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Does Health Education Really Matter? Evaluating the Role of Health Education in Improving Anemia Knowledge in Adolescent Girls

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Abstract
Anemia remains a significant global health issue, particularly among adolescents, where its prevalence threatens both individual well-being and national development. This study evaluates the impact of health education on improving anemia knowledge among 32 adolescent girls at SMPN 2 Majalengka. Using a quasi-experimental approach, pretest and posttest questionnaires assessed participants' knowledge before and after a structured health education program. The intervention included lectures and discussions covering anemia's definition, symptoms, risk factors, impacts, prevention, and treatment. Results revealed a notable improvement in knowledge, with the proportion of respondents scoring in the "good knowledge" category increasing from 65.6% in the pretest to 84.4% in the posttest. The greatest improvement in understanding anemia management was observed, rising from 46.9% to 75.0%. These findings underscore the importance of systematic and well-structured health education in enhancing adolescents' understanding of anemia and promoting informed health decisions. Future efforts should prioritize developing interactive and accessible health education programs for broader adolescent populations. Further research with larger sample sizes and diverse methodologies is recommended to generalize findings and explore additional factors, such as family support and healthcare access, that influence the effectiveness of health education interventions.

Keywords: Anemia, adolescent girls, health education, knowledge.

1. Introduction

Anemia, commonly called "lack of blood" in Indonesia (Kasad, Keumalahayati, Azwarni, Harahap, & Helmi, 2023; Rimbawan, Nurdiani, Rachman, Kawamata, & Nozawa, 2023), is a health condition characterized by decreased hemoglobin, hematocrit, or red blood cells below the standard threshold (Chaparro & Suchdev, 2019; Velliyagounder, Chavan, & Markowitz, 2024). The World Health Organization (WHO) estimates that more than 30% of the global population suffers from anemia, with a higher prevalence in developing countries (Cairo, Silva, Bustani, & Marques, 2014). In Indonesia, the prevalence of anemia increased from 37.01% in 2013 to 48.9% in 2018, ranking the country fifth in Southeast Asia for the highest anemia cases (Margawati, Syauqy, Utami, & Adespin, 2023; Sungkar et al., 2022).

Anemia is particularly prevalent among children, adolescent girls, women of reproductive age, and pregnant or postpartum women (Ashraf, Nafees Uddin, Mustafa, Mughal, & Atif Aleem, 2024; Campbell et al., 2018). WHO reports that anemia affects 40% of children aged 6–59 months, 37% of pregnant women, and 30% of women aged 15–49 years globally (Let, Tiwari, Singh, & Chakrabarty, 2024). Iron deficiency is identified as the primary cause of anemia (Shaka & Wondimagegne, 2018). Other contributing factors include deficiencies in nutrients such as vitamins A, B, C, and E, as well as zinc, acute and chronic inflammation, parasitic infections, congenital or acquired blood disorders, low parental awareness about anemia (especially among mothers), educational background, and unhealthy dietary habits (Aggarwal, Aggarwal, Goyal, & Aggarwal, 2020; Sari, Herawati, Dhamayanti, & Hilmanto, 2022).

Anemia significantly impacts various age groups, particularly adolescent girls, who face heightened risks due to poor iron intake and blood loss during menstruation (Engidaw, Wassie, & Teferra, 2018; Wiafe, Ayenu, & Eli-Cophie, 2023). Its effects include fatigue, reduced activity tolerance, and, in the long term, potential neurodevelopmental delays and serious complications during pregnancy and childbirth (Abu-Ouf & Jan, 2015; Georgieff, 2020; Świątczak et al., 2022). With its high prevalence among adolescents, a vital part of the productive population, anemia poses a direct and indirect threat to national development (Nugraha, 2023).

The WHO recommends strategic interventions, including iron supplementation, food fortification, infection control, and health education, to reduce the prevalence of anemia (Sari et al., 2022). Health education is regarded as an effective measure to enhance awareness and understanding of anemia at an early stage (Yulianingsih, Yanti, & Hulawa, 2023). This study aims to evaluate the effectiveness of health education in improving adolescent girls' knowledge about anemia.

2. Method

This study used a quasi-experimental approach, a type of quantitative research to assess respondents' knowledge about anemia before (pretest) and after (posttest) health education was given. The measuring instrument used was a questionnaire prepared by the research team, which contained questions related to anemia. This study has obtained a permit with the number B-028A / UNIVYPIB / DRPM-MJL / III / 2024. The research subjects consisted of 32 female students of SMPN 2 Majalengka.

The study series consists of preparation, implementation, and evaluation. In the preparation stage, the activities carried out include: (1) preparation of a study proposal by the Research Team; (2) coordination between the Research Team and the Directorate of Research, Community Service, and Innovation of the Imam Bonjol

Education Foundation University (YPIB) Majalengka; (3) coordination between the Research Team and the Public Relations Team of SMPN 2 Majalengka; (4) submission of study permits to the Principal of SMPN 2 Majalengka; and (5) creation of teaching media and teaching material evaluation questionnaires.

The implementation stage is an activity to implement health education on May 20, 2024. The activities include the event's opening, pretest, delivery of teaching materials using lecture and question and answer methods, posttest, and closing. The teaching materials provided consist of definitions, types, signs and symptoms, risk factors, impacts, prevention, and treatment of anemia.

In the evaluation stage, the Research Team self-refed on the activities, processed the pretest and posttest data, and compiled a study report. The pretest and posttest data were analyzed to see the frequency distribution of respondents who had good knowledge (scored 80-100) and less (scored 0-79). The frequency distribution of respondents in the pretest and posttest was compared to see any changes (increase or decrease) in respondents' knowledge before and after being given health education.

3. Results and Discussion

3.1 Descriptive Results

Based on the study, the results obtained are from pretest and posttest questionnaires. The data obtained are data on the characteristics and knowledge of respondents about anemia. Respondent characteristic data consists of age, gender, experience consuming iron, menstruation, and receiving health education about anemia. Respondent knowledge data consists of pretest and posttest knowledge.

Table 1. Frequency Distribution of Respondent Characteristics (n=32)

Respondent Characteristics	f	(%)
Age		
Adolescents (14–15 years)	32	100
Gender		
Female	32	100
Iron Supplement Consumption		
Ever	32	100
Never	0	0
Menstruation		
Yes	31	96.9
No	1	3.1
Health Education Participation		
Yes	32	100
No	0	0

Table 1 above illustrates that all respondents (100%) were adolescent females aged between 14 and 15 years. These respondents had prior exposure to iron

supplementation and had participated in health education programs on anemia provided by the Community Health Center. Additionally, nearly all respondents (96.9%) had already experienced menstruation, highlighting a uniform demographic profile in terms of age, gender, and health education background.

3.1 Pretest and Posttest Results of Respondent Knowledge

Table 2. Frequency Distribution of Respondents' Knowledge (n=32)

Knowledge	f	(%)
Pretest		
Good	21	65.6
Poor	11	34.4
Posttest		
Good	27	84.4
Poor	5	15.6

Table 2 shows that more than half of the respondents (65.6%) had good knowledge during the pretest, and most (84.4%) demonstrated good knowledge during the posttest. This indicates an increase in the number of respondents with good knowledge from the pretest to the posttest.

This improvement in the proportion of respondents with good knowledge from the pretest to the posttest suggests that the intervention, such as health education, enhanced their understanding. The increase from 65.6% to 84.4% demonstrates a positive shift in knowledge levels and highlights the potential impact of targeted educational programs on the awareness and comprehension of anemia-related topics. These findings underline the importance of structured and well-delivered health education in addressing knowledge gaps and promoting informed adolescent decision-making.

Table 3. Frequency Distribution of Respondents' Knowledge in Pretest and Posttest (n=32)

Question Items	Answers	Pretest		Posttest	
		f	%	f	%
Definition of anemia	Correct	26	81.3	31	96.9
	Incorrect	6	18.8	1	3.1
Signs and symptoms of anemia	Correct	18	56.3	27	84.4
	Incorrect	14	43.8	5	15.6
Causes of anemia	Correct	30	93.8	31	96.9
	Incorrect	2	6.3	1	3.1
Prevention of anemia	Correct	21	65.6	27	84.4
	Incorrect	11	34.4	5	15.6
Management of anemia	Correct	15	46.9	24	75.0
	Incorrect	17	53.1	8	25.0

The table demonstrates a significant improvement in respondents' knowledge about anemia across all question items after receiving the intervention. Regarding the definition of anemia, the percentage of correct answers increased from 81.3% in the pretest to 96.9% in the posttest. A similar trend was observed for understanding the signs and symptoms of anemia, with correct responses rising from 56.3% to 84.4%. Additionally, knowledge of the causes of anemia was already high during the pretest at 93.8% and improved slightly to 96.9% in the posttest.

Improvements were also evident in the aspects of anemia prevention and management. Correct responses about prevention increased from 65.6% in the pretest to 84.4% in the posttest, indicating better awareness of preventive measures. Meanwhile, knowledge about anemia management saw the most significant growth, with correct answers rising from 46.9% to 75.0%. These findings suggest that the intervention effectively enhanced the respondents' understanding of anemia, particularly in areas with relatively low prior knowledge.

The results of this study align with the results of activities in Manggarai Regency, which show that health education about anemia can improve adolescent girls' knowledge of the prevention and treatment of anemia. Good knowledge about the prevention and treatment of anemia is possessed by 30% of adolescent girls before being given health education and 85% of adolescent girls after being given health education (Ningsih et al., 2023).

In this study, the health education materials provided include the definition, types, signs and symptoms, risk factors, impacts, prevention, and treatment of anemia. The definition of anemia is a condition in which the number of red blood cells or the concentration of hemoglobin in them decreases from the normal limit and is not enough to meet the body's needs (Kassebaum et al., 2014).

By the results of this study, it emphasizes the critical role of health education in enhancing adolescent girls' knowledge about anemia, particularly in understanding its definition, causes, signs, prevention, and management. The improvements observed in the post-test results demonstrate the effectiveness of structured educational interventions in bridging knowledge gaps and fostering better awareness among adolescents.

These results also underscore the potential of health education as a vital strategy to empower young individuals with the information needed to make informed health decisions, as also stated by (Zanobini, Del Riccio, Lorini, & Bonaccorsi, 2024), ultimately contributing to the prevention and management of anemia (Wisnuwardani, Wulandari, & Kartika, 2023). Future initiatives should continue to prioritize comprehensive, interactive, and accessible educational programs to maximize their impact on adolescent health outcomes.

As a note, this study has limitations in the sample, limited to only 32 respondents, so the results may not be generalizable to a broader population. In addition, this study relies only on pretest and posttest as measurement methods and does not consider other factors that may affect the increase in knowledge.

4. Conclusion

The results showed that health education has a significant role in improving adolescent girls' knowledge about anemia. There was an increase in the proportion of respondents with good knowledge from 65.6% in the pretest to 84.4% in the posttest. The increase was seen in understanding the definition, signs and symptoms, causes, prevention, and treatment of anemia, with the highest increase in knowledge about anemia management (46.9% to 75.0%). These results emphasize the importance of a structured and systematic health education program in supporting better health decision-making by adolescents.

Given the positive impacts identified, future efforts should focus on developing comprehensive, interactive, and accessible health education programs for a wider group of adolescents. In addition, further studies with larger samples and diverse evaluation methods are recommended to increase the generalizability of the results of this study. Future studies can also consider external factors such as social environment, family support, and access to health facilities to identify additional factors that influence the effectiveness of health education. This will provide deeper insights to improve the efficiency and coverage of health education interventions.

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