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Animated Video Anemia Education and its Effect on Iron Tablet Adherence and Hemoglobin Levels among Female Adolescents at SMPN 17 Samarinda

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Abstract

Background: Adolescent girls are at high risk of anemia. Health screening in 2021 showed that 46.15% of adolescent girls at SMPN 17 Samarinda were at risk of anemia. Limited knowledge and low awareness remain major challenges in anemia prevention and management.
Objective: This study aimed to examine the effect of anemia education using animated videos on adherence to iron tablet consumption and hemoglobin levels among adolescent girls at SMPN 17 Samarinda.
Methods: This quantitative study employed a quasi-experimental pretest–posttest control group design. A total of 36 respondents were selected using purposive sampling and divided into an experimental group receiving animated video education (n = 18) and a control group receiving leaflet-based education (n = 18). The study was conducted from May to July 2023. Data were collected using the MMAS-8 questionnaire to assess adherence and hemoglobin level measurements. Data were analyzed using Wilcoxon and Mann–Whitney tests with a significance level of $\alpha = 0.05$.
Results: The experimental group showed significant improvements in iron tablet adherence ($p = 0.000$) and hemoglobin levels ($p = 0.000$). In the control group, adherence increased significantly ($p = 0.000$), but no significant change in hemoglobin levels was observed ($p = 0.112$). Significant differences between groups were found for adherence ($p = 0.002$) and hemoglobin levels ($p = 0.001$).
Conclusion: Animated video–based anemia education was more effective than leaflet-based education in improving adherence to iron tablet consumption and hemoglobin levels among adolescent girls. Future studies should include assessments of iron-rich dietary intake to obtain more comprehensive findings

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INTRODUCTION

Aisah et al., (2022) Youth are the nation's future assets who have a key role in facing upcoming challenges, and are expected to be able to achieve achievements and be able to face challenges that exist in the future. To create the nation's next generation who have high creativity, competitiveness, and productivity, it is important to pay attention to the health and nutritional

status of adolescents from an early age. In Indonesia, nutritional problems, especially in the form of micronutrients such as anemia in adolescents, are one of the significant factors in influencing their health conditions (Priliani et al., 2025). Adolescent girls are at high risk of anemia due to increased iron requirements during growth and menstruation, which may negatively affect health and productivity (Aisah et al., 2022). Recent systematic reviews have shown that adherence to iron supplementation remains a critical challenge among adolescent girls globally, with multiple determinants including knowledge, attitudes, and perceived benefits influencing compliance rates (Silitonga et al., 2023).

Anemia is a condition in which the body experiences a shortage of red blood cells or insufficient hemoglobin levels in accordance with the physiological needs of the body (World Health Organization, 2024). Limited knowledge and low awareness regarding anemia remain major challenges in preventing and managing this condition. The incidence rate of anemia in the world in women of childbearing age (15-49 years) is 29.9%, while in Indonesia it reaches 31.2%. In addition, based on RISKESDAS data in 2013, the incidence of anemia in Indonesia was 21.7% and in RISKESDAS data in 2018, the incidence of anemia increased to 23.7%. This proportion is higher in rural 25% compared to urban 22.7%. The incidence of anemia is also higher in women 27.2% compared to men 20.3%. Based on age groups, anemia that occurs in the age group of 15-24 years is 32%.

Aisah et al., (2022), Andriyani et al., (2025) Anemia can occur in various age groups, but is more common in adolescent girls and women of childbearing age (WUS). One common cause of anemia is a lack of iron intake, which can be caused by an inadequate diet, unhealthy eating habits, or blood loss that occurs slowly over a long period of time or suddenly. Young women have a higher risk of anemia compared to young men, mainly because they tend to experience more blood loss during menstruation. The diagnosis of anemia is established if the hemoglobin level is less than 12.0 g / dL (Priliani et al., 2025). Animated video–based health education has been widely reported to improve knowledge and compliance related to anemia prevention among adolescents (Aisah et al., 2022; Andriyani et al., 2025).

In addition, anemia can have a more serious impact on adolescent girls, especially since they are expectant mothers who are about to experience pregnancy and childbirth. However, most previous studies focused on knowledge and compliance outcomes without simultaneously measuring physiological indicators such as hemoglobin levels. Therefore, anemia can increase the risk of complications during pregnancy and childbirth, such as an increased risk of premature birth, low birth weight (BBLR), postpartum bleeding, maternal death, risk of cesarean section, and its potential effect on the child's mental development. In addition, anemia can also increase the risk of preeclampsia, separate placentas, and heart failure problems in mothers (Wulandari, Sutrisminah, & Susiloningtyas, 2021).

The government's program to reduce anemia in adolescent girls is the provision of iron supplements or blood added tablets (TTD). The level of adherence of adolescent girls to taking TTD regularly is a marker of the success of this program in hopes of reducing the prevalence of anemia. However, the level of compliance in using TTD still faces challenges that are influenced by various factors such as the level of knowledge, attitudes, motivations, perceptions, and possible side effects (Pertiwi, 2019). To overcome anemia in adolescent girls, one of the actions that can be taken is to provide education using videos. The use of video is a form of innovation in the development of educational media, especially by utilizing advanced technology such as animated videos. Animated videos display interesting images that help improve memory of the information conveyed, as well as provide satisfaction and joy to respondents (Goad, Huntley-Dale, & Whichello, 2018). It is important to note that nowadays, the current generation has a preference that favors the use of advanced technology, especially animated videos featuring funny and unique characters (Szeszak et al., 2016).

In a study conducted by (Aisah, Ismail, & Margawati, 2022), it was found that animated educational videos have a good influence as an effective educational tool to increase adolescent girls' knowledge about how to prevent anemia during the COVID-19 pandemic. In addition, research conducted by Saengow et al., (2018) showed that the use of animated videos is effective in improving the understanding and adherence of epilepsy patients to drug use. Meta-analytic

evidence demonstrates that animated videos significantly enhance patient knowledge and learning outcomes across various health contexts, with an overall positive effect size (d = 0.35) compared to standard education methods. A comprehensive systematic review and meta-analysis further confirmed that video-based learning significantly improves knowledge acquisition (Cohen's d = 0.67 in medicine), skills development (Cohen's d = 0.76 in medicine), and attitude changes (Cohen's d = 0.74) in health education (Morgado et al., 2024).

Data from the Samarinda City Health Office in 2021 in the health network of junior high school children in 18 health centers in Samarinda, from a total of 3,072 adolescent girls with a risk of anemia as much as 3.48%. Based on the management of the working area of the Sungai Kapih Health Center in Samarinda City, the highest prevalence results occurred in SMPN 17, which was 46.15% of adolescent girls at risk of anemia. SMPN 17 is a school that has received TTD distribution from the Sungai Kapih Health Center since February 2022. The results of a preliminary study examining Hb levels at SMPN 17 in adolescent girls found that out of 86 adolescent girls, there were 52 adolescent girls (60.46%) had hemoglobin levels of <12.0 gr/dL. And based on observations and interviews conducted, it is known that there are still many adolescent girls who do not consume TTD that has been given from school.

The novelty of this study lies in its evaluation of animated video–based anemia education by simultaneously assessing behavioral outcomes (adherence to iron tablet consumption) and physiological outcomes (hemoglobin levels) among junior high school adolescent girls. Unlike previous studies that primarily focused on knowledge or compliance alone, this research provides integrated evidence of educational effectiveness in a real school-based anemia prevention program. Based on the description above, researchers are interested in conducting research on "The Effect of Anemia Education with Animated Video Media on Adherence to Blood Added Tablet Consumption and Hemoglobin Levels of Young Women in SMP Negeri 17 Kota Samari.

METHOD

The type of research conducted in this study is quantitative with a quasi-experimental research design, which is research to find causal relationships between independent variables and dependent variables, where independent variables are controlled and controlled to be able to determine the influence caused by the dependent variable. In this study, the influence of the independent variable was seen, namely anemia education with animated videos on the dependent variable, namely adherence to taking blood-added tablets and hemoglobin levels. This study employed a quasi-experimental pretest–posttest control group design to evaluate the effect of educational interventions.

The research design used was Pretest Posttest with Control Group. In this design, randomization is carried out, meaning that the grouping of members of the experimental group and the control group is carried out based on random or random (Notoatmodjo, 2010). This research design provides pretest before treatment, and posttest after treatment in each group. The subjects consisted of two groups, namely the adolescent girl group who were given anemia education through animated videos and the control group who were given anemia education through leaflets. The use of educational media such as animated videos has been shown to effectively influence health behavior change.

RESULTS AND DISCUSSION

Result

This study was conducted to determine the effect of anemia education with animated videos on adherence to the consumption of blood-added tablets and hemoglobin levels of adolescent girls at SMP Negeri 17 Samarinda which was carried out on May 5 – July 12, 2023. The respondents in this study were class IX (Nine) students with a total of 36 female students, which were divided into two classes, namely the experimental class with education using animated video media and the control class with education using *leaflet media*.

Research Site Overview

SMP Negeri 17 Samarinda is located at Jl. Tatako RT.24, Sungai kapih, Sambutan District, Samarinda City, East Kalimantan, with people with diverse social and cultural backgrounds. Started operating in the academic year 1991/1992, with a land area of 24,000 m2. The location of the school is in an environment that is quite far from the office center, both the city government and the provincial government. Students come from three villages, namely Sungai Kapih Village, TWelcome Village and Pulau Atas Village. In accordance with the zoning, students of SMP Negeri 17 Samarinda are located not too far from the school. The economic condition of the parents of students is on average middle with the majority of private workers. SMPN 17 Samarinda has Accreditation A, using the 2013 education curriculum and learning time is a full day (5h / m).

SMPN 17 Samarinda is part of the Sungai Kapih Health Center working area which manages anemia prevention programs in adolescents. This program has been implemented since 2022. The goal is to reduce the incidence of anemia in adolescent girls by distributing blood-added tablets (TTD) every week for 3 months. TTD giving activities are carried out by UKS officers every month, where UKS officers immediately give four blood-added tablets to young women to be consumed every week.

Characteristics of Respondents

Characteristics are special characteristics possessed by individuals or groups who are subjects in research. The characteristics of respondents in this study include age, menstrual status and parental occupation.

1. Age

The age distribution of respondents was analyzed to describe the demographic characteristics of adolescent girls involved in the experimental and control groups.

Table 1. Distribution of respondents' frequency by age

Age	Group			
	Experiment		Control	
	n	%	n	%
13 Years	1	5.6	2	11.1
14 Years	14	77.8	14	77.8
15 Years	2	11.1	2	11.1
16 Years	1	5.6	0	0
Total	18	100	18	100

Source : Primary Data (2023)

Based on table 1, it can be seen that the age of respondents in this study was in the range of 13-16 years. Most of the respondents were 14 years old, namely 14 people (77.8%) each in the experimental group and 14 people (77.8%) in the control group.

2. Menstruation

Menstrual characteristics of respondents were examined to identify menstrual status and duration, which are important factors related to iron requirements and anemia risk among adolescent girls.

Table 2. Frequency Distribution of Respondents Based on Menstruation

	Menstruation	Group			
		Experiment		Control	
		n	%	n	%
	Menstrual Status				
a.	Already menstruating	18	100	18	100
b.	Not yet menstruating	0	0	0	0
	Length of Menstrual Days				
a.	< 3 days	0	0	0	0
b.	3 days to 7 days	13	72.2	12	66.7
c.	> 7 days	5	27.8	6	33.3

Source : Primary Data (2023)

Based on table 2, it can be seen that all respondents have experienced menstruation, each of which is 100% (18 people) and most respondents have a menstrual day length of 3 days to 7 days by 72.2% (13 people) in the experimental group and 66.7% (12 people) in the control group.

3. Parents' Work

The occupational background of respondents' parents was analyzed to provide an overview of the socio-economic characteristics of the study participants.

Table 3. Frequency distribution of respondents based on parents' occupation

	Parents' Work	Group			
		Experiment		Control	
		n	%	n	%
	Father's Work				
a.	Private	14	77.8	14	77.8
b.	Civil servants	1	5.6	2	11.1
c.	Self employed	3	16.7	1	5.6
d.	Laborer	0	0	0	0
e.	Not Working	0	0	1	5.6
f.	Miscellaneous	0	0	0	0
	Mother's Work				
a.	Private	1	5.6	0	0
b.	Civil servants	1	5.6	2	11.1
c.	Self employed	0	0	0	0
d.	Laborer	0	0	0	0
e.	IRT	16	88.9	16	88.9
	Miscellaneous	0	0	0	0

Source : Primary Data (2023)

Based on table 3, it can be seen that the work of respondents' parents is quite diverse. Results showed that most of the father's work was private. In the experimental group as many as 14 people (77.8%) and in the control group 14 people (77.8%). In both groups, most of the mother's work is housewives (IRT). The experimental and control groups were 16 people each (88.9%)

Univariate Analysis

Univariate analysis is a method of analyzing data from one variable separately without being influenced by other variables. This analysis is also known as descriptive analysis or descriptive statistics, which aims to provide an overview of the phenomenon under study. In this study, univariate analysis was carried out to determine the adherence of consumption of blood added tablets (TTD) and hemoglobin levels.

1. Blood Added Tablet (TTD) Consumption Adherence

Univariate analysis was conducted to describe the level of adherence to blood-added tablet (TTD) consumption before and after the intervention in both the experimental and control groups.

Table 4. Frequency Distribution of Respondents Based on Adherence to Blood Added Tablet (TTD) Consumption Before and After Intervention in Experimental Group and Control Group

Compliance TTD consumption	Experiment				Control			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
Low Compliance	16	88.9	2	11.1	18	100	13	72.2
Moderate Compliance	2	11.1	11	61.1	0	0	3	16.7
High Compliance	0	0	5	27.8	0	0	2	11.1
Total	18	100	18	100	18	100	18	100

Source : Primary Data (2023)

Based on table 4, it can be seen that the frequency distribution of the experimental group before the intervention was carried out, most respondents were included in the low compliance category, namely 16 people (88.9%), and after the intervention, most respondents were included in the medium compliance category, namely 11 people (61.1%). In the control group before the intervention, it was known that all respondents belonged to the low compliance category of 18 people (100%) and after the intervention it was known that most respondents belonged to the low compliance category of 13 people (72.2%).

2. Hemoglobin Levels

Hemoglobin levels of respondents were analyzed descriptively to determine changes in anemia status before and after the intervention in the experimental and control groups.

Table 5. Distribution of Respondents' Frequency Based on Hemoglobin Levels Before and After the Intervention in the Experimental Group and Control Group

Hemoglobin Levels	Experiment				Control			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
< 12 gr/dL (Anemia)	11	61.1	2	11.1	13	72.2	9	50
12-16 gr/dL (Not anemic)	7	38.9	16	88.9	5	27.8	9	50
Total	18	100	18	100	18	100	18	100

Source : Primary Data (2023)

Based on table 5, it can be known the frequency distribution of the experimental group before the intervention, most respondents had hemoglobin levels of <12 g / dL (anemia) which was 11 people (61.1%) and after the intervention most respondents had hemoglobin levels of 12 - 16 g / dL (not anemia) which was as many as 15 people (83.3%). In the control group before the intervention, it was known that most respondents had hemoglobin levels <12 g / dL (anemia) which was 13 people (72.2%) and after the intervention it was known that respondents had hemoglobin levels <12 g / dL (anemia) which was 9 people (50%) and hemoglobin levels 12 - 16 g / dL (not anemia) as many as 9 people (50%).

Bivariate Analysis

Bivariate analysis is a statistical method used to identify the interconnected impact between two variables. This study aims to examine the impact of two methods of anemia education, namely using animated videos and using *leaflets*, on the level of adherence in taking additional blood tablets (TTD) and hemoglobin levels.

1. Normality Test

The Normality Test is a method applied to assess whether the distribution of data on a particular group of data or variables follows a normal distribution or not. The distribution of data is said to be normal if the significance value > 0.05. The normality test used is the Shapiro-Wilk method because the number of respondents in this study was less than 50 respondents.

Table 6. Shapiro-Wilk Normality Test Results of Each Variable

Group	Variable	n	Sig. Pre-Test	Sig. Post-Test
Experiment	TTD Ingestion Compliance	18	0.001	0.007
	Hemoglobin Levels	18	0.234	0.421
Control	TTD Ingestion Compliance	18	0.021	0.003
	Hemoglobin Levels	18	0.302	0.795

Source : Primary Data Analysis (2023)

Based on table 6, it can be seen that the experimental group data on the TTD consumption compliance variable before the intervention was 0.001 and after the intervention was 0.007 which means the data are not normally distributed. Meanwhile, the control group data on the TTD consumption compliance variable after the intervention was 0.003, which means that the data was not normally distributed. This is because the significance value < 0.05. Requirements testing in this study uses the *Shapiro-Wilk* normality test, based on normality testing that has been done, it can be concluded that there are abnormally distributed data. Because the data is not normally distributed, the next analysis used is to use a non-paarametric statistical test, the *Wilcoxon test.*

2. Wilcoxon Test

The Wilcoxon test is used to identify whether there is an average difference between two respondents in pairs.

a. Adherence to Blood Add Tablet Consumption in Experimental and Control Groups

The Wilcoxon test was applied to examine differences in adherence to blood-added tablet consumption before and after the intervention within each group.

Table 7. Differences in Average Adherence to Blood Added Tablet Consumption Before and After Intervention in Experimental and Control Groups

TTD ingestion compliance	Mean ± SD	Min	Max	*P-Value*
Experimental Group Before	3.22 ± 1.396	2	7	0.000
After	6.61 ± 1.037	5	8	
Control Group Before	1.67_± 1.414	0	2	0.001
After	4.28 ± 2,109	4	8	

Source : Primary Data Analysis (2023)

Based on table 7 of the results of statistical tests using the *Wilcoxon test,* it can be seen that the Mean value of SD ± in the experimental group before the intervention was 3.22 ± 1,396 and after the intervention was 6.61 ± 1,037 with *a p-value* of 0.000. In the control group, it can be seen that the Mean value of SD ± before intervention was 1.67 ± 1.414 and after intervention was 4.28 ± 2.109 with *a p-value* of 0.001. It can be concluded that there were significant differences in adherence to TTD consumption before the intervention and after the intervention, both in the experimental and control groups.

b. Hemoglobin Levels in the Experimental and Control Groups

The Wilcoxon test was used to analyze changes in hemoglobin levels before and after the intervention in the experimental and control groups.

Table 8. Differences in Average Hemoglobin Levels Before and After Intervention in Experimental and Control Groups

Hemoglobin Levels	**Mean ± SD**	**Min**	**Max**	***P-Value***
Experimental Group Before	11.378 ± 1.1860	9.8	13.4	0.000
After	14,244 ± 1.3129	11.5	16.2	
Control Group Before	11,228 ± 1.7999	8.5	14.9	0.112
After	12,294 ± 1.7531	8.6	15.1	

Source : Primary Data Analysis (2023)

Based on table 8 of the results of statistical tests using the *Wilcoxon* test, it can be seen that the Mean value of SD ± in the experimental group before the intervention was 11.378 ± 1.1860 and after the intervention was 14.244 ± 1.3129 with a p-value of 0.000 so that it can be concluded that there was a significant difference in hemoglobin levels before and after the *intervention in the experimental group* using animated video media. While in the control group it can be known that the Mean value of SD ± before the intervention was 11.228 ± 1.7999 and after the intervention was 12.294 ± 1.7531 with *a p-value* of 0.112. So it can be concluded that there was no significant difference in hemoglobin levels before the intervention and after the intervention using *leaflet media.*

3. Mann-Whitney Test

The Mann-Whitney test is a data test to determine if there is a difference in the average of two independent respondents.

a. Differences in Adherence to Blood Added Tablet Consumption in the Experimental Group and Control Group

The Mann–Whitney test was conducted to compare differences in adherence to blood-added tablet consumption between the experimental and control groups.

Table 9. Differences in Average Adherence to Blood Added Tablet Consumption in the Experimental Group and Control Group

TTD Ingestion Compliance	Mean ± SD	Min	Max	*P-Value*
Experimental Group	6.61 ± 1.037	5	8	0.002
Control Group	4.28 ± 2,109	2	8	

Source : Primary Data Analysis (2023)

Based on table 9 of the results of statistical tests using the *Mann-Whitney* test, it can be seen that there is a significant difference in TTD consumption compliance between the experimental group and the control group with *p values – values of 0.002* < 0.05. So it can be concluded that decision making is "Ha accepted". Thus, it can be said that there are differences in anemia education results between the experimental group and the control group. Because there is a significant difference in the formulation of the research problem, it can be answered, namely "there is an effect of anemia education with animated videos on the adherence of consumption of blood-added tablets in adolescent girls at SMPN 17 Samarinda".

b. Differences in Hemoglobin Levels in the Experimental Group and the Control Group

The Mann–Whitney test was performed to compare post-intervention hemoglobin levels between the experimental group and the control group.

Table 10. Differences in Average Adherence to Blood Added Tablet Consumption in the Experimental Group and Control Group

Hemoglobin Levels	Mean ± SD	Min	Max	*P-Value*
Experimental Group	14,244 ± 1.3129	11.5	16.2	0.001
Control Group	12,294 ± 1.7531	8.6	15.1	

Source : Primary Data Analysis (2023)

Based on table 10 of the results of statistical tests using the *Mann-Whitney* test, it can be seen that there is a significant difference in hemoglobin levels between the experimental group and the control group with *p values – values of 0.001* < 0.05. So it can be concluded that decision making is "Ha accepted". Thus, it can be said that there are differences in anemia education results between the experimental group and the control group. Because there is a significant difference in the formulation of the research problem, it can be answered, namely "there is an effect of anemia education with animated videos on hemoglobin levels in adolescent girls at SMPN 17 Samarinda".

Discussion

Adherence to Blood Added Tablet Consumption of Young Women Before and After Anemia Education in the Experimental Group and Control Group

Adherence refers to the extent to which a person follows guidelines or rules that have been given by health workers. This is a change in behavior from disobeying the rules to obeying the rules. These findings are consistent with previous studies reporting that animated video education significantly improves adherence to iron tablet consumption among adolescents.

In this study, the measurement of TTD consumption compliance was obtained from the results of filling out the MMAS-8 (*Morisky Medication Adherence Scale-8*) questionnaire which

contained 8 questions to measure the level of adherence. All answers are summed and scored, High Compliance if Score 8, Medium compliance if score 6-7, Low compliance if more than <6. The results of the analysis of TTD consumption compliance in this study in the experimental group before the intervention can be found that there are 16 people (88.9%) belonging to the low compliance category and 2 people (11.1%) belonging to the medium compliance category and after the intervention it is known that there are 11 people (61.1%) belonging to the medium category, 5 people (27.8%) belonging to the high category, and 2 people (11.1%) belonging to the low compliance category.

Based on the results of statistical tests using *the Wilcoxon* test in the experimental group with animated video educational media, a p-value of 0.000 (p < 0.05) was obtained which showed the effect of providing anemia education with animated videos on TTD consumption compliance in the experimental group. This can also be seen from the descriptive test carried out, namely there was an increase in the average compliance score of TTD consumption before the intervention, which was 3.22 ± 1,396 and increased to 6.61 ± 1,037 at the time after the intervention.

According to Mahendra et al., (2019) The use of media is a means to convey messages to the target so that it is easily understood by the target / intended party. Health media used in health education is expected to increase respondents' knowledge about certain health issues and can also influence changes in their attitudes in a more positive direction. The main purpose of using health media is to provide clear and effective information, so that respondents can understand the importance of health issues. In addition, media can also be used to motivate individuals to take better action in maintaining their health. Thus, it is expected that the use of health media will help in creating a positive change in the knowledge and attitudes of respondents regarding health.

Hemoglobin Levels of Adolescent Women Before and After Anemia Education in the Experimental Group and Control Group

The hemoglobin (Hb) level is an important parameter in the diagnosis of anemia. Anemia is a medical condition in which the amount of hemoglobin in the blood is below normal limits. Hemoglobin is a protein in red blood cells that helps transport oxygen throughout the body. When hemoglobin levels are low, the body may experience a lack of oxygen, which can cause symptoms such as fatigue, dizziness, pallor, shortness of breath, and decreased energy. The diagnosis of anemia usually depends on the limits of certain hemoglobin levels, and in adolescent girls, values less than 12 g/dL are considered indicators of anemia (Supariasa, 2016).

In this study, the measurement of Hb levels was obtained from the results of Hb level examination carried out by the researcher himself using the Hb meter tool*, namely EasyTouch GCHB*, by categorizing the test results into 2 categories, namely 1 = <12 gr / dL (anemia) and 2 = 12-16 g / dL (not anemia).

The results of the analysis of hemoglobin levels in this study in the experimental group before the intervention can be found that there are 11 people (61.1%) experiencing anemia and 7 people (38.9%) not having anemia with an average hb level of 11.37 g / dL and after the intervention it is known that there are 3 people (16.7%) experiencing anemia and 15 people (83.3%) not having anemia with an average hb level of 14.24 g / dL. Improvement in hemoglobin levels following educational intervention supports earlier evidence that multimedia education can positively influence physiological outcomes. Similarly, a randomized controlled trial in rural Bangladesh demonstrated that mobile health-based nutritional education significantly improved hemoglobin levels and reduced anemia prevalence among adolescent girls, supporting the effectiveness of technology-enhanced health education interventions (Ahmed et al., 2025).

Based on the results of statistical tests using the Wilcoxon test in the experimental group with animated video educational media, a p-value of 0.000 (p < 0.05) was obtained which showed the effect of providing anemia education with animated videos on Hb levels in the experimental group. This can also be seen from the descriptive test carried out, namely there was an increase in the average hemoglobin level before the intervention, which was 11,378 ± 1.1860 and increased to 14,244 ± 1.3129 after the intervention.

The results of this study are in line with research conducted by Arniti et al., (2021) about the prevention and control of anemia against Hb levels with nutritional counseling, lecture methods and video screenings on Hb levels of adolescent girls in MAN Labuan Bajo, which obtained scores *p-value* (0.000) which means that counseling has an effect on increasing Hb levels. The use of media as a health education tool is a very important approach in conveying health information to the public. Media has a key role in increasing understanding and awareness of health issues, motivating healthier behavior change, and facilitating communication between health professionals and patients or clients (Mahendra et al., 2019).

Differences in Average Adherence to Blood Added Tablet (TTD) Consumption and Hemoglobin Levels of Young Women After Anemia Education in the Experimental Group and Control Group

Results of *the Mann Whitney test to* determine the difference in average adherence to TTD consumption between the experimental group and the control group in adolescent girls at SMPN 17 Samarinda. The results of the statistical test obtained *a p-value* of 0.002 ($p < 0.05$) which showed a significant average difference between the experimental group (anemia education using animated videos) and the control group (anemia education using *leaflets).* These results were reinforced by an increase in the average results of TTD consumption compliance in the experimental group which was higher than the control group, namely 6.61 in the experimental group and 4.28 in the control group.

The results of this study are in line with research conducted by Aisah et al. (2022) That showed an average increase in adherence in the experimental group of 3.55 higher than that of the control group, an increase of only 2.76. Test Results Mann-Whitney produce ρ-value 0.000, meaning that there is a significant difference in health education using audiovisual videos in the form of videos about anemia to the compliance of female students in consuming blood-added tablets at SMK Medika Pekalongan. Results of other studies conducted by Susanti & Anggriawan (2020) showed that the average compliance of pregnant women who adhered to taking TTD before the intervention was 19.13 and after the intervention increased to 28.6 with a significance value of 0.002 ($p < 0.05$).

Adherence is the result of education, especially in the context of health psychology, referring to behaviors that are in line with recommendations from information sources. Behavior is influenced by knowledge and attitudes, so to improve knowledge and attitudes health promotion is needed. Health promotion aims to educate individuals about the importance of good behavior to prevent disease. School is an important environment for health promotion because a large part of the population is students, and school is a place where health knowledge, attitudes, and behaviors are learned early (Riyanto, 2021).

Based on the results of the analysis, it was found that there was a very significant difference for the average adherence score of adolescent girls' TTD consumption between the experimental group given the animated video intervention compared to the control group who were only given *leaflets*. The effectiveness of using animated videos to increase the average adherence score of TTD consumption after the intervention was higher than the leaflet administration. So it can be said that the provision of animated video interventions is proven statistically more influential to increase adherence to TTD consumption of adolescent girls in an effort to prevent anemia, compared to the provision of *leaflets.*

Results of the *Mann Whitney test* to determine the difference in average Hb levels between the experimental group and the control group in adolescent girls at SMPN 17 Samarinda. The results of statistical tests obtained *a p-value* of 0.001 ($p < 0.05$) which showed a significant average difference between the experimental group (anemia education using animated videos) and the control group (anemia education using *leaflets).* These results were reinforced by an increase in the average results of TTD consumption compliance in the experimental group which was higher than the control group, namely 14,244 in the experimental group and 12,294 in the control group.

The results of this study are in line with research conducted by Rotua (2017) which showed an average increase in Hb levels in the treatment group of 13,741 higher than the

comparison group of 12,670. Result *Independent T-Test* produce *ρ-value* 0.027, meaning that there was a significant difference in the treatment group that used video as a nutritional education medium. Animated and audiovisual media are more effective than printed materials in sustaining behavioral change related to anemia prevention (Aisah et al., 2022). Results of other studies conducted by Dewi et al., (2020) About the effect of counseling with video media on anemia knowledge and iron consumption intake.

The results showed that the average difference in the score of measuring knowledge about anemia in the treatment group with video was 34.23 while for the control group without video was 26. And the average difference in the measurement score of iron consumption intake of the treatment group was 62.65 while for the control group was 57.2. Based on test results *Mann Whitney* In knowledge, a p value = 0.000 was obtained and iron consumption intake was obtained p value = 0.001. Thus, it can be concluded that there is a significant influence of educational videos in increasing knowledge about anemia and iron consumption in high school students in Denpasar City. Increasing knowledge about anemia and improving iron consumption can have a positive impact on hemoglobin levels, helping to prevent the risk of anemia.

CONCLUSION

Based on the results and discussion of the study "The Effect of Anemia Education with Animated Videos on Adherence to the Consumption of Blood Added Tablets and Hemoglobin Levels of Young Women at SMPN 17 Samarinda", it can be concluded as follows: (1) There was an effect of providing anemia education on adherence to the consumption of blood-added tablets in adolescent girls at SMPN 17 Samarinda in the experimental group with animated videos (p = 0.000) and in the control group with leaflets (p = 0.001). (2) There was an effect of providing anemia education on hemoglobin levels in adolescent girls at SMPN 17 Samarin in the experimental group with animated videos (p = 0.000). However, there was no effect of anemia education in the control group with leaflet media (p = 0.112) on hemoglobin levels. (3) There was a significant mean difference in adherence to the consumption of blood-added tablets (p = 0.002) and hemoglobin levels (p = 0.001) between the experimental group and the control group.

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AUTHOR CONTRIBUTION STATEMENT

All authors contributed equally to the conceptualization of the study, data collection, data analysis, interpretation of results, manuscript preparation, and final approval of the submitted manuscript.

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