. The adolescent age group is a strategic target group to overcome anemia because adolescents are still learning and curious. It is easier to absorb knowledge.

According to the results of Kusudaryati *et al.* research (2016) stated that providing nutritional education with media booklets effectively increases the average iron intake in teenage girls at Senior High School called SMAN 1 Simo Boyolali [11]. Meanwhile, according to the results of Zaki's research (2019) stated that there is an increase in average protein intake before and after nutrition education in teenage girls with less chronic energy (KEK) in Senior High School called SMAN 5 Purwokerto [12]. Based on their research, that states nutrition education with media booklet can increase nutrition intake. The weakness of the booklet media is that it cannot be carried everywhere because of its large size, so it needs to be replaced with a smaller form such as a pocket book. This study aims to determine nutrition education's influence using pocketbook media on protein and iron intake in teenage girls.

## Methods

The research design used in this study is quasi-experimental with a control group pre- and post-test design. This study sample was 50 samples (25 treatment groups and 25 control group samples) conducted with the purposive sampling method. This research was in 2020 at Senior High School called SMKN 11 Bandung for the treatment and control groups. The intervention was carried out 3 times within 2 weeks. The media used are a pocketbook and PowerPoint slides used for nutrition education. Pocketbooks and nutrition education were given to the treatment group, while the control group received nutrition education without a pocketbook. Protein and iron intake is measured using a 1 × 24 h food recall form questionnaire. This study's statistical analysis was paired samples t-test, Wilcoxon, independent t-test, and Mann-Whitney U-test, and has obtained an ethics review with No. 09/KEPK/PE/ II/2020.

## Results

The results of this study are processed univariate and bivariate. Univariate consists of the sample's characteristics based on age, protein intake value, and iron intake value. Table 1 indicates characteristics based on age.

The results of the sample characteristic based on age in Table 1 show that the sample age is in the range of 15–16 years.

**Table 1: Distribution preview sample based on age**

Age (years)	Group			
	Treatment		Control	
	n	%	n	%
15	14	56.0	11	44.0
16	11	44.0	14	56.0
Total	25	100.0	25	100.0

The sample treatment group was dominated by 15 years with as much 56%. The sample control group was dominated by 16 years old with a percentage of as much 56%.

Based on the analysis results in Table 2, there was an increase in the average intake of protein and iron in the treatment group, namely, protein intake from 41.11 g to 64.0 g and iron intake from 10.2 mg to 16.9 g after the intervention. There was an increase in the average intake of protein and iron in the control group, namely, protein intake from 36.0 g to 39.0 g and iron intake from 8.9 g to 11.1 g after the intervention.

**Table 2: Value protein and iron intake before and after nutrition education in treatment and control groups**

Variable	Group	Pre-test			Post-test		
		Mean	Min-Max	SD	Mean	Min-Max	SD
Protein Intake	Treatment	41.1	11–76.7	14.8	64.0	38.4–110.5	18.3
	Control	36.0	18.4–65.6	11.8	39.0	13.2–89	15.4
Iron Intake	Treatment	10.2	2.4–16.5	3.9	16.9	7.2–33.6	5.7
	Control	8.9	2.5–16.9	3.7	11.1	2.7–24.6	5.7

Based on the analysis in Table 3, nutrition education is influenced using pocketbook media on protein and iron intake in the treatment group with  $p \leq 0.001$  and  $p \leq 0.001$ . While in the control group, there is no influence of nutrition education using PowerPoint media on protein and iron intake with  $p = 0.326$  and  $p = 0.052$ .

**Table 3: Differences in average protein and iron intake value before and after nutrition education in treatment and control groups**

Variable	Group	Average		Value p
		Pre-test	Post-test	
Protein intake	Treatment	41.11	64.04	<0.001 <sup>1</sup>
	Control	36.03	39.06	0.326 <sup>1</sup>
Iron intake	Treatment	10.21	16.97	<0.001 <sup>2</sup>
	Control	8.92	11.19	0.052 <sup>2</sup>

<sup>1</sup>Wilcoxon, <sup>2</sup>paired samples t-test

Based on the analysis (Table 4), there was an average difference in protein intake at the end of the study treatment and control group with  $p = 0.003$ . There was an average difference in iron intake at the end of the study treatment and control group with  $p = 0.023$ .

**Table 4: Differences in average changes in protein and iron intake after nutrition education between treatment and control groups**

Variable	Group				Value p
	Treatment		Control		
	Mean rank	Median (min-max)	Mean rank	Median (min-max)	
Protein intake	22.92	21.6 (-30.6–78.1)	3.02	5.5 (-40.6–56.0)	0.003 <sup>1</sup>
Iron intake	6.76	5.7 (-4.1–26.2)	2.26	3.2 (-10.2–11.1)	0.023 <sup>2</sup>

<sup>1</sup>Mann-Whitney, <sup>2</sup>independent samples t-test

## Discussion

Descriptive analysis of samples based on age is known to be 15–16 years. The sample treatment group mostly with the age of 15 years was 14 students (56%). The sample control group mostly with age 16 years old was 14 students (56%). The 15–17 age range is included in middle adolescence. This time is characterized by the development of emotions and the independence of the family. They pay more attention to their surrounding social environment, spending more time with their peers outside the home. At this time, the role of peers also affects the selection of food. The choice of food is based on similarities with friends rather than their needs [13].

There was an increase in the average intake of protein and iron in the treatment group, namely, protein intake from 41.11 g to 64.0 g and iron intake from 10.2 mg to 16.9 g after the intervention. There was an increase in the average intake of protein and iron in the control group, namely, protein intake from 36.0 g to 39.0 g and iron intake from 8.9 g to 11.1 g after the intervention.

The role of nutrition education is necessary to increase adolescent nutrition knowledge regarding the selection of food consumed so that deviations in eating behavior can be prevented. Nutrition education or counseling is an educational approach to produce the behavior of individuals or communities needed in improving food improvement and nutritional status [14].

Based on Wilcoxon tests conducted in the treatment group to test pre- and post-test proteins,  $p < 0.001$  was obtained. Moreover, the test results paired samples t-test to test the pre- and post-test iron obtained the results of the importance of  $p < 0.001$ .  $p < 0.05$  was considered, then  $H_0$  is rejected, and  $H_a$  is accepted, so it can be concluded that there is an influence of nutrition education using pocketbooks on protein and iron intake in teenage girls.

Nutrition education is needed to have nutritional knowledge to prevent deviations in eating consumption [15]. Nutrition education in schoolchildren must be provided in appropriate ways and media to attract children's attention and facilitate children's receiving nutrition information.

Based on Wilcoxon tests conducted in the control group to test the pre- and post-test, the protein obtained  $p = 0.326$ . Moreover, the test results paired samples t-test to test the pre- and post-test iron obtained from  $p = 0.52$ .  $p > 0.05$ , then  $H_0$  is accepted, and  $H_a$  is rejected, so it can be concluded that there is no influence of nutrition education using PowerPoint media on protein and iron intake in teenage girls.

Nutrition education media are no less important in the process of information delivery. This method serves as a tool or channel to deliver messages to the target or client [16].

Based on statistical tests using Mann–Whitney, the average protein intake ranking was higher in the treatment group (22.92 g) than the control group (3.02 g). Statistically shows that there is a significant difference with  $p = 0.003$ . Statistical tests used the independent samples t-test, average iron intake ranking higher in the treatment group (6.76 mg) than the control group (2.26 mg). Statistically shows that there is a significant difference with  $p = 0.023$ . These results suggest that that nutritional education in students may increase protein and iron intake.

The results of this study are in line with research conducted by [17] that there is a difference in protein intake ( $p = 0.000$ ) and iron intake ( $p = 0.000$ ) after counseling between treatment and control groups. After counseling, it shows significant differences among the treatment and control groups because they are given nutrition education using PowerPoint and pocketbooks. In contrast, the nutrition education control group only uses PowerPoint and does not get pocketbooks as a repetition of materials.

Human behavior reflects various psychiatric symptoms, such as desire, interest, will, knowledge, emotion, thinking, attitude, motivation, and reaction. Behavior formation changes due to interactions between individuals and their environment, namely, through learning [18]. Media play an important role in improving nutritional knowledge in adolescents. Print media are the closest medium to students. Printed materials also occupy an important position in health research because it provides a clear message that can be brought home. The material effectively strengthens information submitted orally or used as a medium to convey the information itself [19].

The provision of nutrition education in pocketbooks has been designed as attractively as possible, not too much material, and accompanied by exciting pictures to read all the examples. The pocketbook contains protein and iron and its functions, food sources high in protein and iron, inhibitors and iron enhancers, and information about anemia supported by the picture. A pocketbook is a small book the size of a uniform pocket, so it is practical to be carried everywhere and can be read any time when needed. With the effectiveness of the pocketbook, students can obtain knowledge information about proteins and iron.

## Conclusion

The treatment group's average protein and iron intake was from 41.11 g to 64.0 g and from 10.2 mg to 16.9 g after the intervention. There was an increase in the average intake of protein and iron in the control group, namely, protein intake from 36.0 g to 39.0 g and iron intake from 8.9 g to 11.1 g after the intervention.

The average protein intake ranking was higher in the treatment group (22.9 g) than in the control group (3.0 g). Statistically ( $p = 0.003$ ) shows that there is a significant difference.

The average iron intake ranking was higher in the treatment group (6.7 mg) than in the control group (2.2 mg). Statistically ( $p = 0.023$ ) shows that there is a significant difference.

For intervention groups, nutrition education with pocketbook media influenced protein intake ( $p = 0.000$ ) and iron ( $p = 0.000$ ) in teenage girls. However, there is no effect of nutrition education with media PowerPoint on protein intake ( $p = 0.326$ ) and iron ( $p = 0.52$ ) in teenage girls for the control group.

## Recommendations

The pocketbook used in this study is expected to continue to be read repeatedly. It can be used for adolescents in nutrition education activities and health promotion to increase knowledge and change eating consumption behavior.

Schools can work with the School Health Unit (UKS) and students to conduct nutrition education regularly. Hence, nutritional information is conveyed to students used as research samples and all school students to prevent nutritional anemia.

Further researchers are expected to research further with other factors to be known other factors that can affect protein and iron intake.

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