

The Effectiveness of Education through Animated Media to Improve Teenage Girl's Knowledge and Attitudes about Prevention of Anemia

U. Aniroh^{1*}, T. Mawardika², Zumrotul Choiriyah³
¹²³ Faculty of Health, Universitas Ngudi Waluyo, Indonesia

Corresponding email: umianiroh@unw.ac.id

Abstract. Reproductive health is an important topic to get attention, especially among teenagers. Teenager involves growth, change, the existence of various occasions, and reproductive health risks, one of which is anemia, which will be at risk for the teenager's reproduction in undergoing further developmental tasks. One of the causes of anemia among teenage girls is iron loss through the blood that comes out during menstruation every month and other factors, such as food intake, disease, lack of knowledge, and other factors. One effort to prevent anemia is carried out by education with animated media. The information received will be longer and better because it involves more five senses and creates a strong impression in the memory. This study aimed to determine the effectiveness of animated media on the knowledge and attitude of teenage girls about the prevention of anemia. The study was conducted at Nahdlatul Ulama Vocational High School of Semarang Regency in December 2020. The research used a quasi-experimental design with a pretest-posttest control group design. The variables of knowledge and attitudes are measured before and after being given anemia prevention education with animated media. Data collection used the research subjects of 60 respondents divided into two groups, namely the treatment group and control group. The data analysis employed paired t-test with a significance level of 95% ($p < 0.05$). The results showed that education through effective animated media against teenage girl's knowledge (p -value 0.044) and attitude (p -value 0.043) about the prevention of anemia. The results of this study can be used as consideration for applying health education, especially the prevention of anemia in teenage girls on a broader order, namely the community.

Keywords: animated media, teenager girl, anemia prevention

1. Introduction

The development of the reproductive system of teenage girls is not only influenced by the condition of the nutritional status but also the other health problem that often appears in teenagers is anemia. Anemia causes anoxia (lack of supply of oxygen) to the body's organs because of the reduced amount of oxygen brought in blood to the network. This causes a decrease in body organs and disruption of body metabolism, including influencing the reproductive system. Additionally, anemia will also cause cognitive changes and behavior in women of reproductive age [1].

One of the causes of anemia in a menstrual teenager that can occur in the age range of 10-16 years or the early days of a teenager, the volume of blood that came out during menstruation resulting in iron loss of as much as 12-15 mg per month or 0.4-0.5 mg per day. At the time of menstruation, women experienced iron loss. They experienced basal loss, so if the woman per day experiences iron loss of 1.25 milligrams, the volume of blood that exits each month ranges from 30-50 cc [2]. Previous research proved a significant relationship between hemoglobin levels and the menstrual cycle [3]. There was a significant relationship between hemoglobin levels and nutritional status with menstrual cycle patterns at the end of a teenager [4]. Anemia can also be caused by coagulation abnormalities that can lead to disruption of the menstrual cycle patterns if left untreated. The order of menstrual cycles is very important for women because it is associated with fertility levels. The menstrual distance that is too long can sign that ovulation does not happen in a woman's body. Irregular menstrual cycles in adolescents can also interfere with their learning achievement because hormone irregularities in the body can cause teenagers to be vulnerable to

stress, sensitivity, and psychological disorders that influence learning interest and school achievements [5].

The World Health Organization reports that the prevalence of anemia among adolescent women in Southeast Asia reaches 45.7% [6]. Basic Health Research of The Ministry of Health reported that from 2013 to 2018, there was an increase in the prevalence of anemia in the 15-24 year age group, namely 18.4% to 32% or 14.7 million people [7]. The incidence of anemia in Central Java in 2013 reached 57.1% [8]. Previous research has shown that 46% of young women experience anemia among high school students [9].

The high incidence of anemia in adolescent girls is correlated with the low level of adolescent knowledge [10]. One of the contributing factors is the lack of information obtained by young women, so that knowledge is still not sufficient and attitudes. Because knowledge has a relationship with adolescent attitudes about anemia [11], therefore health promotion efforts are needed by providing adequate anemia prevention education both in concept and in the media used to convey the message.

Currently, there are various kinds of communication methods and media to convey messages, one of which is animation media. By applying animated media, delivering messages will be more interactive because the media displays images that can move and make a sound [12]. Additionally, learning with animation media involves the sense of sight and the sense of hearing. The more senses that play a role in learning, the easier it is for students to remember and understand the material [13]. Extension with animation media can influence and increase the score of knowledge and attitudes of young women about anemia towards changes in knowledge and attitudes of young women about anemia [14]. The use of animation media in the learning process can also lead to positive benefits or certain values [15]. Based on the reasons mentioned above, this study aims to develop animated media as educational media to increase the knowledge and attitudes of young women about anemia prevention.

2. Method

2.1. Participants

The participants consisted of 60 female senior high school students from Nahdlatul Ulama Vocational High School Ungaran, Semarang Regency who were divided into two groups, 30 participants as treatment or intervention group and 30 participants as the control group who fulfill the following criteria: 1). All students who are registered as active students, 2). Students who have experienced menstruation for at least the last 1 year, 3) Students who have regular menstrual patterns, 4). Students who have a smartphone, and 5). Students who are willing to follow the whole series of research processes. Meanwhile, the exclusion criteria in this study were students who experienced the chronic disease. The age range of the respondents was 16-17 years.

2.2. Materials

The measurement of the independent variable used a questionnaire consisting of 12 questions about knowledge using multiple choice answers. The attitude variable consisted of ten statement items using a Likert scale model. Education on anemia prevention was designed by researchers using animated media developed and validated by experts, then trials on a small scale were conducted.

2.3. Procedure

The 60 respondents were then given a questionnaire via google form about knowledge and attitudes to prevent anemia. After both groups filled in the questionnaires, the intervention group was then given education through animated media about anemia prevention for 30-40 minutes, while the control group was not given education. Then the questionnaire was filled in again via google form by the intervention group and the control group for the next 1 week.

3. Result

3.1. Characteristics of Age Respondents

Table 1. Characteristic of Age Respondents

Age	n	Mean (year)	Deviation Standard (year)
Control	30	17,4667	8,31407
Intervention	30	16,8667	7,78154

Table 1 shows the age respondents who are most frequently seventeen years old for control or intervention groups.

3.2. Distribution of Respondents' Knowledge Categories

Table 2. Distribution of Knowledge Categories before and after Anemia Prevention Education in the Intervention and Control Groups

Knowledge Category	Intervention		Control	
	Pre (%)	Post (%)	Pre (%)	Post (%)
Good	28 (93,3)	30 (100)	27 (90,0)	29 (96,7)
Less	2 (6,7)	0 (0)	3 (10,0)	1 (3,3)
Total	30 (100)	30 (100)	30 (100)	30 (100)

Before and after anemia prevention education in the intervention group, the knowledge category showed that the majority of knowledge before education was 28 respondents (93.3%) and 30 respondents (100%) after education. In the control group, 27 respondents (90.0%) had good knowledge before education and 29 respondents (96.7%) after education.

3.3. Distribution of Respondents Attitude Categories

Table 3. Distribution of Attitude Categories before and after Anemia Prevention Education in the Intervention and Control Groups

Attitude Category	Intervention		Control	
	Pre (%)	Post (%)	Pre (%)	Post (%)
Positive	26 (86,7)	30 (100)	25 (83,3)	26 (86,7)
Negative	4 (13,3)	0 (0)	5 (16,7)	4 (13,3)
Total	30 (100)	30 (100)	30 (100)	30 (100)

The pre and post-education attitude categories for anemia prevention in the intervention group showed a positive majority of pre-education attitudes as many as 26 respondents (86.7%) and after education as many as 30 respondents (100%). In the control group, most pre-education

attitudes were positive as many as 25 respondents (83.3%) and post-education as many as 26 respondents (86.7%).

3.4. Differences of Knowledge and Attitude in the Pretest and Posttest of Control Group

Table 4. The Differences of Knowledge and Attitude in the Pretest and Posttest of Control Group

Variable	Test	n	Mean	Deviation std	Mean different	t	p-value	95% interval diff	
								lower	Upper
Knowledge	Pretest	30	47,600	2,197	0,267	1,47	0,164	-	0,656
	Posttest	30	47,330	2,609					
Attitude	Pretest	30	33,410	2,186	0,256	1,33	0,211	-	0,831
	Posttest	30	33,215	2,423					

Table 4 shows that the pretest rate of anemia prevention knowledge of the control group is 47,600 with a deviation standard of 2,197, while the posttest rate is 47,330 with a deviation standard of 2,609. The different rate of pretest and posttest (mean difference) of the control group is 0,267 with lower -0,123 and upper 0,656. The Dependent t-test result is p-value = 0,164. Because the p-value > 0,05, there is not significant pretest and posttest of knowledge in the control group.

The pretest rate of anemia attitude of the control group is 33,410 with a deviation standard of 2,186, and the posttest rate is 33,215 with a deviation standard of 2,423. The pretest and post-test differences rate (mean difference) of the control group is 0,256 with lower -0,119 and upper 0,831. The Dependent t-test result is p-value = 0,211. Because the p-value > 0,05, there is not significant pretest and posttest of attitude in the control group.

3.5 Differences of Knowledge and Attitude in the Pretest and Posttest of Intervention Group

Table 5. The Differences of Knowledge and Attitude in the Pretest and Posttest of Intervention Group

Variable	Test	n	Mean	Deviation std	Mean different	t	p-value	95% interval diff	
								lower	Upper

Knowledge	Pretest	30	47,800	2,145	3,933	3,133	0,007	1,241	6,626
	Posttest	30	61,866	5,668					
Attitude	Pretest	30	33,741	2,152	5,756	3,273	0,006	1,659	8,876
	Posttest	30	40,165	6,433					

Table 5 shows that the pretest rate of anemia prevention knowledge of the intervention group is 47,800 with a deviation standard of 2,145, while the posttest rate is 61,866 with a deviation standard of 5,668. The pretest and post-test difference rate (mean different) of the intervention group is 3,933, with lower 1,241 and upper 6,626. The Dependent t-test result is $p\text{-value} = 0,007$, because of $p\text{-value} < 0,05$, there is significant pretest and posttest of knowledge at intervention group.

The pretest rate of anemia attitude of the intervention group is 33,741 with a deviation standard of 2,152, and the *posttest* rate is 40,165 with a deviation standard of 6,433. The pretest and post-test difference rate (*mean different*) of the intervention group is 5,756 with lower 1,659 and upper 8,876. The *Dependent t-test result is p-value = 0,006* because of $p\text{-value} < 0,05$, there is significant.

There was no significant difference in the average increase in knowledge and attitudes in the control group. In contrast, there was a significant difference in the average increase in knowledge and attitudes in the intervention group. Based on these results, it can be concluded that the knowledge and attitudes of a teenage girl towards anemia prevention in the two groups differed significantly.

3.6. The Effectiveness of Animated Media to Improve Knowledge and Attitude of Teenager Girl about Anemia Prevention

Table 6. The Effectiveness of Animated Media to Improve Knowledge and Attitude of Teenager girl about Anemia Prevention

Variable	Group	n	Mean	Deviation std	Mean difference	t	p-value
Knowledge	Control	30	47,33	2,609	3,467	2,152	0,044
	Intervention	30	56,87	5,668			
Attitude	Control	30	38,13	2,874	3,286	2,842	0,043
	Intervention	30	49,72	5,715			

Table 6 shows that the control group rate of anemia prevention knowledge is 47,33 with a deviation standard of 2,609, while the intervention group rate is 56,87 with a deviation standard of

5,668. The different rate of the control and intervention group (*mean different*) is 3,467. The *independent t-test result is p-value = 0,044*, because *p-value < 0,05* shows that the animated media effectively improves the knowledge of teenage girls about anemia prevention.

The control group rate of anemia prevention attitude is 38,13 with a deviation standard of 2,874, while the intervention group rate is 49,72 with a deviation standard of 5,715. The different rate of the control and intervention group (*mean different*) is 3,286. The *independent t-test result is p-value = 0,043*, because of *p-value < 0,05*, there is *animation media effectively improving the attitude of teenage girls about anemia prevention*.

4. Discussion

In this study, it was found that the average age of the respondents was 16-17 years. This age range is included in the adolescent category, where teenagers are those who are in the transitional stage between childhood and adulthood [16]. At this time, teenager cognitive development occurs, including changes in mental abilities such as learning, memory, reasoning, thinking, and language [17]. Teenagers begin to have the capacity to acquire and use knowledge efficiently. They reach their peak due to brain growth reaching perfection. The nervous system that functions to process information develops rapidly [18]. During this period, it is important to provide adequate information about reproductive health, one of which is preventing anemia in adolescence. The accelerated growth of female adolescents is the basis for the quality of health and intergenerational life [19]. The nutritional status of women is a key element in reproductive health, including pre-pregnancy, pregnancy, and the health of breastfeeding mothers [20]. Lack of adolescent knowledge about health is a significant problem. Knowledge is the entrance to awareness which will be the basis for changes in better health behavior [21].

Education in this study was provided so that respondents had sufficient knowledge about anemia prevention, which hoped that they would also behave and take measures to prevent anemia. Attitudes based on knowledge will last longer than attitudes based on knowledge [22]. Respondents who agree with the information about anemia prevention have a positive attitude and vice versa. People who disagree with information about anemia prevention have negative attitudes. The results of this study are in line with the results of previous studies on the effect of nutrition education interventions with animation media on increasing knowledge and attitudes about young women, which indicate that the attitude of the subject before and after the intervention [14].

Based on the data analysis, it was concluded that there was an increase in teenage girls' knowledge and attitudes after being given education about anemia prevention. The increase in knowledge and attitudes of young women in the intervention group was higher than the control group. This indicates that the development of animation learning media can improve learning outcomes, as indicated by an increase in teenage girls' knowledge score and attitudes about anemia prevention [26].

Several factors based on the findings of the researchers, among others, are: 1) learning to use animation media make respondents more excited because there has never been education on anemia prevention with using the previous animation media, 2) the appearance of an attractive animation media and accompanied by moving pictures motivate respondents to learn the concept of anemia prevention that has never been obtained, 3) visualization using moving images makes respondents interested in the concept of anemia prevention so that it can increase respondents' understanding of the material. These results are also supported by several previous studies that stated that multimedia positively affects biology learning achievement in students [23]. Other research shows that multimedia can increase student interest and learning achievement in physics [24], and animation media can also stimulate student interest and learning outcomes [25]. The use of animation media effectively improves student learning outcomes because learning with animation media involves the senses. Sight and hearing will make it easier for students to remember and understand the material [12], besides learning more meaningful if it involves many senses [13].

5. Conclusion

1. There is no significant difference in respondents' level of knowledge and attitudes in the control group.
2. There is a significant difference in the knowledge and attitudes of the respondents before and after being given education in the intervention group.
3. Education through animation media effectively affects the knowledge and attitudes of teenage girls about anemia prevention.

The results of this study can be a consideration for applying health education, especially the prevention of anemia in teenager girls, in a broader setting, namely the community and the school organizing regular educational activities in collaboration with health education agencies and health centers or local health offices.

6. References

- [1] L.E. Murray-Kolb, "Iron status and neuropsychological consequences in women of reproductive age: what do we know and where are we headed?," *J Nutr.*,141:747S–755S, 2011.
- [2] R. Fitrianingtyas, "Usia menarche, status gizi, dan siklus menstruasi santri putri," *Jurnal preventia*, Vol.2,2017.
- [3] A. Wahyuningsih,"Hubungan Kadar Hemoglobin Dengan Keteraturan Siklus Menstruasi Pada Mahasiswi Prodi D III Kebidanan Tingkat III Stikes Muhammadiyah Klaten," *Jurnal Involusi Kebidanan*, Vol. 2, No. 3, January 2012, 34-45, 2012.
- [4] T. Anggarini dan F.Cahyaningrum, " Hubungan Kadar Hemoglobin dan Status Gizi Dengan Siklus Menstruasi pada Remaja Akhir Akademi Kebidanan Kota Semarang," *Jurnal Dinamika Kebidanan*,Vol. 2 No.1,January 2012.
- [5] Verawaty & Rahayu, " Menjaga dan Merawat Kesehatan Seksual Wanita," Bandung, Grafindo Media Pratama,2011.
- [6] <https://www.who.int/data/gho/data/themes/topics/topic-details/GHO/world-health-statistics>
http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
- [8] Dinas Kesehatan Provinsi Jawa Tengah, "Profil Kesehatan Provinsi Jawa Tengah 2013," Semarang : Dinkes Prov. Jateng,2014.
- [9] S. Novitasari, " Hubungan Tingkat Asupan Protein, Zat Besi, Vitamin C, dan Seng dengan Kadar Hemoglobin pada Remaja Putri di SMA Batik 1 Surakarta, Karya Tulis Ilmiah,Universitas Muhammadiyah Surakarta,2014.
- [10] F. A.Yunita et.al., " The Relationship Between The Level Of Knowledge Of Teenagers (Girl) About Iron Consumption With The Incidence Of Anemia In SMP 18 Surakarta," *Placentum Jurnal Ilmiah Kesehatan dan Aplikasinya*, Vol.8 no.1, 2020.
- [11] L. N. Tambunan, W. Araya, N. Safitri, " Hubungan Tingkat Pengetahuan dengan Sikap tentang Anemia Defisiensi Besi dan Dampaknya terhadap Kesehatan Reproduksi pada Remaja Putri," *Dinamika Kesehatan: Jurnal Kebidanan dan Keperawatan*, LPPM Universitas Sari Mulia, Banjarmasin Kalimantan Selatan. Vol.7.no.2 ,2016.
- [12] D. Oktarini, et al., " Efektivitas Media Animasi terhadap Hasil Belajar Biologi Siswa SMPN 2 Kediri," *Jurnal Pengkajian Ilmu dan Pembelajaran Matematika dan IPA*,Vol. 2,No.1, 2014.
- [13] A.Arsyad, "Media Pembelajaran," Jakarta: Raja Grafindo Persada, 2011.

- [14] S. Syakir, "Influence of nutrition education using animation media on knowledge and attitude about anemia of adolescence girls," *Arsip Gizi dan Pangan*, vol.3, no.1, pp 3, 2018.
- [15] N. Wahyunitasari dan A. Samawi, "Pengaruh Penggunaan Media Animasi Terhadap Hasil Belajar IPA Siswa Slow Learner," *Jurnal P3LB*, Vol.1, No.2, pp 140, 2014.
- [16] S. Anugrahadi, "Mengenal Remaja Generasi Z (Dalam Rangka memperingati Hari Remaja Internasional)," <http://ntb.bkkbn.go.id/?p=1467>.
- [17] Y. Jahja, "Psikologi Perkembangan," Jakarta: Kencana, Koshigaya, Osamu, 2012.
- [18] Y.N.E. Sary, "Buku Ajar Psikologi Pendidikan," Yogyakarta: Parama Publishing, 2015.
- [19] Kementerian Kesehatan RI, "Pedoman pencegahan dan penanggulangan anemia pada remaja putri dan wanita usia subur" Jakarta: Kementerian Kesehatan RI, 2016.
- [20] T. Sudargo, T. Aristasari, A. Afifah, "1000 Hari pertama kehidupan" <https://ugmpress.ugm.ac.id/id/product/kedokteran-umum/1000-hari-pertamakehidupan>, 2016.
- [21] I. Aritonang, "Merubah perilaku untuk hidup sehat: teori dan praktik upaya preventif-promotif dalam mewujudkan GERNAS perbaikan gizi dan PHBS," Yogyakarta: Leutikabooks, 2014.
- [22] S. Notoatmodjo, "Promosi Kesehatan dan Perilaku Kesehatan" Jakarta: Rineka Cipta, 2014.
- [23] Y.H. Cheng, J.T. Cheng, D.J. Chen, "The Effect of Multimedia Computer Assisted Instruction and Learning Style on Learning Achievement. WSEAS Transactions on Information Science and Applications, Issue 1, Volume 9, January, 2012
- [24] B.A. Adegoke, "Effect Of Multimedia Instruction On Senior Secondary School Students Achievement In Physics" *European Journal Of Education Studies* Vol.3 ,No.3, 2011.
- [25] A. Salim, Astuti, Ishafit dan M. Toifur, "Pemanfaatan Media Pembelajaran (Macromedia Flash) Dengan Pendekatan Konstruktivis Dalam Meningkatkan Efektivitas Pembelajaran Fisika Pada Konsep Gaya, Prosiding Seminar Nasional Penelitian, Pendidikan dan Penerapan MIPA, Fakultas MIPA, Universitas Negeri Yogyakarta, may 2011.
- [26] S. Apriyanto and A. Anum, "Gender Dynamics on Speaking Interaction in the College Classroom," *J. Smart*, vol. 4, no. 2, p. 73, 2018, doi: 10.26638/js.692.203x.