



## Changes in Knowledge and Attitudes in Preventing Anemia in Female Adolescents: A Comparative Study

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### ABSTRACT

**Background:** Anemia in adolescents is a global health problem, with prevalence in Southeast Asia reaching 27% -55% and 37.1% in Indonesia. Anemia in adolescents entails a negative impact, including fatigue, decreased concentration, growth problems, and long-term causes of anemia during pregnancy. Therefore, health education regarding anemia in adolescents is an effort to prevent and diminish the prevalence of anemia and anemia during pregnancy.

**Purpose:** This study aims to describe adolescents' changes in knowledge and attitudes in preventing anemia after being treated with health education.

**Methods:** This study employed a quasi-experimental design using a pretest-posttest technique with the control group. Samples were obtained through the total sampling of 20 female students as the experimental and 19 students as the control group. Data analysis used the Wilcoxon tests.

**Results:** This study indicated the p-value of the knowledge variable  $p = 0.002$  and the attitude variable  $p = 0.001 (<0.05)$ .

**Conclusion:** There is a change in educating female adolescents about anemia on knowledge and attitudes in preventing anemia. Health workers and schools are urged to improve adolescent reproductive health promotion, especially regarding anemia in female adolescents and its prevention.

**Keywords:** *health education; Knowledge; Attitude in preventing anemia*

## **BACKGROUND**

The World Health Organization (WHO) defines anemia as a condition in which hemoglobin levels are less than 13 g/dL in men over 15 years and less than 12 g/dL in women over 15 years and not pregnant (Goddard et al., 2011). Iron deficiency anemia is a common nutritional problem in the world and affects more than 600 million people. Globally, the prevalence of anemia is estimated at 51%. Thirty-six percent (or roughly 1400 million people) out of 3800 million estimated population in developing countries suffer anemia, while the prevalence in developed countries only reaches approximately 8% (or roughly 100 million people) of an estimated population of 1200 million people (Arisman, 2010). According to WHO data, the prevalence of anemia in adolescents in Southeast Asia shows a figure of 27% - 55% (Erkan, 2011).

Anemia is a major nutritional problem in adolescents and generally due to the wrong diet besides infection and menstruation. For example, the prevalence of iron deficiency anemia in Indonesia according to 2013 Riskesdas (Basic Health Research) data shows that the majority of children under five was 28.1 percent, 29 percent in children 5-12 years, 37.1 percent in pregnant women, and respectively 22.7 percent in female adolescent of age 13-18 years and women of childbearing age 15-49 years (Agency of Health Research and Development of Indonesian Ministry of Health, 2013).

Female adolescents require higher nutrients, including iron, for growth, making them more susceptible to anemia. The factor causing female adolescents to be prone to iron deficiency anemia is the monthly menstrual cycle. Besides, dietary factors in adolescents influence the occurrence of anemia. Female adolescents who lack nutritional intake are more at risk of developing anemia (More et al., 2013).

Anemia can result in fatigue, decreased concentration, growth problems, and affect work productivity. Furthermore, anemia can reduce the body's resistance, making it vulnerable to infection (Jain & Chandra, 2012; Maureen M. Black, 2013). The long-term result of iron deficiency anemia in female adolescents is the inability to meet nutrients the mother and fetus during pregnancy, and it may increase the frequency of complications, the risk of maternal mortality, premature birth rate, low birth weight, and perinatal mortality rate (Bhutta et al., 2005; Clark, 2008). Therefore, anemia in adolescents must be prevented with various efforts.

An effort to prevent anemia according to government policy is through health education. By providing health education, it is expected to improve adolescent reproductive health. Health education can be administered by integrating infantile reproductive health material in relevant subjects and developing extracurricular activities, such as guidance and counseling, Skill-Based Health Education (PKHS), and School Health Services (UKS) (Romauli S, 2009).

Efforts to provide health education on adolescent reproductive health, especially anemia in adolescents, are necessary to minimize anemia in female adolescents. Health education is a part of health promotion which is beneficial for changing people's behavior (Dewi et al., 2019). Health education is an activity of providing information to increase the community's knowledge, attitudes, and practices in maintaining and improving their health.

## **OBJECTIVE**

The purpose of this study is to describe the changes in knowledge and attitudes of adolescents in preventing anemia after being treated with health education in female

adolescents on the level of knowledge and attitudes in preventing anemia in grade X students.

**METHODS**

This study employed a quantitative method with a quasi-experimental design using pretest-posttest with the control group. In this study, the members of the control group and the experimental group were grouped randomly. Then, a pretest (O1) was performed in both groups, followed by an intervention of providing health education to the experimental group. The control group was not intervened during the research process and was only given health education after the study was completed to maintain ethical justice for each research respondent. After the intervention, a posttest (O2) was administered to both groups.

	Pretest	Intervention	Posttest
Experimental Group	O1	X	O2
Control Group	O1'		O2'

**Figure 1.** Research Design

The population in this study were all female students of class X in a high school in Yogyakarta, totaling 49 students. The samples involved were 39 female students. The sampling technique used total sampling. However, ten students were absent during the study and, as a result, were included in the exclusion criteria. The samples were divided into two groups, 19 students in the control group and 20 students in the experimental group. The division of the model into the control group and experimental group was conducted randomly.

Research permission was obtained from the Elementary and Secondary Education Council of the Muhammadiyah Regional Head of Board of Yogyakarta following No. 397 / REK / III.4 / F / 2014. Respondents were given informed consent before the study was conducted. The respondent's confidentiality is guaranteed by leaving out the respondent's name in the questionnaire but providing a designated code. Nevertheless, the control group was given health education after the research process had been completed.

The data was collected using a questionnaire that has been tested for its validity (0.468) and reliability (0.960) in a high school in Yogyakarta with almost similar characteristics as the research site. First, data were obtained by handing out questionnaires to female adolescents before and after health education treatment to the experimental group. Then, data were analyzed using univariate and bivariate. The statistical test used in this study was the Wilcoxon and Mann-Whitney tests.

**RESULTS**

**1. Characteristics of the Respondents**

**Table 1.** Characteristics of the Respondents

Characteristic	N	%
Age		
15 years old	5	12,8
16 years old	30	76,9

17 years old	4	10,3
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Table 2 presents that of the 39 female adolescents who became respondents, most of them (76.9%) were 16 years old.

**2. Respondents' knowledge about anemia in female adolescents before and after being given health education in the control and experimental group.**

**Table 2.** Frequency distribution of knowledge about anemia in female adolescents before and after being given health education in the control and experimental group.

	Knowledge level about anemia in female adolescents											
	the control group						the experimental group					
	Pre Test			Post Test			Pre Test			Post Test		
	F	%	Mean	F	%	Mean	F	%	Mean	F	%	Mean
Good	6	31,6	17,05	7	36,8	17,16	6	30,0	16,3	16	80,0	18,6
Moderate	13	68,4		12	63,2		13	65,0		4	20,0	
Less	0	0		0	0		1	5,0		0	0	
Total	19	100,0		19	100,0		20	100,0		20	100,0	

Table 2 shows the different mean scores in students' knowledge in the control group between pretest and posttest. The pretest means score led 17.05 and 17.16 for the posttest. Students experienced a high mean score inability by 0.11. It also presents the different mean scores in students' knowledge in the experimental group between pretest and posttest. The mean score before health education treatment showed 16.3 and 18.6 after the intervention. Students experienced an increased mean score in knowledge by 2.3

**3. Respondents' attitudes towards preventing anemia in female adolescents before and after being given health education in the control and experimental group.**

**Table 3.** Frequency distribution of respondents' attitudes towards preventing anemia in female adolescents before and after being given health education in the control and e experimental group.

	Attitudes in preventing anemia											
	the control group						the experimental group					
	Pre Test			Post Test			Pre Test			Post Test		
	F	%	Mean	F	%	Mean	F	%	Mean	F	%	Mean
Good	9	47,4	93,58	9	47,4	95,95	7	35,0	93,7	15	75,0	101,65
Moderate	10	52,6		10	52,6		13	60,0		5	25,0	
Total	19	100,0		19	100,0		20	100,0		20	100,0	

**Table 3.** shows the different mean scores in students' attitudes in preventing anemia between pretest and posttest in the control group. The mean score in the pretest obtained 93.58 and 17.16 in the posttest. Students experienced a high mean score in the knowledge of 2.37. It also displays the different mean scores in

students' attitudes in preventing anemia between pretest and posttest in experimental groups. The mean score before the health education intervention earned 93.7 and 101.65 after the intervention. Students experienced a high mean score in the knowledge of 7.95.

#### 4. The effect of health education about anemia in female adolescents on knowledge and attitudes in preventing anemia.

**Table 4.** Result of Wilcoxon test

Group	Asymp. Sig. (2-tailed)	
	Knowledge about anemia	Attitudes in preventing anemia
Control group	0.317	0.070
Experimental group	0.002	0.001

The bivariate results using the Wilcoxon test on the experimental group's variable level of knowledge and attitudes were obtained at 0.002 and 0.001, respectively. These results indicate a p-value <0.05. It implies that there was a significant difference in the experimental group. There was a difference in knowledge and attitudes before and after being given health education; in the experimental group, the knowledge and attitudes after intervention about anemia were higher than in the control group. In the control group, the p-value of the knowledge and attitude variables were 0.317 and 0.070, consecutively. These results did not differ in pretest and posttest scores in the control group since they were not given health education.

## DISCUSSION

Knowledge is the result of knowing, which occurs after individuals sensing particular objects. Education is an activity or learning process to develop or improve specific abilities through information addition so that the education object can act independently. Information will influence one's knowledge regardless of low education, but it will significantly increase his knowledge once he obtains the correct information (Notoatmodjo, 2012).

Increased knowledge and understanding of respondents happens because they have learned through counseling so that there is a learning process, the transition from not knowing to knowing, from not understanding to understanding something. Notoatmodjo (2012) explains that learning is an attempt to acquire new things in the form of behavior, including knowledge, aptitude, skills, and values, with independent psychological activities (Notoatmodjo, 2012). Departing from that explanation, it can be determined that the typical characteristic of the learning process is to acquire something new, which is from inexistence to existence, from unknown to known, from not understood to understood. This knowledge is ultimately expected to influence behavior (Hamzah et al., 2019).

This study shows that providing information through health education about anemia to grade X students can give additional knowledge about anemia to them. It is evidenced by an increase in posttest results in the intervention group. Previous research suggests that the importance of health education on adolescent nutrition and meeting the iron needs consumption is vital to prevent anemia in adolescents (Chalise et al., 2018).

Other studies also affirm that health education is the most effective way to increase knowledge (Abu-Baker et al., 2021). Health education is communicated to adolescents because knowledge resulting from health education is essential as it can form new awareness, attitudes, and behaviors in adolescents (Munira & Viwattanakulvanid, 2021).

Attitude is a closed reaction or response from an individual to a stimulus or object. Attitude clearly shows the connotation of a proper reaction to certain stimuli, which in everyday life is an emotional reaction to social stimuli. Thus, attitude is not an action or activity but a predisposition to action or behavior (Notoatmodjo, 2012).

The process of attitude formation takes place gradually, starting from the learning process. The learning process occurs due to personal experiences with particular objects, such as people, things, or events, by interconnecting those objects with other experiences where one has had a confident attitude towards that experience or through a social learning process with other people. Personal philosophy is heavily influenced by internal factors, namely psychological and physiological factors and external factors in the form of interventions outside the individual, such as education, training, and counseling. Changes in attitude are affected by to what extent a content of communication or stimuli is considered, understood, and observed so that respondents give a positive response (Hamzah et al., 2019).

Health education given to respondents and increasing knowledge effectively improve adolescent attitudes in preventing anemia (Abu-Baker et al., 2021). A positive attitude towards anemia prevention can reduce the incidence of anemia because adolescents mind maintaining nutritional intake, thus making Hb levels normal (Jalambo et al., 2017). Furthermore, female adolescents' attitudes can be reshaped to be more positive in preventing anemia by providing education about anemia that involves support sources for them, such as family, friends, teachers, and the environment (Partida et al., 2018).

The results correspond with the results of research conducted by Sharifirad et al. (2011) entitled Precede Educational Model For Controlling Iron-Deficiency Anemia In Talesh, Iran, which concludes that there was an effect of health education in adolescent attitudes towards anemia prevention. The results of the study proved that there was a significant increase in the mean score of awareness and attitude in the intervention group compared to the control group ( $p < 0.001$ ) (Sharifirad et al., 2011). Research by Jalambo et al., 2017 found a significant increase in knowledge and attitudes in preventing anemia in adolescents after being given interventions with health education about nutrition. The results of adolescents with good knowledge before the intervention obtained 22.7% (10) and increased to 90.9% (40) after the intervention ( $p < 0.001$ ). Attitudes and practices also showed noticeable improvement from 36.4% and 54.5% during pretest, to 75.5% and 75.5% ( $p < 0.001$  and  $p < 0.002$ ) during posttest, respectively (Jalambo et al., 2017). Furthermore, research by Yusoff et al., 2012 suggested that there was a significant increase in knowledge and attitudes in adolescents after being given health education about nutrition in preventing anemia (Yusoff, 2012). It implies the importance of health education for female adolescents in improving knowledge and attitudes towards anemia prevention to influence adolescents to prevent anemia from happening.

The increase in respondent's knowledge and understanding happened as the respondents had gained learning experience through counseling. A learning process occurred, from not knowing to know, from not understanding to understanding. According to the Systematic Review of Shape et al. 2020, it was evidenced that health

education in adolescents significantly increased their knowledge, attitudes, and practices in preventing malnutrition. Interventions carried out specifically are essential in preventing malnutrition, especially in developing countries (Shapu et al., 2020). This method can also be applied in adolescents to prevent anemia through health education programs.

It is expected that knowledge improvement of female adolescents can be observed in the school environment since it is more important to provide such programs organized by the school. Further, female adolescents can also be motivated to form or join groups that give insight into how nutrition in adolescents or other educational programs related to adolescent health regularly managed (World Health Organization, 2011). Knowledge is an essential factor in improving anemia prevention behavior in adolescents (Munira & Viwattanakulvanid, 2021). Poor knowledge will be a risk factor for malnutrition in adolescents which can lead to anemia in adolescents (Pareek & Hafiz, 2015).

The results of this study are correlated with previous research suggesting that a positive attitude in preventing anemia can be formed through health education about the anemia diet (Simbar et al., 2020). A positive attitude can be cultivated by involving family, friends, teachers, and the environment in health education to directly influence adolescents' eating habits in daily life (Partida et al., 2018). Health education, especially adolescent nutrition, can improve knowledge, attitudes, and behavior to prevent anemia (Munira & Viwattanakulvanid, 2021).

## **CONCLUSION**

Health education for female adolescents has been proven effective in increasing knowledge and attitudes in preventing anemia. Based on this research, health education about anemia for female adolescents can improve the knowledge and good moods in preventing anemia. The school is expected to facilitate and make more efforts in improving adolescent reproductive health, especially in avoiding anemia through active involvement of PIK KRR (Information and Counseling Center Adolescent Reproductive Health) or other mediums that can solve problems related to reproductive health for students. Health workers, especially midwives, must improve adolescent reproductive health promotion through health education, especially about anemia in female adolescents, in an effort to reduce anemia cases. Future researchers can study using different methods or data collection by providing periodic health education, iron supplementation, and hemoglobin tests.

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