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THE EFFECT OF PEER GRUP EDUCATION AND E-BOOKLET ON PROTEIN AND IRON INTAKE OF ADOLESCENT GIRLS

Pengaruh Peer Group Education dan E-Booklet Terhadap Asupan Protein Dan Zat Besi Remaja Putri

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ABSTRAK

Anemia remaja putri menjadi salah satu masalah kesehatan global yang krusial, termasuk di Indonesia, karena berdampak pada jangka panjang kehidupan remaja tersebut. kurangnya pengetahuan remaja putri mengenai anemia merupakan salah satu penyebab tidak langsung anemia. Meningkatkan pengetahuan dapat dilakukan dengan memberikan edukasi gizi melalui peer group education dengan media e-booklet. Tujuan penelitian ini untuk menganalisis pengaruh edukasi gizi melalui peer group education dengan media e booklet terhadap asupan protein dan zat besi remaja putri. Penelitian menggunakan metode pre eksperimen dengan desain nonequivalent control group. Teknik pengambilan sampling menggunakan purposive sampling. Subjek penelitian sebanyak 48 orang, terdiri atas 24 orang kelompok kontrol dan 24 kelompok intervensi. Kelompok kontrol diberikan peer group education, sedangkan kelompok intervesni diberikan peer group education dan media e-booklet. Dilakukan pretest dan posttest pada masing-masing kelompok. Instrumen yang digunakan untuk melihat asupan protein dan zat besi berupa form food record 4x24 jam Hasil penelitian menunjukan pemberian edukasi gizi berpengaruh terhadap peningkatan asupan protein dan zat besi remaja putri (p=0,000). Analisis data menggunakan uji paired t test. Kesimpulan penelitian ini adalah edukasi gizi dengan e-booklet merupakan salah satu media edukasi yang dapat digunakan untuk meningkatkan asupan protein dan zat besi pada remaja putri.

Kata kunci: *edukasi gizi e-booklet, protein dan zat besi, remaja putri*

ABSTRACT

Anemia in adolescent girls has become one of the crucial global health issues, including in Indonesia, as it impacts the long-term lives of these adolescents. The lack of knowledge among adolescent girls about anemia is one of the indirect causes of anemia. Increasing knowledge can be achieved by providing nutritional education through peer group education using e-booklets as a medium. The purpose of this research is to analyze the effect of nutrition education through peer group education using e-booklet media on the protein and iron intake of adolescent girls. The research uses a quasi-experimental method with a nonequivalent control group design. The sampling technique used is purposive sampling. The research subjects consisted of 48 individuals, comprising 24 in the control group and 24 in the intervention group. The control group was given peer group education, while the intervention group was provided with peer group education and e-booklet. Pretests and posttests were conducted for each group. The instrument used to assess protein and iron intake was a food record form for 4x24 hours. The research results indicate that nutritional education has an impact on increasing protein and iron intake among adolescent girls (p=0.000). Data analysis using Paired t-test analysis. The conclusion of this research was that nutrition education using

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an e-booklet is one of the educational media that can be used to increase protein and iron intake among adolescent girls.

Keywords: e-booklet nutrition education, protein, and iron, adolescent girl

INTRODUCTION

Iron nutritional anaemia is highly prevalent in women throughout their life span, especially during reproductive age. Several adverse health consequences have been linked to iron deficiency conditions, which have an impact on all aspects of a woman's emotional and physical well-being. Women's anemia is predominantly caused by pregnancy, hemorrhage, and postpartum conditions. Anaemia is underdiagnosed and undertreated among women of childbearing age, despite its high prevalence and detrimental impact on quality of life [1],[2]. In developing countries, the prevalence of anemia among adolescent females is 53.7% [3]. According to the World Health Organization [WHO] (2022), the prevalence of anemia among women aged 15-49 years in Indonesia is 30.6% [4]. In addition, the prevalence of anemia cases among adolescent girls aged 10-19 increased from the Riskesdas study in 2013 to 2018, from approximately 31.7% to 48.9% [5]. According to the Jambi Province Regional investigation and Development Agency's (2017) investigation, anemia affects 60.45% of adolescent girls in Jambi Province [6].

Adolescence is an important period due to significant physical, psychological and behavioural changes. It is a transition period from childhood to adolescence, characterised by many changes that affect nutritional needs. This is due to increased growth and physical activity [7],[8]. Due to the growth and development of strong muscles, the need for iron in adolescents is growing so fulfilling their needs is important. Iron (Fe) plays a role in monoamine synthesis, energy metabolism, myelination, neurotransmitter, and dopamine metabolism [1].

Good nutrition is crucial for the prevention of nutritional disorders and the development of future diseases [9]. Nutritional knowledge, diet, and compliance with the consumption of blood additive tablets (TTD) are among the factors that can impact anemia in adolescent females[10]. The research by Wuryanti et al. (2024) states that there is a significant relationship between the level of knowledge and the incidence of anemia and nutritional status in adolescent girls [11]. Nutrition education has the potential to enhance comprehension of nutrition, as per Davidson et al. (2018) in Fitri et al. (2020). The goal is that by developing this knowledge, it will lead to the emergence of good consumption patterns that can influence an individual's health and nutritional status [12].

Peer group education is one of the educational techniques that aims to share information, values and behaviors in a group, where members have the same age and status. Interactions with peers make communication more open and more relevant [13]. According to Lewa (2016) Peer group activities are effective as an educational method that can increase physical activity and weight loss in overweight adolescents. Utilizing media is one approach to instructing students on nutrition [14]. Respondents are intrigued by the health education content, and the e-booklet employed in this investigation is more practicable. e-booklet is a form of educational media that contains text and images combined in an engaging way to enhance the reader's knowledge, which can be stored on a smartphone, laptop, or personal computer (PC) [15]. The research by Nikmah et al. (2022) claims that nutrition education conducted twice a week through Google Meet and an e-booklet can improve knowledge and attitudes regarding anemia in adolescent girls[16]. According to the research techniques and media, past research has used the peer group education method and e-booklet medium. However, there are few studies that use peer group education and e-booklets

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as independent variables. Meanwhile, in this study, the peer group education method was used with the e-booklet.

Health education that is more visually appealing can facilitate the communication of health information more effectively. It has the potential to enhance individuals' interest in reading, comprehending, and retaining information [17] The impact of nutrition education delivered with peer group education dan e-booklet on protein and iron intake was the focus of this investigation.

METHODS

This investigation is a pra-experiment that employs a nonequivalent control group design. The research was conducted in SMAN 2 and SMAN 7 Kerinci Regency, Jambi Province, from April to July 2023. Purposive sampling was implemented as the sampling methodology. Intervention and control groups were established for the research subjects. The control group was given peer group education, while the intervention group received peer group education and an e-booklet.

The implementation of peer group education begins with selecting tutors, who receive education twice. One week after the tutor training, groups are formed, with each group consisting of 4-5 subjects and 1 tutor. The tutor is given 15 minutes to explain, followed by a 15-minute discussion. The control dan intervention subjects will receive education from peer tutors twice over a span of 2 weeks. The tutor presented information about anemia, its causes, effects, how to prevent it, the benefits of taking blood supplement tablets, the benefits of protein-rich diets, and the benefits of iron foods.

The e-booklet was distributed once per week for two weeks for intervention groups, following the peer group education program. Media needs analysis was conducted before the education took place. The e-booklet was designed using Canva, after the media was completed, it was validated by media experts, content experts, and language experts. Following a media validity test by material specialists, media experts, and linguists, adjustments were made based on the ideas and critiques received. After determining that the medium is practical, a small trial for respondents is conducted. A small trial was then undertaken with ten female pupils. E-booklet can be accessed through the following link https://online.fliphtml5.com/qqluc/uwja/#p=27 and the researcher conducted control through WhatsApp Group [18].

The sample size was 48 individuals, which were divided into two groups: 24 control groups (SMAN 2 Kerinci students) and 24 intervention groups (SMAN 7 Kerinci students). The rationale for sampling is derived from the expert opinion that the experimental group should consist of 10-20 individuals [19]. The identity data and characteristics of respondents are recorded using questionnaires after respondents provide informed consent. Furthermore, to review the data on protein and iron intake that was obtained through 4x24 hour food record forms. The Health Ethics Commission of the Faculty of Medicine, Sebelas Maret University Surakarta, has granted ethical clearance approval for this investigation under the number 55/UNS27.06.11/KEP/EC/2023.

Data analysis was first carried out by testing the normality of the data using the shapiro-wilk test. Analysis of the effect of peer group education and e-booklets on the intervention group has normally distributed data ($p>0.05$) then uses the paired t-test analysis.

RESULTS

1. Educational Media E-booklet

The figure 1 is an e-booklet that contains material on the definition of anemia, its causes, signs and symptoms, types of protein and iron-rich foods, as well as the

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importance of consuming blood supplement tablets, all included in nutrition education using the e-booklet. The results of the material expert validation received a score of 75% with a category of suitable media. It is recommended to add material on the effects of iron deficiency, create a new page on iron category material, and add a bibliography on the last page of the e-booklet. The results of the media expert validation received a score of 81.3% with a category of suitable media, and it is recommended to change the font and font color. The language expert validation received a score of 83.4% with a category of very suitable media.

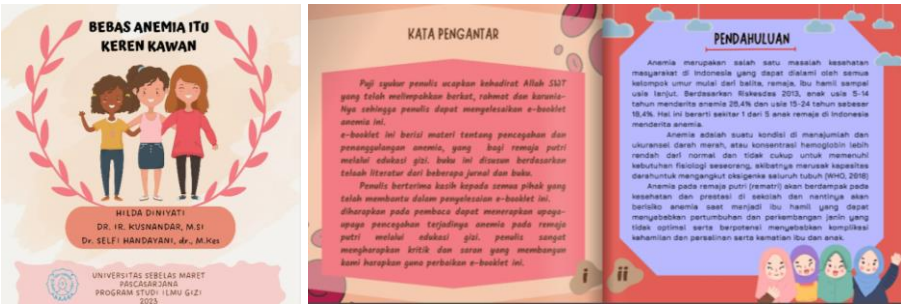

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Figure 1. Nutrition Education with E-Booklets

2. Characteristics of respondents based on age

The study was conducted on 48 adolescent girls, each group consisting of 24 adolescent girls. Based on the results of the study include data on the characteristics of adolescent girls consisting of 15-16 years old, family income and pocket money.

Table 1. General Characteristics of Respondents

Respondent Characteristics	Control n (%)	Intervention n (%)	Total (n=48)
Age			
15 tahun	6 (25%)	6 (25%)	12 (25%)
16 tahun	17 (70,8%)	15 (62,5%)	32 (66,6%)
17 tahun	1 (4,2%)	3 (12,5%)	4 (8,3%)
Family Income			
Rp. <1.800.000 (low)	3 (12,5%)	6 (25%)	9 (18,7%)
Rp. 1.800.000 s/d 3.000.000 (curently)	9 (37,5%)	9 (37,5%)	18 (37,5%)
Rp. 3.000.000 s/d 4.800.000 (high)	8 (33,3)	6 (25%)	14 (29,16%)
Rp. > 4.800.000 (Very high)	4 (16,7%)	3 (12,5%)	7 (14,5%)
Pocket money			
Rp. <11.700 (low)			
Rp. 11.800 s/d 18.200 (currently)	4 (16,7%)	1 (4,2%)	5 (10,4%)
Rp. 18.300 (high)	20 (83,3%)	23 (95,8%)	43 (89,5%)

The study's findings revealed information in table 1 about respondents characteristics such as age, family income, and pocket money. Adolescent girls range in age from 15 to 17 years, with the majority (66.6%) at age 16. According to this study, the majority of parents, 37.5%, have a monthly salary ranging from Rp. 1,800,000 to 3,000,000, which is considered moderate. The majority of adolescent girls (89.5%) had Rp. 18,300 in pocket money, which is considered high.

3. Data Normality Test

The Shapiro-Wilk test was used on the control and intervention groups to determine the results of the normality test in this study. The results of the

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normality test for the pretest and posttest data in the control and intervention groups are presented in the following table:

Table 2. Results of Normality Test

Variabel	P-value			
	Pretest	Keterangan	Posttest	Keterangan
Iron Intake				
Control	0.212	Normal	0.733	Normal
Intervention	0.507	Normal	0.264	Normal
Protein intake				
Control	0.543	Normal	0.860	Normal
Intervention	0.705	Normal	0.137	Normal

Table 2 shows the results of the normality test on iron and protein intake variables in the control and intervention groups, which have a normal data distribution with a significance value of p>0.05. The analysis test used was the paired t-test.

4. The Effect of peer group education and e-booklets on protein intake and iron intake among adolescent girls.

Table 3. Results of the Independent Test of T Sample Pretest and Posttest Values of Protein and Iron Intake In Intervention dan Control Groups

Variabel	Protein		Difference Average (IK95%)	t	p
	Control	Intervention			
Protein intake					
Pretest	73,987±5,931	75,800±7,645	-1,81 (-5,78 s/d 2,16)	- 0, 918	0,363
Postest	82,769±6,391	90,274±7,916	-7,50 (-11,69 s/d -3,32)	-3,614	0,001
Iron intake					
Pretest	46,712±6,333	57,235±9,41	-10.52 (-15,18 s/d -5,85)	-4,542	0,000
Postest	63,61±9,68	69,06±5,222	- 5,44 (-9,96 s/d -0,92)	-2,425	0,004

Table 3. Explain that there was no significant difference in protein intake pretest between the control group and the intervention group (p value 0.363). Meanwhile, in the posttest, there was a significant difference in protein intake between the control group and the intervention group (p-value 0.001). In iron intake, there was a significant difference between the control group and the intervention before and after education (p value < 0.05).

Table 4. Results of Paired Sample T-Test Pretest-Posttest Variable Protein Intake and Iron Intake in Adolescent Girls

Variabel	Average behaviour±SD		Difference mean±SD	IK95%	T	p
	Pre-test	*Post-test*				
Protein intake						
Control Groups	73,98±5,931	82,76±5,931	- 8,780±4,968	10,879 s/d-6,682	-8,657	<0,001
Intervention groups	75,80±7,64	90,27±7,916	- 1,447±6,557	-17,243 s/d-11,705	-10,813	<0,001
Iron intake						
Control groups	46,71±6,33	63,61±9,68	- 1,690±10,83	-21,477 s/d-12,327	-7,643	<0,001
Intervention groups	57,23±9,41	69,06±5,22	- 1,182±8,517	-15,421 s/d-8,228	-6,801	<0,001

Table 4. The results obtained from the paired sample t-test were that there was a difference in the average protein intake in the control group before and after which was 8.780, seen in the t = -8.657 and p values of <0.001, in the intervention group before and after which 1.447 was seen in the t value = -10.813 and the p-value <0.001, then

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the test results were declared significant, which means that there was a difference in the average protein intake before and after the education was given for 4 weeks. The results of the paired sample t-test showed a difference in the average iron intake in the control group before and after, which was 1.690 seen in the t value = -7.643 and the p value <0.001 in the intervention group, there was a difference in the average before and after which was -1.183 seen in the t value = -6.801 and the p-value <0.001, then the test results were declared significant, which means that there was a difference in the average iron intake before and after the education was given for 4 weeks.

DISCUSSION

The results of this research obtained data on the characteristics of the respondents, including age, family income, and pocket money. The age characteristics of this study involved a total of 48 respondents. The age range of adolescent girls is from 15 to 17 years, with the highest number being 16 years old at 66.6%. Previous research indicates that adolescents aged 13 to 18 years are associated with an incidence of anemia at 23% of the total number of adolescents [20]. The pocket money of teenage girls is mostly 95.8% having an allowance of Rp. 18,300, which falls into the high category. The purchasing power for school food is determined by the amount of pocket money that the child has. The larger the allowance, the more often children will consume their favorite snacks without paying attention to the nutritional content of those snacks. The wrong choice of food will affect the nutritional status of the child [21]. This study shows that the majority, 37.5%, of parents' monthly income amounts to Rp. 1,800,000-3,000,000, which falls into the medium category. Income is the most determining factor of the quality and quantity of food. Low income is also associated with a lower interest in shopping among the community, which can hinder the growth and development of children towards health. Conversely, the higher the income of parents, the more assured the nutritional needs of family members can be met.

The Effect of Nutritional Anemia Education With E-Booklets on Protein and Iron Intake in Adolescent Girls

Based on Table 4, it shows that there was an influence of protein intake provided through peer group education and e-booklets with a significant value (p<0.001). This is in line with Khotimah's (2019) research, which shows an influence of educational media on the intake of protein, iron, and Vitamin C among adolescent girls, with a p-value <0.05 [22]. According to Cristiany et.al. (2021), education (peer groups and nutritionists) is more effective in enhancing the knowledge and eating habits of adolescents, which in turn will increase the body's Hb levels [23]. Educational media also influences changes in research subjects' eating habits; Fahridha et al., (2023) found that delivering nutrition instruction through e-booklet media has an impact on gaining knowledge [24]. According to the findings of Nikmah's study (2022), the usage of nutrition e-booklet media is helpful in boosting students' knowledge of balanced nutrition. It is clear that the group-provided peer group education and e-booklet are more successful at increasing knowledge [16].

Similar to the research conducted by Anas et al. (2023), the intervention group and the control group exhibited variations in nutritional intake (Fe, protein, and vitamin C) [25]. Sefaya et al. (2017) conducted research that demonstrated an increase in protein adequacy (8.5%) in the control group, which was superior to the intervention group (2.9%), as well as an increase in the percentage of individuals with a sufficient level of iron adequacy (11.4%) following the initiation of nutritional education [26].

The average score increases both before and after education, which is crucial due to the increased demand for nutrients, such as iron, during adolescence. The requirement for iron is greater in teenage females due to the fact that they must replenish the iron that

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is lost during menstruation. The incidence of iron nutritional anemia can be influenced by a decrease in the body's iron content, which can occur when the body's demand for iron increases and it is not consumed in sufficient quantities [27]. Young women undergo menstruation each month and excrete a specific quantity of iron, which is essential for the production of hemoglobin. Anemia is the result of inadequate blood hemoglobin levels [28].

This demonstrates that the utilization of e-booklet media as an educational medium facilitates the target's comprehension of the information conveyed in comparison to verbal communication, as the target can directly observe the images and text that serve as an explanation of the images in the media [15],[29]. This indicates that the use of e-booklet media can enhance the motivation of adolescent girls to adopt healthier dietary habits. The e-booklet has a wealth of captivating and enlightening material, including eating menus that provide enough protein and iron consumption [30].The incidence of anemia is significantly correlated with the ingestion of protein and iron, as indicated by previous research.

Multiple investigations have affirmed that utilising e-booklet medium is efficacious in enhancing knowledge and inducing modifications in health behaviour. An individual's eating choices can be influenced by their level of nutritional awareness [31]. Previous research has shown that female students exhibit variations in knowledge and behavioural modifications before and after receiving health education on iron deficiency anaemia through e-booklet media [32]. This study has limitations since the researchers pay less attention to food intake by using daily food records to describe individual and family food consumption statistically and qualitatively, as well as to influence each respondent's food intake.

CONCLUSION

The implementation of e-booklet media for nutritional anaemia education effectively enhanced the consumption of protein and iron among teenagers in the intervention group. Utilising e-booklets for nutritional education can serve as an innovative approach to avoid anaemia in adolescents within school settings, by effectively managing the duration of the intervention period. Collaboration between health workers and teachers in schools is advised to enhance student education on preventing and addressing nutritional anaemia, hence enhancing both health outcomes and academic performance.

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