

THE EFFECT OF HEALTH EDUCATION ON HB LEVELS AND INTAKE OF IRON, PROTEIN AND VITAMIN C AMONG ADOLESCENT GIRLS

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ABSTRAK : PENGARUH PENDIDIKAN KESEHATAN TERHADAP KADAR HB DAN ASUPAN BESI, PROTEIN DAN VITAMIN C PADA REMAJA PEREMPUAN

Latar Belakang: Penyuluhan gizi dengan bantuan media edukasi diharapkan dapat membantu remaja putri untuk memahami dan sadar akan manfaat dan pentingnya mengkonsumsi tablet tambah darah (TTD) sehingga memiliki dampak positif pada peningkatan kadar hemoglobin (Hb).

Tujuan: untuk mengetahui pengaruh pemberian *Health Education* terhadap kadar hemoglobin dan asupan zat besi, protein dan vitamin C pada remaja putri.

Metode: menggunakan *Quasi Eksperimen* di MTs DDI Patobong sebagai kelompok intervensi dan MTs Muhammadiyah Punnia sebagai kelompok kontrol. Diperoleh sampel 44 orang masing-masing kelompok dengan menggunakan *Purposive Sampling* (pemberian intervensi *Health Education* dengan metode penyuluhan dan TTD selama 3 bulan, sampel diberikan TTD 1x sepekan). Analisis data menggunakan *Uji Chi Square*, *Uji Paired Sampel T Test* dan *Independent Sampel T Test*.

Hasil: rata-rata sampel berusia 13 tahun, berat badan 30-40 kg, tinggi badan 146-150 cm dan IMT 17-25. Hasil penelitian diperoleh rata-rata perubahan kadar HB pada kelompok intervensi ($1,63 \pm 134$) dan kelompok kontrol $0,89 \pm 503$ dan signifikan pada masing-masing kelompok ($p \text{ value} = 0,000 \leq 0,05$). Ada perbedaan perubahan kadar Hb antara kelompok ($p \text{ value} = 0,037 \leq 0,05$). Hasil penelitian menunjukkan bahwa ada perubahan zat gizi Fe, Protein dan Vitamin C baik pada kelompok intervensi maupun kontrol ($p \text{ value} = \leq 0,05$). Ada perbedaan signifikan terhadap perubahan Fe ($p \text{ value} = 0,045$), Protein ($p \text{ value} = 0,040$), dan Vitamin C ($p \text{ value} = 0,023$) antara kelompok intervensi dan kontrol. Remaja putri menunjukkan sikap patuh mengkonsumsi TTD dengan tingkat kepatuhan (95.5%) pada kelompok intervensi dan kelompok kontrol (90,9%).

Kesimpulan: terdapat pengaruh signifikan pemberian *Health Education* terhadap kadar HB, kepatuhan minum TTD dan zat gizi pada remaja putri.

Saran: Edukasi gizi dapat diaplikasikan pada remaja putri dan penggunaan booklet dapat berikan dalam menunjang proses edukasi untuk penanganan anemia pada remaja putri dan edukasi gizi harus didukung oleh pihak sekolah untuk meningkatkan program pemberian tablet Fe pada remaja setiap 1 kali sepekan dan pihak keluarga terkait penyusunan menu tinggi zat besi, protein dan vitamin C pada remaja putri untuk mengurangi kejadian anemia.

Kata Kunci : Asupan Zat Besi, *Health Education*, Kadar Hb, Protein Dan Vitamin C, Remaja Putri.

ABSTRACT

Background : Nutrition counseling with the help of educational media is expected to help adolescent girls understand and be aware of the benefits and importance of taking iron tablets (TTD) so that they have a positive impact on increasing hemoglobin (Hb) levels.

Objective: to determine the effect of health education on hemoglobin levels and intake of iron, protein, and vitamin C in adolescents.

Methods: used quasi-experiments at MTs DDI Patobong as the intervention group and MTs Muhammadiyah Punnia as the control group. A sample of 44 people from each group was obtained using purposeful sampling (provision of health education interventions with the counseling method and TTD for 3 months; samples were given TTD once a week). Data analysis used the Chi Square Test, Paired Sample T Test, and Independent Sample T Test.

Results: the average age of the sample is 13 years, the weight is 30–40 kg, the height is 146–150 cm, and the BMI is 17–25. The results showed that the average change in Hb levels in the intervention group (1.63 ± 134) and the control group was 0.89 ± 503 and was significant in each group (p value = 0.000 < 0.05). There was a difference in changes in Hb levels between groups (p value = 0.037 < 0.05). The results showed that there were changes in the nutrients Fe, protein, and vitamin C in both the intervention and control groups (p value < 0.05). There were significant differences in changes in Fe (p value = 0.045), protein (p value = 0.040), and vitamin C (p value = 0.023) between the intervention and control groups. Adolescent girls showed adherence to taking iron supplements, with a level of adherence of 95.5% in the intervention group and 90.9% in the control group. Conclusion: There is a significant effect of providing health education on HB levels, adherence to taking iron tablets, and nutrition in adolescent girls.

Suggestion: Nutrition education can be applied to adolescent girls and the use of booklets can be provided in supporting the education process for the management of anemia in adolescent girls and nutrition education must be supported by the school to increase the program of giving Fe tablets to adolescents every 1 time a week and the family related to the preparation of a menu high in iron, protein and vitamin C in adolescent girls to reduce the incidence of anemia

Keyword : Adolescent Girls. Hb Levels, Protein And Vitamin C, Health Education, Iron Intake

INTRODUCTION

Adolescents are those who are at the transition stage between childhood and adulthood. Growth during adolescence occurs very quickly (*adolescence growth spurt*). The high growth rate causes adolescents to need food that contains sufficient nutrients. Therefore, the nutrients needed by adolescents must be fulfilled both in terms of quality and quantity. (Haya & Destariyani, 2020).

According to the *World Health Organization* (WHO), in 2020, the prevalence of anemia will be around 28.7 million people worldwide (WHO, 2020). According to data from the Ministry of Health for 2020, almost 23% of young women in Indonesia have anemia, or a lack of blood. With approximately 21 million young women, there are at least 4.8 million who have a low red blood cell count.

Iron nutritional anemia is often experienced by women, especially young women. There are several factors that affect low Hb levels in young women, namely blood loss caused by menstrual bleeding, lack of iron in the food consumed, chronic disease, and the habit of consuming foods that interfere with iron absorption (such as coffee and tea), which can cause low absorption. Iron and the mushrooming of fast food stalls, especially in urban areas, can change people's consumption patterns, thereby increasing the risk of anemia. Besides that, there are young women who are not compliant with consuming Fe Tablets. (Rahayu et al., 2019).

The need for iron absorption peaks at the age of 14–15 in female adolescents. Anemia in young women has a negative impact on decreased immunity, growth and development, activity, concentration, intelligence, and comprehension. (Sringrat et al., 2019).

One of the government's efforts to reduce the incidence of anemia, especially in young women, is to provide iron tablets. According to Regulation of the Minister of Health Number 88 of 2014 concerning Standards for Blood Supplement Tablets for Women of Reproductive Age and Pregnant Women and Circular Letter of the Director General of Public Health of the Indonesian Ministry of Health Number HK.03.03/V/0595/2016 concerning administration of blood supplement tablets. (Vermita et al., 2019)

Disobedience of young women in taking iron tablets can inhibit the benefits of iron (Fe) supplementation. This is caused by feelings of boredom or laziness, the unpleasant taste and smell of iron tablets, and the side effects felt after consuming iron tablets, such as nausea and vomiting, pain or burning in the pit of the stomach, and black stools. (Ningtyas et al., 2020).

Based on this description, it is necessary to intervene in *health education* and Giving iron tablets to young women is an effort to increase the knowledge and attitudes of young women and achieve the target of giving iron tablets (TTD) as a preventive form of anemia in adolescents, especially young women. Nutrition counseling with the help of educational media It is hoped that this will help young women understand and be aware of the benefits and importance of taking iron tablets (TTD).

This study aims to determine the effect of health *education* on hemoglobin levels and intake of iron, protein, and vitamin C in adolescents.

RESEARCH METHODS

This study uses the design method. *Quasi-experiments* with a plan *non-equivalent control group design*. This research was conducted at MTs DDI Patobong and Muhammadiyah Punnia schools in Pinrang District, South Sulawesi Province. This research was conducted from July to September 2022. The population in this study was all young women who attended MTs Patobong and Muhammadiyah Punnia. The intervention sample came from MTs DDI Patobong and included as many as 22 adolescent girls. The control sample consisted of 22 adolescent girls from MTs Muhammadiyah Punnia. The intervention and control samples were from class VIII. The sampling method uses the technique of "*purposeful sampling*." The intervention group was given health education and TTD, and the control group was given TTD for 3 months. Inclusion criteria in this study were young women who were willing to be respondents in the study and agreed to informed consent, aged 12–18 years, young women not menstruating, young women in good health, not suffering from serious illnesses, and young women who did not consume other blood-boosting supplements and herbs. Data were analyzed with the Chi Square Test method, the paired *Sampel T test*, and the *independent sample T test*.

Process Health Education: Implementation of health education is carried out in the AULA of the MTs DDI Patobong school with the counseling method and also via WhatsApp. The provision of HE material was carried out by researchers. Activity *Health education* was carried out six times in April–June 2022, with a duration of 60 minutes per time spent conducting counseling. *Process Health Education* in the Hall of MTs DDI Patobong Pinrang: The opening was carried out for 20 minutes. First, the researcher introduced the name and origin of the campus, then explained the purpose of the activity and the subject of discussion, then distributed questionnaires to assess respondents' knowledge before the activity was carried out. Material presentation *Health education* was carried out for 60 minutes using PPT slides interspersed with the researcher's explanation of the material : understanding adolescents, understanding hemoglobin levels, limiting hemoglobin levels, the impact of high hemoglobin adolescent girls, the impact of low hemoglobin in adolescent girls, maintaining normal Hb levels adolescent girls, and at

the end of the activity, the researcher conducted an evaluation, asking and answering questions from respondents for 20 minutes. HE Process Via WhatsApp: The opening was carried out for 15 minutes. First, the researcher introduced the name and origin of the campus, then explained the purpose of the activity and the subject matter of the discussion. Giving material *Health education* is carried out for 60 minutes using video slides and animations that appear in stages regarding the material: understanding adolescents, understanding hemoglobin levels, limiting hemoglobin levels, the impact of high Hb in young women, the impact of low Hb in young women, maintaining normal Hb levels in young women, and at the end of research activities, evaluating, asking, and answering questions from respondents for 20 minutes.

RESEARCH RESULTS

Table 1 shows that of the 44 respondents who were used as samples, in the dominant intervention group, 13-year-old respondents were 20 people (90.9%), and for dominant weight, 13 people (59.1%) had a body weight of 30–40 kg and dominantly had a height of 146–150 cm as many as 10 people (45.5%) and dominantly had a BMI of 18.5-22.9 as many as 21 people (95.5%). While in the control group, the dominant respondents aged 13 years were 19 people (86.4%), and for dominant body weight, namely 30–40 kg, there were 14 people (63.3%) and dominant height of 146–150 cm, 9 people (of 30–40 kg and dominantly had a height of 146–150 cm as many as 10 people (45.5%) and dominantly had a BMI of 18.5-22.9 as many as 21 people (95.5%). While in the control group, the dominant respondents aged 13 years were 19 people (86.4%), and for dominant body weight, namely 30–40 kg, there were 14 people (63.3%) and dominant height of 146–150 cm, 9 people (41%), and dominant BMI of 18.5-22.9 for 19 people (86.4%).

Based on analysis using *Uji Chi Square*, the age group has a value of $p = 0,635 > 0.05$. Meanwhile, the weight group has a value of $p = 0,914 > 0.05$, and the height group has a value of $p = 0,771 > 0.05$, as well as the BMI group, which has a value of $p = 0,294 > 0.05$. Thus, based on the four variable characteristics of the respondents, there is no difference between the intervention group and the control group.

Table 1
Frequency Distribution Based on Respondent Characteristics at MTs DDI Patobong and MTs Muhammadiyah Punnia Pinrang Regency

Characteristics of Respondents	Group				Total		<i>*p Value</i>
	Intervention		Control				
	n	%	n	%	n	%	
Age (Years)							
13	20	90.9	19	86.4	39	88.6	0,635
14	2	4.5	3	13.6	5	11.4	
Body Weight (kg)							
30-40	13	59.1	14	63.6	27	61.3	0,914
41-50	5	22.8	5	22.8	10	22.7	
>50	4	18.1	3	13.6	7	16	
Height (cm)							
140-145	8	36.4	7	31.8	15	34.1	0,771
146-150	10	45.5	9	41	19	43.2	
>150	4	18.1	6	27.2	10	22.7	
IMT							
<18,5	1	4.5	3	13.6	4	9.1	0,294
18,5-22.9	21	95.5	19	86.4	40	90.9	

**Uji Chi Square*

Table 2
Frequency Distribution of Compliance with Added Tablet Consumption Intervention and Control Group Blood at MTS DDI Patobong and MTS Muhammadiyah Punnia Pinrang Regency

Group	TTD Drinking Compliance				n	%
	Comply		Disobedient			
	n	%	n	%		
Intervention	21	95.5	1	4.5	22	100
Control	20	90.9	2	9.1	22	100

Table 2 shows that of the 22 respondents who were used as samples in the intervention group, 21 (95.5%) adhered to Fe consumption, and 1 person (4.5%) disobeyed. Meanwhile, 20 people (90.9%) adhered to the control group in consuming Fe, and 2 people (9.1%) did not comply.

As a result, it can be concluded that the majority of female adolescents (95.5%) in the intervention group and 90.9% in the control group consumed Fe tablets.

Table 3
Comparing Changes in HB Levels After Intervention at MTS DDI Patobong and MTS Muhammadiyah Punnia Pinrang Regency

Group	n	Hemoglobin Levels		<i>*p value</i>	Mean Difference ($\bar{x} \pm SD$)
		Pre	Post		
		($\bar{x} \pm SD$)	($\bar{x} \pm SD$)		
Intervention	22	10.98 $\pm$ 1.00	12.61 $\pm$ 1.02	0.000	1.63 $\pm$ 0.02
Control	22	11.20 $\pm$.921	12.09 $\pm$.418	0.000	0.89 $\pm$ 0.50
<i>**p value</i>		0.448	0.033		0.037

**Uji Paired Sample T Test*

***Independent Sampel T Test*

Based on table 3 above, it shows that of the 22 people who were used as samples, in the intervention group, the average HB level before was 10.98 g% (low HB level), and the HB level after was 12.61 g% (normal HB level). In the control group, the average HB level before was 11.20 g% (low HB level), and the HB level after was 12.09 g% (normal HB level). Based on the results of the *Uji Paired Sample T Test*, then the value is obtained as $p = 0.000 \leq 0.05$. Thus, it was concluded that there were changes in HB levels before and after the intervention in both the intervention and control groups.

Comparison of HB levels in the pre-intervention and post-intervention conditions In the pre-state, it was shown that the intervention group had an average HB level of 10.98 g% (low HB level) and the control group had an average HB level of 11.20 g% (low HB level). Results *Independent Test Sample T Test*, then the value is obtained $p = 0.448 > 0.05$, this proves that in the pre-state there is no

significant difference between the intervention and control groups or in an equivalent state before the intervention is given. And in the post-situation, it showed that the intervention group had an average HB level of 12.61 g/L (normal HB level) and the control group had an average HB level of 12.09 g/L (normal HB level). Results *Independent Test Sample T Test*, then the value is obtained: $p = 0.033 \leq 0.05$. These results indicate that in the post-test state, there is a significant difference between the intervention group and the control group..

A comparison of changes in HB levels between the intervention and control groups obtained a mean value of 1.63 for the intervention group and 1.42 for the control group. Results: *Independent Test Sample T Test*, then the value is obtained: $p = 0.037 \leq 0.05$. Thus, it was concluded that the alternative hypothesis was accepted because there were differences in changes in HB levels between the intervention group and the control group.

Table 4
Comparing Changes in Nutritional Substances (Fe, Protein, and Vitamin C)
After Intervention: Between Intervention and Control Groups
at MTS DDI Patobong and MTS Muhammadiyah Punnia
Pinrang Regency

Asupan Nutrisi	Mean $\pm$ SD				<i>*p value</i>	Mean Difference ($\bar{x} \pm SD$)
	Pre ($\bar{x} \pm SD$)	AKG %	Post ($\bar{x} \pm SD$)	AKG %		
Fe (mg)						
Intervention	15.38 $\pm$ 3.48	102	20.50 $\pm$ 6.20	133	0,001	5.12 $\pm$ 2.72
Control	13.38 $\pm$ 4.20	86	16.83 $\pm$ 4.94	106	0,005	3.38 $\pm$ 0.74
**p value	0,091		0,036			0,045
Protein (g)						
Intervention	39.05 $\pm$ 9.06	60	69.56 $\pm$ 13.06	106	0.000	30.51 $\pm$ 4.00
Control	33.23 $\pm$ 12.65	50	59.93 $\pm$ 13.47	90	0.000	26.7 $\pm$ 0.82
**p value	0,087		0,020			0.040
Vitamin C (mg)						
Intervention	34.12 $\pm$ 18.10	52	56.71 $\pm$ 19.02	86	0.000	22.59 $\pm$ 0.92
Control	27.00 $\pm$ 9.42	41	44.97 $\pm$ 18.94	64	0.000	17.97 $\pm$ 9.52
**p value	0,109		0,046			0.023

** Uji Paired Sample T Test*

***Independent Sampel T Test*

Based on table 4 above, it shows that in the intervention group, the nutrient Fe (iron) was before 15.38 and after 20.50, and in the control group, the nutrient Fe (iron) was before 13.38 and after 16.83. $p \leq 0.05$, which means there was a change in Fe nutrition before and after both the intervention and control groups. In the protein nutrition intervention group before 39.05 and after 69.56, and in the protein nutrition control group before 33.23 and after 59.93.

Markp = $0.000 \leq 0.05$, which means that there were changes in protein nutrition before and after in both the intervention and control groups. In the vitamin C nutrition intervention group before 34.12 and after 56.71, and in the control vitamin C nutrition group before 27.00 and after 44.97. Markp = $0.000 \leq 0.05$, which means that there were changes in vitamin C nutrition before and after both the intervention and control groups. Thus, it was concluded that there

were changes in the intake of Fe, protein, and vitamin C before and after both the intervention group and the control group.

Comparison of Fe, protein, and vitamin C nutrients in pre-intervention and post-intervention conditions. In the pre-state for nutrients Fe, protein, and vitamin C, it shows that from the results of the *Independent Test Sample T Test*, a value of $p > 0.05$ was obtained, which means that there were no significant differences in the intervention group or the control group. This proves that the two groups were in an equal state before being given the intervention. While in the post-state for nutrients Fe, protein, and vitamin C, from the results of the *Independent Test Sample T Test*, a value of $p > 0.05$ is obtained, which means that in the post-state there is a significant difference between the intervention group and the control group.

Comparison of changes in Fe, protein, and vitamin C nutrients between the intervention and control groups. The mean difference in Fe intake for the intervention group was 5.12, and the control group was 3.38. From the results, the *Independent Test Sample T Test* earned a value of $p = 0.045 \leq 0.05$. Protein nutrients obtained mean a difference of 30.51 for the intervention group and 26.7 for the control group. $p = 0.040 \leq 0.05$. The intervention group had a mean difference of 22.59, while the control group had a mean difference of 17.97. $p = 0.023 \leq 0.05$. Thus, it was concluded that there were differences in changes in Fe, protein, and vitamin C between the intervention group and the control group.

DISCUSSION

Giving effect to *health education* and blood supplement tablets on Hb levels before and after the intervention and control groups. The results showed that of the 22 people who were used as samples, in the intervention group, the average HB level was before 10.98 g% and after 12.61 g%. In the control group, the average HB level was before 11.20 gr% and after 12.09 gr%. Based on the results of the *Uji Paired Sample T Test*, the value is obtained as $p = 0.000 \leq 0.05$. Thus, it was concluded that there were changes in HB levels before and after the intervention in both the intervention and control groups.

The results showed that the change in HB levels between the intervention and control groups obtained a mean value of 1.63 for the intervention group and 0.87 for the control group. Results *Independent Test Sample T Test*, then the value is obtained: $p = 0.037 \leq 0.05$. Thus, it was concluded that there were differences in changes in HB levels

between the intervention group and the control group.

Administration of Fe tablets was carried out for the intervention group and the control group. Fe tablets consist of 60 mg of iron. *Health Education* It was also carried out to introduce types of foods high in iron and the importance of taking iron tablets to young women, with the aim of increasing their knowledge and fostering an attitude of obedience to taking iron supplements so that their HB levels increase. Adolescent girls are expected to consume Fe tablets 12 times. The results of the study regarding adherence to taking iron tablets showed that administration of iron supplements once a week for 3 months was carried out in 22 samples in the intervention and control groups. The intervention group consisted of 21 respondents who were obedient, and the control group consisted of 20 respondents who were obedient when consuming iron tablets. Most young women show obedience when consuming iron tablets.

Health education is related to input, process, and output, namely to increase knowledge and attitudes in order to change the behavior of adolescents in preventing iron deficiency anemia. (Diramayanadya, 2020)

Counseling is a systematic and methodical effort to change lifestyles through changes in knowledge, attitudes, skills, and behavior towards a healthy lifestyle. Attitudes are formed based on consideration and appreciation. In this study, counseling helped young women consider taking iron tablets. Attitudes are influenced by belief in an action, knowledge of an action, evaluation of the assessment of actions, and tendencies to act. Counseling is able to provide the information needed to assess an action. So it is hoped that it can improve the attitude of young women toward a supportive attitude. (Abdillah et al., 2022).

The intention to consume blood-boosting tablets is one of the initial forms of health behavior formation. According to Ajzen and Fisbein in the Theory of Planned Behavior, intention is how much confidence a person has to perform a behavior. Factors that influence the formation of one's intention include attitudes, subjective norms, and perceptions of behavioral control. (Savitry et al., 2017).

Compliance with taking iron tablets is a form of behavior, so the tendency of young women to comply with taking iron supplements on a regular basis can be analyzed using behavioral theory. One of the behavioral theories that can be used is the Theory of Planned Behavior (TPB). The behavior of an individual can be estimated from the intention of the individual, which is formulated in the TPB.

Obedient behavior is the result of the young woman's intention to consume iron tablets with a frequency of one tablet every week. (Ningtyias et al., 2020).

Iron (Fe) tablets contain 200 mg of ferrosulfate, or the equivalent of 60 mg of elemental iron, and 0.20 mg of folic acid. Iron absorption occurs in the duodenum and upper small intestine (jejunum). Iron enters the stomach from the esophagus in the form of iron (ferrous) and is then oxidized in the form of soluble iron (ferrous). Stomach acid will lower the pH so that it can increase the solubility and absorption of iron. After becoming ferrous, intestinal mucosal cells in the duodenum and jejunum will absorb this iron. The absorption of iron is assisted by a special protein, namely transferrin (TF). This protein functions to transport iron from the digestive tract to all body tissues, especially the spinal cord, which will be used to form red blood cell hemoglobin. (Kurniati, 2020).

This study is in line with the results of Ariyanto's research regarding the application of health education and Fe tablet therapy to the hemoglobin of female adolescents in Sikka District. Using the paired T test and ANOVA, the results obtained showed that before being given Iron (Fe) tablet therapy, the average Hb level was 7.34 g/dL. After the intervention, the average Hb level increased to 10.98 g/dL, and the difference in Hb levels was 3.64 g/dL. The increase in Hb levels is statistically significant because a p-value of 0.000 is obtained where the p-value is smaller than the alpha value ($p < 0.05$) ($p = 0.000 < 0.05$). These results indicate that there was a significant change in Hb levels before and after being given iron (Fe) tablet therapy, with an increase in Hb levels in female adolescents of 49.59%. (Ayupir, 2021).

The results of the research conducted by Aminah and Purwati (2019) show that there are relevant differences between the two groups. The intervention group was seen in the mean difference value of 13.12 gr/dL. In the control group, the change in mean difference was 11.52 gr/dL, with a p value of $0,000 \leq 0,05$. So there are differences in changes in HB levels between the intervention group and the control group.

Giving effect of health education and blood supplement tablets on nutritional intake (Fe, protein, and vitamin C) before and after both the intervention and control groups. The results showed that there were changes in the nutrients Fe, protein, and vitamin C in both the intervention and control groups. Based on the results of the Uji Paired Sample T Test, the value is obtained: p value ≤ 0.05 .

The research results obtained showed changes in the nutrients Fe, protein, and vitamin C

between the intervention and control groups. The nutrient Fe is obtained with a p value of 0,045, which means there are differences in changes in Fe intake in the intervention group and the control group. Protein nutrients are obtained with a p value of 0,040, which means there are differences in changes in protein nutrition in the intervention group and the control group. Nutrient vitamin C is obtained (p value = 0,023), which means there are differences in changes in vitamin C nutrition in the intervention group and the control group.

Health education is carried out six times for three months to provide nutrition education to young women. Education is carried out aiming to increase the knowledge of young women. Introducing TTD and types of foods high in iron to increase HB levels Educational material is presented in the form of PPTs and animated videos that aim to attract young women's interest and focus on the material presented. The results of measuring the knowledge of young women through questionnaires showed that before being given education, there were 22 young women who did not know about the types of foods high in iron, and after education, there were 20 young women who had good knowledge and 2 young women who had sufficient knowledge. There was a change in the knowledge of young women before and after health education was carried out in the intervention and control groups.

One way to increase one's knowledge is by providing nutrition education. Education that provides knowledge of nutrition is an approach to producing the individual or community behavior needed to improve or maintain good nutrition. Nutrition education can also increase their knowledge and attitude towards nutrition. The goal of nutrition education is to gain knowledge, be able to build a conceptual framework for nutritional principles, and build a positive attitude towards good nutritional habits so that you are able to use this knowledge in food selection. The higher the knowledge of nutrition, the more it will affect the attitude and behavior toward food consumption. (Setyohadi et al., n.d.).

Education can be done through several media and methods. Education carried out with the help of the media will make it easier and clearer for the audience to receive and understand the material presented. In addition, the media can also help educators convey material. The provision of nutritional knowledge or education must be done in the right way and through the right media in order to attract attention and make it easier for respondents to receive information about nutrition. Knowledge of good nutrition will enable a person to arrange a good

menu for consumption. The greater a person's nutritional knowledge, the more he will take into account the type and amount of food he gets for consumption. (Syawitri & Sefrina, 2022).

Digestion of food is the process of changing food from large to smaller and finer sizes and breaking down complex food molecules into simple molecules using enzymes and digestive organs. The process of the digestive system starts in the mouth, esophagus, and stomach and ends with the absorption of simple nutrients in the intestine, where they are used by the body's tissues. In addition to these main organs, there are organs that help the digestive system, namely the liver (liver), gallbladder, and pancreas. (Runtulalu et al., 2015).

The absorption of iron is strongly influenced by the availability of vitamin C. The role of vitamin C in the process of iron absorption is to help reduce ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}) in the small intestine so that it is easily absorbed. This reduction process will be greater if the pH in the stomach increases. Vitamin C can increase acidity so that it can increase iron absorption by up to 30%. (Andaruni & Nurbaety, 2018).

Protein has the function of transporting iron via transferrin. Inadequate protein intake interferes with the transport of iron as well as the formation of hemoglobin. Transferrin is made when iron attaches to proteins, so it can be said that iron is not present freely in the body. Transferrin transports iron and is then bound to the process of forming hemoglobin in the bone marrow. (Wati et al., 2022)

This is in line with the results of Silalahio's research regarding the potential of nutrition education in increasing nutritional intake in young women, which obtained 24-hour food recall results in the intervention group and the control group, namely protein intake from 53.25 35.54 to 65.48 41.67. Intake of vitamin C from 33.53 53.05 to 58.78 95.38. Iron intake from 10.05 9.97 to 8.54 11.42. The value of $p < 0.05$ was obtained, which means that there was a significant change in the intervention and control groups. (Verarica Silalahio et al., 2013).

In line with research in Pinrang Regency regarding the comparison of nutritional levels of young women in the two groups, before being given Fe/Kurma tablets, Sukkari had an RDA of less than 80% in terms of the components of protein, iron, and vitamin C. And after being given nutritional intake treatment, has achieved more than 80% of the AKG determination. After being tested for analysis, it has a significance level of $P = 0.05$, which means that some of these nutrients have a significant difference in changes between the intervention group and the control group. (Husnah, 2021).

Compliance with blood supplement consumption in both the intervention and control groups. The results showed that of the 22 respondents who were used as samples in the intervention group, 21 (95.5%) adhered to Fe consumption, and 1 person (4.5%) disobeyed. Meanwhile, 20 people (90.9%) adhered to the control group in consuming Fe, and 2 people (9.1%) did not comply. Thus, it can be concluded that the majority of female adolescents (95.5%) in the intervention group and 90.9% in the control group consumed Fe tablets.

Administration of Fe tablets and *health education* are carried out to foster the intention of young women to comply with consuming Fe tablets once a week. The education aimed at increasing the knowledge of young women regarding hemoglobin levels, the impact of low HB on young women, and how to maintain normal HB levels. After education. The results of the interviews showed that young women began to pay attention to the nutritional content of food, reduced their habit of eating ready-to-eat food, and that each young woman had a supply of iron supplement tablets and consumed Fe tablets once a week and every day during menstruation.

According to the Regulation of the Minister of Health Number 88 of 2014 concerning Standards for Blood Supplement Tablets for Adolescents, Women of Reproductive Age, and Pregnant Women and the Circular Letter of the Director General of Public Health of the Indonesian Ministry of Health Number HK.03.03/V/0595/2016 concerning administration of blood supplement tablets, The benefits of iron (Fe) supplementation are often hampered by adherence to taking Fe tablets. Adherence to taking Fe tablets is one of the factors that is considered the most influential in the success of the iron (Fe) supplementation program, in addition to the provision of Fe tablets and their distribution system.

This research is in line with the research entitled "The Influence of Health Education on Blood Supplement Tablets (TTD) in the Class of Pregnant Women on Maternal Compliance in Consuming Blood Supplement Tablets." According to the results obtained from 30 respondents, the level of adherence before health education was as high as 5 people (16.7%) and disobedient as many as 25 people (83.3%). After being given health education, compliance increased to 16 people (53.34%) and disobedient as many as 14 people (46.66%). The results of the statistical test using the marginal homogeneity test obtained $p = 0.000$, meaning that health education about blood supplement tablets (TTD) in pregnant women has an effect on their

adherence to consuming iron tablets. Health education in this study used the lecture method and was given at the third meeting in the class of pregnant women. Previously, a pretest was carried out on respondents using the MMAS-8 questionnaire. Furthermore, the researchers practiced directly how to take iron tablets using drinks containing vitamin C. In addition, in the process of providing health education using audiovisual media such as laptops and Power Points, Each respondent was given a leaflet to learn about blood supplement tablets. (Setiawati & Rumintang, 2019)

CONCLUSION

There is an influence of health education and blood supplement tablets on HB levels before and after both the intervention and control groups. And there are differences in changes in HB levels between the intervention and control groups. There is the influence of giving health education and blood supplement tablets for nutrients (Fe, protein, and vitamin C) before and after both the intervention and control groups. There were differences in changes in nutritional intake (Fe, protein, and vitamin C) between the intervention and control groups. There was compliance with the consumption of iron tablets in both the intervention and control groups.

SUGGESTION

Nutrition education can be applied to young women, and the use of booklets can be provided to support the educational process for treating anemia in young women. Nutrition education must be supported by the school to improve the program for giving Fe tablets to adolescents once a week and by the family regarding the preparation of a high-nutrient menu of iron, protein, and vitamin C in young women to reduce the incidence of anemia.

REFERENCES

- Abdillah, M. A. I., Triawanti, Azma, R., Noor, M. S., & Noor Muthmainah. (2022). Pengaruh Konseling terhadap Pengetahuan dan Sikap Ibu Hamil dalam Mengonsumsi Tablet Tambah Darah. *Jurnal Mahasiswa Pendidikan Dokter*, 5(3), 648–657.
- Aminah, S., & Purwati, Y. (2019). Pengaruh Pendidikan Kesehatan Terhadap Tingkat Pengetahuan Tentang Anemia pada Remaja Putri di SMPN 2 Kalibawang Kulonprogo. *Naskah Publikasi*.
- Andaruni, N. Q. R., & Nurbaety, B. (2018). Rista Andaruni NQ, Nurbaety B. Efektivitas Pemberian Tablet Zat Besi (Fe), Vitamin C Dan Jus Buah Jambu Biji Terhadap Peningkatan Kadar Hemoglobin (Hb) Remaja Putri Di Universitas Muhammadiyah Mataram. *Midwifery Jurnal Kebidanan Mataram*. 2018;3(2):104. ht. *Midwifery Journal: Jurnal Kebidanan UM. Mataram*, 3(2), 104.
- Ayupir, A. (2021). Pendidikan Kesehatan dan Terapi Tablet Zat Besi (Fe) terhadap Hemoglobin Remaja Putri. *Pendidikan Kesehatan*, 5(3), 441–451.
- Benjamin, W. (2019). *Permenkes RI No.28 Tahun 2019 Tentang AKG Yang Dianjurkan Untuk Masyarakat Indonesia*. Menteri Kesehatan Republik Indonesia.
- Diramayanadya, N. (2020). *Pengaruh Intervensi Pendidikan Kesehatan Terhadap Pengetahuan dan Sikap Remaja Putri dalam Pencegahan Anemia*. 11(2), 14–22.
- Haya, M., & Destariyani, E. (2020). Perbedaan Status Anemia, Status Gizi Dan Asupan Gizi Gizi Di Perkotaan Dan Perdesaan. *Sanitas: ISSN Health Technology And Art Journal*, 11(1), 77–88.
- Husnah, R. (2021). Penambahan Kurma Sukkari (Phoenix Dactylifera L) Dan Suplementasi Fe Dalam Meningkatkan Kadar Ferritin Pada Remaja Putri Dengan Anemia. In *Frontiers in Neuroscience* (Vol. 14, Issue 1). Unicersitas Hasanuddin Makassar.
- Kurniati, I. (2020). Anemia Defisiensi Zat Besi (Fe). *Jurnal Kedokteran Universitas Lampung*, 4(1), 18–33.
- Ningtyias, F. W., Quraini, D. F., & Rohmawati, N. (2020). Perilaku Kepatuhan Konsumsi Tablet Tambah Darah Remaja Putri di Jember, Indonesia. *Jurnal Promkes*, 8(2), 154.
- Rahayu, A., Yulidasari, F., Anggraini, A. O. P. L., & EDITOR: (2019). *Metode Orkes-Ku (Raport Kesehatanku) dalam Mengidentifikasi Potensi kejadian Anemia Gizi pada Remaja (Meitria Syahadatina Noor, Fauzie Rahman, D. Rosadi, A. R. Sari, N. L. Vina, & Y. Anha (eds.); 1st ed.)*. CV Mine.
- Runtulalu, D., Liliana, & Purba, K. R. (2015). Media Interaktif Pembelajaran Sistem Pencernaan. *Jurnal Infra*, 3(2), 103–108.
- Savitry, N. S. D., Arifin, S., & Asnawati, A. (2017). Hubungan Dukungan Keluarga Dengan Niat Konsumsi Tablet Tambah Darah Pada Remaja Puteri. *Berkala Kedokteran*, 13(1), 113.
- Setiawati, A., & Rumintang, B. I. (2019). Pengaruh Pendidikan Kesehatan Tentang Tablet Tambah Darah (TTD) Pada Kelas Ibu Hamil Terhadap Kepatuhan Ibu Dalam

- Mengonsumsi Tablet Tambah Darah Di UPT BLUD Puskesmas Meninting Tahun 2018. *Jurnal Midwifery Update (MU)*, 1(1), 28.
- Setyohadi, D., Nurikhwani, P. W., Budiarti, L. Y., & Ahdadia, H. (n.d.). *Edukasi tumpeng gizi seimbang sebagai pedoman pola hidup sehat pada masyarakat pesisir*.
- Sriningrat, I. G. A. A., Yuliyatni, P. C. D., & Ani, L. S. (2019). Prevalensi anemia pada remaja putri. *E-Jurnal Medika*, 8(2), 1–6.
- Syawitri, W. A., & Sefrina, L. R. (2022). Pengaruh Media, Pendidikan Gizi, Dan Lingkungan Sebagai Penunjang Kesadaran Dalam Pemilihan Makanan. *Journal of Nutrition College*, 11(3), 197–203.
- Verarica Silalahi, Aritonang, E., & Ashar, T. (2013). Potensi Pendidikan Gizi Dalam Meningkatkan Asupan Gizi Pada Remaja Putri Yang Anemia Di Kota Medan. *Jurnal Kesehatan Masyarakat*, 11(1), 87–95.
- Vermita w, S., Widodo, M. D., Candra, L., & Rialita, F. (2019). Determinan Kejadian Anemia Pada Remaja Putri Di SMA Negeri 1 Reteh Kecamatan Reteh Kabupaten Indragiri Hilir Tahun 2019. *Photon: Jurnal Sain Dan Kesehatan*, 9(2), 88–98.
- Wati, S. W., Sulistiani, R. P., & Ayuningtyas, R. A. (2022). Hubungan Asupan Zat Besi , Protein , Vitamin C dan Status Gizi dengan Kadar Hemoglobin pada Mahasiswi Universitas Muhammadiyah Semarang. *Seminar Nasional Publikasi Hasil-Hasil Penelitian Dan Pengabdian Masyarakat*, 1367–1376.
- WHO. (2019). *prevalence of anaemia in women Of reproductive age*. WHO.