



Effect of nutrition education using the podcast method on adolescent girls' knowledge and attitudes on anemia in Central Jakarta

Pengaruh edukasi gizi dengan metode audio podcast tentang anemia terhadap pengetahuan dan sikap pada remaja putri di Jakarta Pusat

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Abstract

Anemia is one of the nutritional problems in Indonesia and is the higher number in female adolescents. Anemia was caused by low nutrition intake, high intake of inhibitors, and low adherence to an iron tablet. Therefore, there should be new education methods to increase knowledge and attitudes toward anemia prevention during the COVID-19 pandemic. 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 4 State Senior High School, Central Jakarta. We divided subjects into two groups, the podcast group as an intervention group and the flyer group as a control group. The intervention was conducted in four phases over two weeks period. Pretests and posttests were collected using an online questionnaire shared through a messaging platform. Posttests were conducted twice, after the intervention and two weeks after the intervention. We analyzed data using Wilcoxon and Mann-Whitney test with $\alpha = 0,05$. The results showed there was an increase in knowledge ($p = 0,000$) and attitude ($p = 0,036$) scores in the audio podcast group, but for the flyer group, the significant increase was only in knowledge scores ($p = 0,000$). However, there was no difference increase in both methods ($p > 0,05$). The podcast was significantly more effective in increasing knowledge ($p = 0,007$) than flyers, but not for attitudes ($p = 0,389$). Podcasts could be an alternative education method for adolescents. It shows effectiveness in increasing knowledge but not in attitudes, which needs more study.

Keywords: Anemia, attitude, education, knowledge, podcast

Abstrak

Anemia merupakan salah satu masalah gizi di Indonesia, dan jumlahnya tinggi pada remaja putri. Anemia disebabkan oleh rendahnya asupan zat gizi, tinggi asupan inhibitor, dan rendahnya kepatuhan dalam konsumsi zat besi. Oleh karena itu, seharusnya ada metode edukasi yang baru untuk pencegahan anemia selama pandemi covid-19. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh edukasi dengan media audio podcast tentang anemia terhadap pengetahuan, sikap, dan asupan zat gizi. Jenis penelitian ini adalah quasi-experimental dengan desain pretest-posttest control group. Responden penelitian sebanyak 68 remaja perempuan di SMA Negeri 4 Jakarta Pusat. Responden dibagi menjadi kelompok audio podcast sebagai kelompok intervensi dan kelompok flyer sebagai kelompok kontrol. Intervensi dilakukan dalam 4 fase dalam periode 2 minggu, pretest dan posttest dikumpulkan menggunakan kuesioner online yang dibagikan dalam grup aplikasi online. Posttest dilakukan dua kali, setelah intervensi dan 2 minggu setelah intervensi. Analisis data dilakukan dengan menggunakan Wilcoxon dan Mann-Whitney test dengan $\alpha = 0,05$. Hasil penelitian menunjukkan ada peningkatan skor pengetahuan ($p = 0,000$) dan sikap ($p = 0,036$) pada kelompok audio, kecuali pada kelompok flyer peningkatan signifikan hanya pada skor pengetahuan ($p =$

0,000). Audio podcast secara signifikan efektif untuk meningkatkan pengetahuan ($p= 0,007$) daripada flyer, tetapi tidak untuk sikap ($p= 0,389$). Podcast bisa menjadi metode pendidikan alternatif bagi remaja, Ini menunjukkan efektivitas dalam meningkatkan pengetahuan tetapi tidak untuk sikap, yang perlu studi lebih lanjut untuk membuktikannya.

Kata Kunci: Anemia, edukasi, pengetahuan, podcast, sikap

Introduction

One of the goals of the Sustainable Development Goals (SDGs) is to end all forms of malnutrition and overcome the nutritional needs of adolescents, pregnant women, and the elderly (Sustainable Development Goals (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 (WHO, 2021). 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 & Roser, 2020). It may cause malnutrition impact including poor physical dan mental development, and losses in productivity.

The World Health Organization (WHO) 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 & Fitriani, 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 Jakarta was 44,6% and based on the research result most of it is caused by inadequate iron intake from food (Anggraeni, 2010; Junengsih & Yuliasari, 2017; Saptyasih et al., 2016). A study stated that a total of 82% of adolescents in high school in Central Jakarta had inadequate iron intake which may increase the

risk of anemia (Hendarto et al., 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., 2022; Ni'matush Sholihah et al., 2019). According to Sholicha & Muniroh's study (2019), there was a significant association between protein and vitamin C intake on hemoglobin levels in Senior High School 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 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 (Indonesia, 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 & Dyah Kusudaryati, 2016). Efforts to increase dietary iron intake can be done through education or nutrition counseling for adolescents. Nutrition education or counseling is an educational approach to produce individual behavior that can improve food improvement and nutritional status (Fadila & Kurniawati, 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 & Eko, 2019).

The study conducted by Ardiati et al., (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. The better knowledge provided, the better behavior that will be carried out so that it will prevent a disease (Laksmi & Yenie, 2018)

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 (Indonesian Statistics, 2019).

In 2020, many digital educational media innovations are being developed to be used for nutrition education 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. Eka (2018), reported through Daily Social stated that 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 & Tiara, 2019). The study of Rockhill et al., (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. In 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 & Gunawan, 2019). In another study, audio podcasts were also effective in increasing the confidence of health workers in performing clinical skills (O'Connor et al., 2020).

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

Methods

A quasi-experimental with a control group design was conducted on female adolescents of Senior High School 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 subjects.

The sample was calculated following study Widodo & Gunawan (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. The sample was calculated with the following formula:

$$n = \frac{2\sigma^2 [Z_{1-\alpha} + Z_{1-\beta}]^2}{[\mu_1 - \mu_0]^2}$$

Where:

n = Sample size

σ = Deviation standard

Z_{α} = Level of significant = 1,645

Z_{β} = Power of test (0,20 = 0,842)

μ_1 = Average variable score after intervention

μ_0 = Average variable score before intervention

Stratified random sampling was conducted using student list. All students in SMA Negeri 4 are

stratified into X and XI classes. Each class was taken randomly using Ms. Excel formula 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.

Table 1. Description of educational method

Components	Educational methods	
	Podcast	Flyer
Key message	anemia, a balanced diet, iron-rich foods, and iron supplementati on	anemia, a balanced diet, iron-rich foods, and iron supplementati on
Media and instrument	Podcast, distributed through WhatsApp	Flyers, distributed through WhatsApp
Facilitators	Researcher	Researcher
Frequency and duration	twice per week, for 2 weeks period	twice per week, for 2 weeks periods

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 (<https://spoti.fi/3wEiAE3>). The podcast 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 (<https://promkes.kemkes.go.id/flyer-anemia-15x21cm>). The subject who had accessed the media has to list their name in the WhatsApp group. We used flyer as comparison to podcast because it's the general method we have used in our government, so we would like to see the difference effect of new method with orthodox method.

The podcast development step begins with determining the theme and ends with an audio podcasts acceptance test using the Questionnaire for Assessing Educational Podcasts (QAEP)

(Alarcón & Blanca, 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.

Pretest and posttests were collected using an online questionnaire which was shared through the whatsapp group. The questionnaire was modified from previous studies (Aditian, 2009; Runkat, 2019; Sembiring, 2015). Questionnaires were validated through face validity by the panel of experts, and quantitative validity using Spearman correlation analysis.

Knowledge questionnaires consist of 25 questions with multiple choice options with a validity of 25 questions and reliability of Cronbach alpha 0,733. Each question is scored 10 points, and for a total 250 points, then we categorized of total points as good (76-100%), sufficient (56-75%), and poor (0-55%).

Attitude questionnaires consist of 10 questions with a Likert scale ranging from 1-5 with a validity 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 a total 50 points, then we categorized of total points with positive (61-100%), neutral (41-60%), and negative (0-40%).

Posttests were conducted twice, at 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 the Kolmogorov-Smirnov test. All the data are not normally distributed. Data were analyzed using Wilcoxon for difference means before and after the intervention; and Mann-Whitney for difference mean between two groups, with a significance level of 95%.

Result and Discussion

The distribution of demographic information on the subject is presented in Table 2. No significant difference in characteristic between podcast and flyer groups ($p > 0,05$). A total of 68 subjects have been enrolled, most subjects aged 15 - 16 years in both groups.

The flyer group had a balanced proportion between subjects in grades X and XI (50%), while subjects in grade XI were more in the podcast group

(52,9%). Most subjects in both groups had a lower monthly allowance, had been exposed to information about anemia through social media, and subjects' fathers worked as private employees, while subjects' mothers did not work.

Table 2. Demographics information

Variable	Podcast		Flyer		p-value
	n	%	n	%	
Age					
15 - 16	22	64,7	20	58,8	0,618
17 - 18	12	35,3	14	41,2	
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	
> Rp. 3,000	10	29,4	15	44,1	
Mother's Education					
Low	5	14,7	9	26,5	0,211
Middle	19	55,9	12	35,3	
High	10	29,4	13	38,2	
Mother's Occupation					
Employed	8	23,5	11	32,4	0,417
Unemployed	26	76,5	23	67,6	
Mother's Income (.000)					
< Rp. 1,000	27	79,4	21	61,8	0,253
Rp. 1,000 - Rp. 3,000	4	11,8	6	17,6	
> Rp. 3,000	3	8,8	7	20,6	
Exposed Information Related to Anemia					
Yes	29	85,3	29	85,3	1,000
No	5	14,7	5	14,7	
Information Source					
Books	2	6,9	3	10,3	0,611
Parents	2	6,9	0	0	
Social Media	13	44,8	16	55,2	
Health workers	6	20,7	5	17,2	
Web	6	20,7	5	17,2	

Most father and mother education in the audio podcast group was in secondary education, while the flyer group were in higher education. The father's Income in the audio podcast group was in the middle-upper class, while the flyer group was in the higher class. Most of the mother's Income in both groups was in lower class.

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 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 statements about 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 all statements are closer to agree strongly. 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).

Effect Education on Knowledge

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 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 3. Knowledge and attitude before and after the intervention.

Var.	Category	Podcast		Flyer	
		n	%	n	%
Knowledge					
Pre	Good	20	58,8	16	47,1
	Suffic.S	13	38,2	13	38,2
	Poor	1	2,9	5	15,7
Post	Good	28	82,4	23	67,6
	Suffic.	6	17,6	9	26,5
	Poor	0	0	2	5,9
Attitude					
Pre.	Positive	34	100	33	97,1
	Neutral	0	0	1	2,9
	Negative	0	0	0	0
Post.	Positive	34	100	31	91,2
	Neutral	0	0	2	5,9
	Negative	0	0	1	2,9

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 in pretest-posttest score was 11,77. In the flyer group, the mean difference in 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).

Effect Education on Attitude

Table 3 shows the results of attitude 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 in the flyer group (97,1%). On the posttest result, there's no change in attitude in the podcast group, but in the flyer group, there was a decrease in positive attitude (91,2%) and increase in negative attitude (2,9%).

Table 4 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 an education. In the podcast group, the mean difference of pretest-posttest score was 2,88. In the flyer group, the mean difference in 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= 0,389) between the attitudes of adolescents in the group that was educated using podcast audio and flyer.

Table 4. Effect education with the podcast on knowledge and attitude

Methods	Mean±SD		$\Delta\bar{x}$	p-value
	Pretest	Posttest		
Knowledge				
Podcast	76,94±12,49	88,71±12,51	11,77	0,000 ^a
Flyer	71,65±13,622	80,24±13,95	8,59	0,000 ^b
$\Delta\bar{x}$	5,29	8,47	3,176	
p-value	0,139 ^c	0,007 ^c	0,639 ^c	
Attitude				
Podcast	84,00±6,47	86,88±7,05	2,88	0,036 ^b
Flyer	83,24±10,37	82,82±13,49	-0,42	0,472 ^b
$\Delta\bar{x}$	0,76	4,06	3,294	
p-value	0,946 ^c	0,389 ^c	0,384 ^c	

^apaired t-test; ^bWilcoxon; ^cMann-Whitney, p-value > 0,05

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. 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 increase in students' knowledge of anemia in the podcast audio group was better than in the flyer group, judging by the average posttest score. 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 & Saksono, 2015). 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 & Tiara, 2019).

Reception of information by audio podcast is higher than flyer because audio podcast contains oral explanations using easy-to-understand language so that the material is delivered clearly and effectively. This finding is supported by Mayangsari & Tiara's study (2019) which showed an increase in the average score of knowledge after being given podcast audio was 9,5. 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 & Eko, 2019).

There was a significant difference in knowledge of anemia before and after podcasts and flyers intervention. The statistical 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".

The study reported that there were significant differences between knowledge in the audio podcast and flyer groups with a mean difference of 8,47. A 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, are able to give an idea of what is heard and are 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 & Saksono, 2015). It was supported by subjects' acceptance of the audio podcast, stated strongly agree with the statement "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 et al., 2007), 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 et al., 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 (Fitriani & Eko, 2019). Nutrition education is one of the sustainable ways to increase knowledge and 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 of audio podcasts was in strongly agreed with the

statement "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 adolescents' attitudes in podcast and flyer groups. The increase in knowledge and attitude scores are not significant between two groups. 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 by personal experience and emotional factors, so good knowledge is not always accompanied by a positive change in attitude (Rusdi et al., 2021).

This study is supported by Rusdi et al.,'s study (2021), which stated there was no significant difference between female adolescents' attitudes on 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. This study used quasi experimental design that quasi-experimental designs do not use random sampling in constructing experimental and control groups. Using non-uniform comparison groups can limit generalization of the findings because non-controlled variables may have influenced the results.

Conclusion

In this study, there were significant increase of knowledge and attitude scores about anemia in the podcast group, but for the flyer group, the significant increase was only in the knowledge score. The podcast is significantly more 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 to compare the effectiveness of online and offline interventions with audio podcasts.

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