

Podcast Education on Anemia's Knowledge and Attitude of Female Adolescent in Central Jakarta

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Abstract: Anemia is one of the nutritional problems in Indonesia, and the number is higher in female adolescents. Anemia was caused by low intake of iron, protein, vitamin C, and low absorption related to high intake of inhibitors like tea and coffee. Iron tablet supplementation program also one of solution in which government gave, but there were obstacles like low adherence and pandemic covid-19. Therefore, female adolescents must be given the education to increase knowledge, and attitudes on anemia prevention. We provide podcast media as the solution. This study aims to determine the effect of education with audio podcast media about anemia on knowledge, and attitudes. We conducted a quasi-experimental with a control group design on 68 female adolescents in SMA Negeri 4, Central Jakarta. We divided subjects into 2 groups, the podcast group as an intervention group and the flyer group, as a control group. The intervention was conducted in 4 phases in 2 weeks period, pre-test and post-tests were collected using an online questionnaire which is shared in the online application group. Post-tests were conducted twice, after the intervention and 2 weeks after the intervention. We analysed data using Wilcoxon and Mann-Whitney with α 0.05. The results showed there was an increase in knowledge (0,000) and attitude (0,036) score in audio podcast group, but for the flyer group, the significant increase was only in knowledge score (0,000). The podcast was significantly effective to increase knowledge (0,007), than flyer, but no for attitudes (0,389).

1 INTRODUCTION

One of the goals of the SDGs is to end all forms of malnutrition and overcome the nutritional needs of adolescents, pregnant women, and the elderly (SDGs, 2015). Developing countries are currently still facing the problem of the Triple Burden of Malnutrition, namely lack of macronutrients, micronutrients, and being overweight or obese (UNICEF 2016). Micronutrients are essential vitamins and minerals needed in small amounts by the body for proper growth and development. Micronutrient deficiencies will cause health effects that are not always acutely visible, which is referred to as hidden hunger (Ritchie, 2017).

The World Health Organization estimates that there are 2 billion people in the world's population suffering from micronutrient deficiencies, one of them is iron deficiency anemia which is the most common among women of reproductive age (WHO, 2011). Globally, the prevalence of anemia is estimated at 9% in developed countries and 43% in developing countries (Wijayanti, 2019). Based on

WHO data the prevalence of anemia in women of reproductive age is 16.8% in the Americas and 41.9% in the Southeast Asian region (WHO, 2011). Based on Indonesia's National Health Survey (2018), the national prevalence of anemia in women was 23.9% in 2013 and 27.2% in 2018. The prevalence of anemia in the 15-24 years of age group was 18.4% in 2013 and increased to 32% in 2018.

The prevalence of anemia in adolescent girls in DKI Jakarta was 44.6% and most of it is caused by inadequate iron intake from food (Anggraeni, 2010; Junengsih, 2017; Tania, 2018). A study stated that a total of 82% of adolescents in high school in Central Jakarta had inadequate iron intake which may increased risk of anemia (Hendarto, 2018). Inadequate absorption of iron can also affect the low iron level in the body (Susilowati et al, 2018). Factors that affect iron absorption are the presence of inhibitors (tannins, casein, calcium, phytic acid, and oxalic acid) and enhancers (vitamin C and protein) (Ems et al, 2020; Sholihah, 2019). According to Solicha's study (2019), there was a significant association between protein and vitamin C intake on

hemoglobin levels in SMA 1 Manyar Gresik. Inadequate intake of protein and vitamin C, hence leading to low hemoglobin levels.

To prevent anemia, the Indonesian Government has been trying to overcome anemia since 1997 through the provision of iron and folic acid supplementation to junior and senior high school girl groups (Permatasari et al, 2018).

In March 2020, Indonesia was faced with a Pandemic of COVID-19. This situation has urged the Indonesian Government to issue a policy of Large-Scale Social Restrictions (PSBB) which has an impact on social activities. This condition has affected health programs in schools such as the provision of iron supplementation for adolescent girls has become restricted (Kemenkes RI, 2020).

Adolescents who do not take iron supplements have a 2,047 times higher risk of anemia compared to female adolescents who consume iron supplements (Listiana, 2016). Another attempt to overcome anemia in adolescents is to increase the intake of food sources of iron (Marfuah, 2016). Efforts to increase dietary iron intake can be done through education or nutrition counseling to adolescents. Nutrition education or counseling is an educational approach to produce individual behavior that can improve food improvement and nutritional status (Fadila, 2018). In addition, nutrition education or counseling can increase knowledge and change attitudes in terms of food consumption. Knowledge is a very important domain for the formation of someone's behavior (Fitriani et al, 2019).

The study conducted by Ardianti (2019) regarding the relationship between knowledge and personal hygiene behavior during menstruation in adolescents found that 55.8% of respondents had a good level of knowledge supported by positive personal hygiene behavior. Amany (2015) states that the better knowledge provided, the better behavior that will be carried out so that it will prevent a disease.

In the era of the industrial revolution 4.0, Indonesia is still in a demographic bonus period where the dominant generation is the youth group. The generation of teenagers aged 16-18 years was born when the use of digital technology began to grow rapidly, so this generation was familiar with its use. This is evidenced by the highest percentage of computer and internet use at the age of 16-18 years compared to other groups of age. They utilize digital technology for the teaching and learning process, seeking information and socialization (Badan Pusat Statistik, 2019).

In 2020, many digital educational media innovations are being developed to be used as

nutrition education or counseling for adolescents. One of the digital educational media that is currently developing among teenagers is podcasts. Podcasts are an interesting technological medium because in podcasts anyone can get involved, exchange ideas, and express anything. Podcasts can also be used easily and can be accessed by teenagers online (Meisyanti, 2020). Based on data from the Pew Research Center 2019 reported by Baer et al. (2020) stated that 32% of the United States population aged 12 years and over, listen to at least one podcast every month. Based on DailySocial survey data (2018), in Indonesia, 67.97% of respondents are familiar with podcasts and most of them are still in the millennial age, namely 16 to 35 years.

The current use of podcasts has touched the realm of education as a learning medium because it can improve learning outcomes and adolescent learning motivation (Mayangsari, 2019). The study of Rockhill (2019) in the United States for college students aged 22-36 showed that the use of podcasts resulted in positive learning and got good learning outcomes. Another study in Indonesia in 2019, there was a significant effect on the use of podcasts for learning English listening in high school students. This is due to the influence of podcasts which can stimulate students to be more imaginative and build a picture of what they hear (Widodo, 2019).

Therefore, this study aimed to determine the effect of education with audio podcast media about anemia on knowledge and attitudes in female adolescent in Central Jakarta.

2 MATERIALS AND METHODS

A quasi-experimental with control group design was conducted in female adolescents of SMA Negeri 4, Central Jakarta. The inclusion criteria of subjects of this study were female adolescents aged between 15 – 18 years and using smartphone device. Exclusion criteria were students who were hospitalized or unable to carry out normal activities and withdrew or missed one of the intervention processes. Subjects received an overview of the background, objective, and benefits of the study. All participants were informed of the purpose of the study and received their written consent to participate voluntarily. The subjects under 20 received permission from their legal guardian before enrolment. This study was approved by University Prof Dr. Hamka's Health Research Ethics Commission with number 03/21.03/0875. Consent was also obtained from the selected school principals, parents, and also subjects.

The sample was calculated following study Widodo, 2019 with a confidence level of 95%, beta 5%, expected different 0.05 points, and 10% loss to follow up. The minimum sample in each group was 34 samples or 68 subjects in total.

Stratified random sampling was conducted. All students in SMA Negeri 4 are stratified into X and XI classes. Each class was taken randomly and then divided into two intervention groups.

The intervention consisted of two treatments, the podcast group as an intervention group and the flyer group as a control group. Initial data collection was conducted by google form, and it included the socio-demographic data, knowledge, and attitude about anemia.

The intervention was conducted in 4 phases in 2 weeks period in both groups. In the podcast group, subjects were given education through audio podcasts, named podcast BINCANGIZI which can be accessed through Spotify. The podcast was given to the subject is about 6-12 minutes long. Subjects can access and listen to podcasts through the application on their smartphones. The topics presented include general information about anemia, a balanced diet, iron-rich foods, and iron supplementation. We use media flyers taken from the Indonesian Ministry of Health's website with the same topic. The subject who had accessed the media have to list their name in the WhatsApp group.

The podcast development step begins with determining the theme and ends with an audio podcasts acceptance test using Questionnaire for Assessing Educational Podcasts (QAEP) (Postigo, 2020). The chosen theme refers to materials to improve the problem of anemia in adolescents. The QAEP included access and use, design and structure, content adequacy, and value as an aid to learning.

Pre-test and post-tests were collected using online questionnaire which was shared through WhatsApp group. The questionnaire was modified from previous studies (Sembiring, 2015; Runkat, 2019; and Aditian, 2009). Questionnaires were validated through face validity by the panel of experts, and quantitative validity using spearman correlation analysis.

Knowledge questionnaires is consisted of 25 questions with multiple choice options with validity 21 of 25 questions and reliability Cronbach alpha 0.733. Each question is scored 10 points, and for total 250 points, then we categorized of total point with good (76-100%), sufficient (56-75%) and poor (0-55%).

Attitude questionnaires is consisted of 10 questions with Likert scale ranging 1-5 with validity 10 of 10 questions and reliability cronbach alpha

0.802. Each question is scored 1 representing "strongly disagree" to 5 representing "strongly agree" for the positive question and vice versa for the negative question, and for total 50 points, then we categorized of total point with positive (61-100%), neutral (41-60%), and negative (0-40%).

Post-tests were conducted twice, in the end of the intervention and 2 weeks after the intervention. Before selecting the test on bivariate analysis, the normality of data was checked using Kolmogorov-Smirnov test. All of the data are not normally distributed. Data were analyzed using Wilcoxon for difference mean before and after intervention; and Mann-Whitney for difference mean between two group, with significance level of 95%.

3 RESULT

The distribution of demographic information on the subject is presented in Table 1. No significant difference of characteristic between podcast and flyer group ($p > 0,05$). A total of 68 subjects have been enrolled, the majority of subjects aged 15 - 16 years in both groups.

Table 1. Demographics information.

Variable	Podcast		Flyer		p-value
	n	%	n	%	
Age					
15 – 16 years	22	64.7	20	58.8	0.618
17 – 18 years	12	35.3	14	41.2	
Grade					
X	16	47.1	17	50.0	0.808
XI	18	52.9	17	50.0	
Allowance/month (.000)					
< Rp. 500	24	70.6	24	70.6	0.896
Rp. 500 – Rp. 1.000	6	17.6	7	20.6	
> Rp. 1000	4	11.8	3	8.8	
Father's Education					
Low	4	11.8	5	14.7	0.225
Middle	20	58.8	13	38.2	
High	10	29.4	16	47.1	
Father's Occupation					
Government employees	2	5.9	2	5.9	0.403
Private employees	19	55.9	20	58.8	
Entrepreneur	6	17.6	10	29.4	
Retired	2	5.9	1	2.9	
Etc.	5	14.7	1	2.9	
Father's Income (.000)					
< Rp. 1,000	11	32.4	7	20.6	0.381
Rp. 1,000 – Rp. 3,000	13	38.2	12	35.3	

Variable	Podcast		Flyer		p-value
	n	%	n	%	
> Rp. 3,000	10	29.4	15	44.1	
Mother's Education					
Low	5	14.7	9	26.5	
Middle	19	55.9	12	35.3	0.211
High	10	29.4	13	38.2	
Mother's Occupation					
Employed	8	23.5	11	32.4	
Unemployed	26	76.5	23	67.6	0.417
Mother's Income (,000)					
< Rp. 1,000	27	79.4	21	61.8	
Rp. 1,000 – Rp. 3,000	4	11.8	6	17.6	0.253
> Rp. 3,000	3	8.8	7	20.6	
Exposed Information Related to Anemia					
Yes	29	85.3	29	85.3	
No	5	14.7	5	14.7	1.000
Information Source					
Books	2	6.9	3	10.3	
Parents	2	6.9	0	0	
Social Media	13	44.8	16	55.2	
Health workers	6	20.7	5	17.2	0.611
Web	6	20.7	5	17.2	

Note: Chi-Square analyzed with p-value < 0.05

The flyer group had a balanced proportion between subjects in grade X and XI (50%), while subjects in grade XI were more in the podcast group (52.9%). Most subjects (70.6%) in both groups had a lower monthly allowance. Based on subject family's characteristic, the father's education in both groups were most in secondary education. The father's occupation was dominated by working as private employees. The father's income in both groups were in the middle-upper class. Most mothers had secondary education than higher education. Unemployed mothers were more dominant in both groups than employed and had income in the low class. A total of 85.3% of subjects in both groups got information related to anemia before and mostly got information through social media.

The first part of the acceptance test included the statements related to access and usage of audio podcasts. The mean statistic for the access and usage statement ranged from 3.73 to 3.85 which all statements are closer to strongly agree. The lowest-rated statement was "I was able to view the podcasts in different places" (m=3.73). The highest-rated statement was "It was easy to access the podcasts" (m= 3.85) and "The podcasts were easy to find online" (m= 3.85). The second part of the acceptance test included the statement related to the design and structure of the development audio podcast. The mean statistic for the design and structure statement

ranged from 3.27 to 3.81 which the statements are closer to agreeing and strongly agreeing. The lowest-rated statement was "The design of the podcasts is attractive" (m= 3.27) dan "The length of the podcasts is appropriate for understanding their content" (m= 3.46). The highest-rated statement was "The audio of the podcasts is clear" (m= 3.81).

The third part of the acceptance test included the statements related to the content adequacy of audio podcasts as a learning tool. The mean statistic for the content adequacy statement ranged from 3.62 to 3.73 which all statements are closer to strongly agree. The lowest-rated statement was "The terminology used in the podcasts is appropriate" (m= 3.62). The highest-rated statement was "The podcasts provide a good summary of the topic being addressed" (m= 3.73) and "The content of the podcasts is relevant to the subject" (m= 3.73). The fourth part of the acceptance test included the statements related to audio podcast value as an aid to learning for the students. The mean statistic for the value as an aid to learning statement ranged from 3.38 to 3.58 which statements are closer to agreeing than strongly agreeing. The lowest-rated statement was "The podcasts encourage independent learning by students" (m= 3.38) and "I'm satisfied with the podcasts as a learning tool for this subject" (m= 3.42). The highest-rated statement was "The podcasts were a good aid to learning about the subject" (m= 3.58), "The podcasts reinforced my understanding of the subject" (m= 3.58), and "The podcasts gave me a better understanding of the subject content" (m= 3.58).

3.1 Effect Education on Knowledge

Table 2 shows the results of knowledge measurement before and after intervention in each group. Based on the table, most pretests in both groups showed good results, but the proportion in the podcast group was higher (58.8%) than the flyer group (47.1%). On posttest result, it showed an increased knowledge score in both groups. In the podcast group, subjects who had good scores increased to 28 subjects (82.4%), still higher than the flyer group which increased to 23 subjects (67.6%).

Table 4 shows the effect of education on knowledge in the podcast and flyer groups. There was a significant increase in knowledge after the intervention. In the podcast group, the mean difference of pretest-posttest score was 11.77. In the flyer group, the mean difference of pretest-posttest score was 8.59. The statistical results using the Wilcoxon test showed that there was a significant difference (p-value 0.000) between the knowledge of

adolescents before and after education with audio podcast media and flyers.

The statistical results between the podcast and flyer groups using the Mann-Whitney test showed that there was a significant difference between knowledge in the group that was educated using audio podcasts and flyers (p-value 0.007).

Table 2. The result of knowledge measurement before and after the intervention.

Variable	Category	Podcast		Flyer	
		n	%	n	%
Pretest	Good	20	58,8	16	47,1
	Sufficient	13	38,2	13	38,2
	Poor	1	2,9	5	15,7
Posttest	Good	28	82,4	23	67,6
	Sufficient	6	17,6	9	26,5
	Poor	0	0	2	5,9

3.2 Effect Education on Attitude

Table 3 shows the results of knowledge measurement before and after intervention in each group. Based on the table, most pretests in both groups showed positive results, but the proportion in the podcast group was higher (100%) than the flyer group (97.1%). On the posttest result, there's no change on attitude in the podcast group, but in the flyer group, there was a decreased in positive attitude (91.2%) and increased in negative attitude (2.9%).

Table 5 shows the results of attitudes towards anemia in the podcast and flyer groups. The table shows a change in the average score after being given education. In the podcast group, the mean difference of pretest-posttest score was 2.88. In the flyer group, the mean difference of pretest-posttest score was -0.42. The statistical results using the Wilcoxon test in both groups showed there was a significant difference between the attitudes of adolescents before and after education with audio podcast media (p-value 0.036), while there was no significant difference between the attitudes of adolescents before and after education with media flyers (p-value 0.472).

The statistical results between the podcasts and flyers groups using the Mann-Whitney test showed that there was no significant difference (p-value 0.389) between the attitudes of adolescents in the group that was educated using podcast audio and flyer.

Table 3. The result of attitude measurement before and after the intervention.

Variable	Category	Podcast		Flyer	
		n	%	n	%
Pretest	Positive	34	100	33	97,1
	Neutral	0	0	1	2,9
	Negative	0	0	0	0
Posttest	Positive	34	100	31	91,2
	Neutral	0	0	2	5,9
	Negative	0	0	1	2,9

Table 4. Effect education with the podcast on knowledge.

Variable	Pretest		Posttest		$\Delta\bar{x}$	p-value
	Min-Max	Mean \pm SD	Min-Max	Mean \pm SD		
Podcast	48 – 96	76.94 \pm 12.497	56 – 100	88.71 \pm 12.513	11.77	0.000 ^a
Flyer	40 – 96	71.65 \pm 13.622	48 – 100	80.24 \pm 13.959	8.59	0.000 ^b
$\Delta\bar{x}$		5.29		8.47		
p-value		0.139 ^c		0.007 ^c		

^apaired t-test; ^bWilcoxon; ^cMann-Whitney, p-value > 0.05

Table 5. The effect of education with the podcasts on attitude.

Variable	Pretest		Posttest		$\Delta\bar{x}$	p-value
	Min-Max	Mean \pm SD	Min-Max	Mean \pm SD		
Podcast	66 – 100	84.00 \pm 6.476	70 – 98	86.88 \pm 7.053	2.88	0.036 ^b
Flyer	54 – 100	83.24 \pm 10.375	36 – 98	82.82 \pm 13.494	-0.42	0.472 ^b
$\Delta\bar{x}$		0.76		4.06		
p-value		0.946 ^c		0.389 ^c		

^apaired t-test; ^bWilcoxon; ^cMann-Whitney, p-value > 0.05

4 DISCUSSION

Based on the results of the study found that there was an increase in students' knowledge about anemia after being given education using audio podcasts and flyers. The increase in students' knowledge of anemia in the podcast audio group was better than the flyer group, judging by the average post-test score. This finding is supported by Mayangsari's study (2019) which showed an increase in the average score of knowledge after being given podcast audio was 9.5. This occurs because the receipt of information with podcast audio contains oral explanations using easy-to-understand language so that the material is delivered clearly and effectively. According to Notoatmodjo (2012), knowledge is the result of knowing after sensing a particular object. Knowledge is essential in shaping one's actions. Efforts that can be made to improve nutrition knowledge are by participating in educational activities or nutrition counseling (Fitriani et al., 2019).

There was a significant difference in knowledge of anemia before and after podcasts and flyers intervention. This is because an audio podcast uses audio or sound that can clearly explain the material. Podcasts also make listeners imagine the content presented, in addition to containing learning materials are also clarified with music and sound effect (Indriastuti, 2014). The development of podcast audio media is also proven to produce better knowledge due to the repetition of material so that it can have an impact on improving knowledge (Mayangsari, 2019). The statistic result was supported by the subjects' acceptance of the audio podcast showed agreeing and strongly agreeing with the statement of "the podcasts provide a good summary of the topic being addressed" and "were a good aid to learning about the subject". Increased knowledge of anemia in flyer groups can occur due to the information provided in the form of text and images that can illustrate the message given. The capture of information will be received by sensors memory and processed by the brain until it becomes a new understanding so that, it can increase students' knowledge about anemia (Rusdi et al., 2021). The results of this study are supported by Gian's findings (2020) which showed the difference in the average knowledge of SMAN 10 Padang students in the prevention of anemia before and after nutrition education in podcast and control groups.

The study reported that there were significant differences between knowledge in the podcast and flyer audio groups with a mean difference of 8.47. The podcast is better to transmit information than a

flyer. Effective, efficient, interesting, and targeted media become one of the requirements for the selection of educational media, so the message delivered can be received well (Rusdi et al., 2021). Podcasts are one of the new media in the digital era as a place to produce interesting audio-based content with a long duration (Faradinna, 2020). Podcasts as an effective learning medium because they can adapt the material to the purpose of learning, able to give an idea of what is heard, and more dynamic. Podcasts can also be used anywhere and anytime through the audio player on smartphones so it is efficient as a medium of remote education (Indriastuti, 2014). It was supported by subjects' acceptance of the audio podcast, stated strongly agree with the statement of "the podcasts were easy to access the podcasts", "the podcasts were easy to find online", and "the podcasts were useful for learning about the subject". According to Helgesen (2003), stated that the process of listening aims to understand what we hear. The more you hear, the more you can understand. This study is supported by Drummond's research (2021), which reported there were significant differences in knowledge scores between podcast groups and control groups. A total of 77% of respondents in the study agreed that podcasts are an effective learning tool.

Attitude is a person's closed reaction to an object and not an action or activity but rather a predisposition to the action of a behavior (Meidiana et al., 2018). Attitude is also a person's willingness to respond to an object's stimuli, both positive and negative (Fitriani et al., 2019). Nutrition education is one of the sustainable ways to increase knowledge and also shape healthy attitudes and behaviors. Attitudes are formed not only by education but by people who are considered important, personal experience, culture, mass media, education, religion, and also emotional factors (Rusdi et al., 2021).

In this study, there were significant differences in attitudes towards anemia before and after being educated in the podcast group, but there was no significant difference in attitudes towards anemia before and after being educated in the flyer group. This is because, in addition to being informed about anemia, audio podcast groups are also given encouragement and support to change their lifestyle so that their views and attitudes are in a positive direction towards anemia in adolescents. The subjects' acceptance toward audio podcasts were in strongly agree with the statement of "The podcasts gave me a better understanding of the subject content". While in the flyer group, only informed about anemia and there's no encouragement and

support sentence to change their attitude. According to Edgar Dale's Cone of Experience (1969), stated that audio recording and still pictures have more experience in remembering information than verbal symbols (Sari, 2019).

The study reported that there was no significant difference between female adolescent's attitudes in podcast and flyer groups. The increased in attitude scores of the podcast group is not that high. This is because a person's attitude could not easily change in a short time, it takes a longer period to get a change in attitude in a more positive direction. In addition, attitude is not only influenced by knowledge but also personal experience and emotional factors, so that good knowledge is not always accompanied by a positive change in attitude (Rusdi et al., 2021). This study is supported by Rusdi's study (2021), which stated there was no significant difference between female adolescent's attitudes in Instagram and WhatsApp groups. There was a decrease in female adolescent's attitude scores after education in the WhatsApp group with a mean difference of -0.90.

5 CONCLUSION

In this study, there were significant increase of knowledge and attitude score in podcast, but for flyer group, the significant increase was only in knowledge score. The podcast is significantly effective to increase knowledge than flyers but not for attitude.

Implementation of using audio podcasts in improving knowledge and attitudes towards anemia is highly recommended and can be a new media of nutrition education tool, however, it is necessary to review the distance, time of education, length of duration, and design of the audio podcast in order to improve understanding of the information provided through an audio podcast. Further research is suggested comparing the effectiveness of online and offline interventions with audio podcasts.

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