

Relationship Between Knowledge Level About Anemia and Anemia Prevention Behavior Among Female Adolescents

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ABSTRACT

Background: Anemia remains one of the leading nutritional health problems among adolescent girls and may negatively affect physical health, cognitive function, academic performance, and future reproductive outcomes. Adequate knowledge regarding anemia is expected to encourage adolescents to adopt appropriate preventive behaviors.

Methods: This quantitative study employed a correlational design with a cross-sectional approach. The study was conducted at SMA N 2 Wates, Yogyakarta, Indonesia. The study population consisted of 357 female adolescents, and 189 participants were selected using proportionate random sampling. Data were collected using structured questionnaires assessing respondents' knowledge about anemia and anemia prevention behavior. Descriptive statistics were used to summarize respondents' characteristics, while Spearman's rank correlation test was performed to determine the relationship between knowledge and preventive behavior with a significance level of $p < 0.05$.

Results: Most respondents were 16 years old and were enrolled in grade X or XI. The majority demonstrated a moderate level of knowledge regarding anemia (52.4%) and moderate anemia prevention behavior (65.1%). Spearman correlation analysis revealed a statistically significant positive relationship between knowledge level and anemia prevention behavior ($p < 0.001$; $r = 0.263$), indicating that adolescents with better knowledge tended to demonstrate better preventive behavior despite the weak strength of correlation.

Conclusion: There was a significant positive relationship between knowledge about anemia and anemia prevention behavior among female adolescents. Strengthening educational interventions within school health programs may improve adolescents' knowledge and encourage healthier behaviors to prevent anemia

INTRODUCTION

Anemia remains one of the most prevalent nutritional disorders among adolescents worldwide and continues to be recognized as a major public health concern. According to the World Health Organization (WHO), anemia is defined as a condition in which the hemoglobin concentration is lower than the physiological level required to meet the body's oxygen demands. In adolescent girls aged 15 years and older, anemia is diagnosed when hemoglobin levels are below 12 g/dL. Iron deficiency anemia accounts for approximately half of all anemia cases globally and disproportionately affects females because of increased iron requirements during puberty and menstrual blood loss.

The burden of anemia among adolescent girls is substantial. WHO estimates that nearly one-third of women of reproductive age worldwide suffer from anemia. Adolescence represents a critical period

characterized by rapid physical growth, hormonal changes, and increased nutritional requirements. During this developmental stage, insufficient iron intake or poor dietary habits may lead to iron deficiency, resulting in impaired physical growth, reduced immunity, fatigue, diminished cognitive performance, and decreased academic achievement. If anemia persists until reproductive age, women are at greater risk of adverse pregnancy outcomes, including maternal complications, preterm birth, and low birth weight infants.

Indonesia continues to experience a high prevalence of anemia among adolescent girls. National health survey data reported that approximately 48.9% of Indonesian adolescent girls experienced anemia, indicating that nearly one out of every two adolescents is affected. This condition remains a national nutritional problem despite various governmental interventions, including Weekly Iron and Folic Acid Supplementation (WIFAS) programs delivered through schools. In Yogyakarta Special Region, anemia among adolescents also remains a health priority because it contributes to decreased educational performance and future reproductive health problems.

The etiology of anemia is multifactorial. Iron deficiency is the leading cause; however, inadequate dietary intake, poor nutritional practices, impaired iron absorption, chronic infections, and insufficient health knowledge also contribute substantially to the development of anemia. Among these determinants, knowledge is considered a modifiable factor because it influences individual awareness and encourages healthy preventive behaviors. Adolescents who possess adequate knowledge regarding anemia are expected to adopt healthier dietary practices, consume iron-rich foods, comply with iron supplementation programs, and seek appropriate health information when experiencing anemia symptoms. Conversely, limited knowledge may hinder adolescents from practicing appropriate preventive behaviors.

Behavioral prevention of anemia includes consuming balanced nutrition rich in iron, increasing vitamin C intake to enhance iron absorption, reducing inhibitors of iron absorption such as tea and coffee during meals, routinely consuming iron supplementation tablets, and participating in regular health examinations. Although these preventive measures have been widely promoted, adolescents frequently demonstrate poor adherence because of misconceptions, lack of awareness, unpleasant experiences with iron tablets, or inadequate family and school support. Consequently, improving adolescents' knowledge is considered an essential strategy for strengthening anemia prevention programs.

Several previous studies have demonstrated that higher knowledge regarding anemia is associated with better preventive behavior among adolescent girls. Nevertheless, the strength of this relationship varies across different settings because behavioral practices are influenced not only by knowledge but also by environmental, cultural, and educational factors. Therefore, local evidence is needed to identify whether knowledge significantly contributes to anemia prevention behavior among female adolescents within specific educational settings.

A preliminary survey conducted at SMA N 2 Wates found that many female students had limited knowledge regarding the causes, symptoms, and prevention of anemia. Although all students received weekly iron supplementation tablets through the school health program, several students admitted that they rarely consumed the tablets because they disliked the taste or simply forgot to take them. These findings indicate that gaps may exist between knowledge and actual preventive behavior.

Based on these considerations, this study aimed to determine the relationship between knowledge about anemia and anemia prevention behavior among female adolescents at SMA N 2 Wates. The findings are expected to provide evidence for improving school-based health promotion strategies and strengthening anemia prevention programs targeting adolescent girls.

METHODS

Design and Sample

This study employed a quantitative correlational design using a cross-sectional approach to determine the relationship between knowledge regarding anemia and anemia prevention behavior among female adolescents. The study was conducted at SMA N 2 Wates, Kulon Progo Regency, Yogyakarta, Indonesia, in 2024. The study population consisted of 357 female students. A total of 189 respondents were selected using proportionate random sampling to ensure adequate representation from each grade level.

Research Instrument and Data Collection

Data were collected using self-administered structured questionnaires consisting of three sections: respondents' demographic characteristics, knowledge regarding anemia, and anemia prevention behavior. The knowledge questionnaire assessed participants' understanding of the definition, causes, symptoms, consequences, and prevention of anemia. The preventive behavior questionnaire evaluated dietary habits, iron supplementation practices, and other preventive measures. Prior to data collection, respondents received information regarding the study objectives and provided informed consent.

Data Analysis

Descriptive statistics were used to summarize respondents' demographic characteristics and variable distributions. The relationship between knowledge level and anemia prevention behavior was analyzed using Spearman's rank correlation test because the variables were ordinal in nature. Statistical significance was determined at a p-value of less than 0.05.

Research Process

The research process consisted of obtaining institutional permission, coordinating with the school administration, recruiting eligible participants, administering questionnaires, checking data completeness, coding responses, performing statistical analysis, and interpreting the findings according to the study objectives.

Ethical Consideration

This study received ethical approval from the Health Research Ethics Committee (Komisi Etik Penelitian Kesehatan/KEPK) prior to data collection with Ethical Clearance Number **002/KEPK/I/2025**. Participation in this study was voluntary, and written informed consent was obtained from all participants before completing the questionnaires. Respondents were informed about the purpose, procedures, benefits, and potential risks of the study. Confidentiality and anonymity of participants were strictly maintained throughout the research process, and participants had the right to withdraw from the study at any time without any consequences.

RESULTS

Characteristics of Respondents

A total of 189 female adolescents participated in this study. Most respondents were 16 years old and were enrolled in grades X and XI. The demographic profile indicates that the study population predominantly represented middle-adolescent students who were actively participating in school health programs.

Tabel 1 Frequency Distribution of Characteristics of Female Students of SMA N 2 Wates in 2024
(n=189)

Respondent Characteristic	Frequency (f)	Percentage (%)
Age		
15 Years	36	19,0
16 Years	65	34,4
17 Years	61	32,3
18 Years	27	14,3

Respondent Characteristic	Frequency (f)	Percentage (%)
Class		
X	68	36
XI	68	36
XII	53	28
Total	189	100

Knowledge Regarding Anemia

More than half of the respondents demonstrated a moderate level of knowledge regarding anemia (52.4%), while fewer respondents were classified as having either good or poor knowledge. These findings indicate that although students had basic awareness of anemia, comprehensive understanding regarding its causes, symptoms, prevention, and consequences remained limited.

Tabel 2 Frequency Distribution of Knowledge Level Assessment about Anemia(n=189)

No	Anemia Knowledge Level	Frequency (f)	Percentage (%)
1	Less	20	10,6
2	Enaugh	99	52,4
3	Good	70	37
	Total	189	100

Frequency Distribution of Anemia Prevention Behavior

Most respondents had sufficient prevention behavior, namely 123 respondents (65.1%), and a small number had insufficient anemia prevention behavior, namely 8 respondents (4.2%).

Tabel 3 Frequency Distribution of Anemia Prevention Behavior (n=189)

No	Anemia Prevention Behaviour	Frekuensi (f)	Percentage (%)
1	Less	8	4,2
2	Enaugh	123	65,1
3	Good	58	30,7
	Total	189	100

Sumber : Data Primer, 2024.

Relationship Between Knowledge and Preventive Behavior

Spearman's rank correlation analysis demonstrated a statistically significant positive association between knowledge regarding anemia and anemia prevention behavior ($r = 0.263$, $p < 0.001$).

Although the correlation coefficient indicated a weak relationship, adolescents with higher knowledge scores tended to report better preventive behaviors than those with lower knowledge levels.

Table 4. Relationship Between Knowledge and Preventive Behavior

Anemia Prevention Behaviour										
Anemia Knowledge Level	Less		Enaugh		Good		Total		P-Value	Coefficient Korelasi
	f	%	f	%	f	%	f	%	0,001	0,263
Less	5	25	9	45	6	30	20	10		
Enaugh	3	3	78	78,8	18	18,2	99	10		
Good	0	0	36	51,4	34	48,6	70	10		
Total	8	4,2	12	65,1	58	30,7	189	10		

DISCUSSION

Knowledge Regarding Anemia Among Female Adolescents

This study found that most respondents possessed a moderate level of knowledge regarding anemia. These findings suggest that although health information about anemia has been introduced through schools and community health services, adolescents still lack comprehensive understanding regarding the causes, clinical manifestations, complications, and preventive strategies of anemia. Moderate knowledge may indicate that existing educational programs provide basic information but are insufficient to develop deeper health literacy.

The findings are consistent with previous studies reporting that adolescent girls commonly demonstrate moderate knowledge regarding anemia because educational interventions are often limited to periodic health campaigns rather than continuous health education. Knowledge acquisition among adolescents is influenced by multiple factors, including educational level, access to health information, parental support, and exposure to school health promotion activities.

Anemia Prevention Behavior

Most respondents also demonstrated a moderate level of preventive behavior. Although schools routinely distribute weekly iron supplementation tablets, not all adolescents consistently consume them. During the preliminary assessment, several students reported forgetting to take the tablets or avoiding them because of their unpleasant taste. This finding indicates that providing supplementation alone may not be sufficient to change health behavior.

Health behavior is influenced not only by knowledge but also by motivation, attitudes, perceived benefits, perceived barriers, family support, peer influence, and environmental factors. Consequently, interventions addressing behavioral determinants are essential to improve adherence to anemia prevention practices.

Relationship Between Knowledge and Preventive Behavior

The present study identified a statistically significant positive relationship between knowledge regarding anemia and preventive behavior. Adolescents with better knowledge were more likely to engage in preventive practices, including consuming iron-rich foods and participating in iron supplementation programs. This finding supports the assumption that knowledge serves as a prerequisite for behavioral change.

However, the correlation coefficient ($r = 0.263$) indicated only a weak association. This suggests that knowledge alone explains only a small proportion of preventive behavior. Behavioral change is a complex process influenced by cognitive, psychological, social, and environmental determinants.

This finding aligns with health behavior theories, including the Health Belief Model and Social Cognitive Theory, which emphasize that knowledge increases awareness but does not automatically produce behavioral change. Individuals are more likely to adopt preventive behavior when they perceive themselves to be susceptible to disease, recognize the benefits of preventive actions, possess confidence in performing the behavior (self-efficacy), and receive adequate environmental support.

Therefore, anemia prevention programs in schools should extend beyond providing factual information. Educational interventions should incorporate interactive learning strategies, behavioral counseling, peer education, family involvement, and continuous monitoring of iron tablet adherence. Such comprehensive approaches are expected to strengthen both knowledge and sustainable preventive behavior among adolescent girls.

Implications for Nursing Practice

The findings of this study highlight the important role of nurses and school health professionals in promoting anemia prevention among adolescents. School nurses should implement structured educational programs focusing on nutritional literacy, healthy dietary practices, and adherence to weekly iron supplementation. Interactive health education may improve adolescents' understanding and

facilitate positive behavioral changes that contribute to reducing anemia prevalence among female adolescents.

CONCLUSION

This study demonstrated a statistically significant positive relationship between knowledge regarding anemia and anemia prevention behavior among female adolescents at SMA N 2 Wates. Although the correlation was weak ($r = 0.263$), the findings indicate that adolescents with better knowledge tend to exhibit more appropriate preventive behaviors. These results suggest that knowledge is an important determinant of anemia prevention; however, it is not the only factor influencing adolescents' health behaviors.

The weak correlation observed in this study indicates that preventive behavior is likely influenced by additional factors, including health beliefs, motivation, family support, peer influence, accessibility of health information, and adherence to iron supplementation programs. Therefore, comprehensive school-based interventions should combine health education with behavioral approaches that strengthen adolescents' motivation and self-management skills.

The findings provide scientific evidence supporting the implementation of continuous anemia education within school health programs. Integrating nutrition education, regular counseling, monitoring of weekly iron supplementation, and collaboration among schools, families, and primary healthcare providers may contribute to improving anemia prevention behaviors among adolescent girls.

Future studies are recommended to investigate other determinants of anemia prevention behavior using multivariate analytical approaches and longitudinal or intervention designs to establish causal relationships and evaluate the effectiveness of educational strategies.

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CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this article.

REFERENCES

- Andriastuti, M., Ilmana, G., Nawangwulan, S. A., & Kosasih, K. A. (2020). Prevalence of anemia and iron profile among children and adolescents in Indonesia. *Journal of Blood Medicine*, 11, 223–231.
- Chaparro, C. M., & Suchdev, P. S. (2019). Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. *Annals of the New York Academy of Sciences*, 1450(1), 15–31.
- Carissa, N., Wulandari, D., & Pratiwi, A. (2023). Relationship between knowledge and anemia prevention behavior among adolescent girls. *Jurnal Keperawatan Indonesia*, 26(2), 95–104.
- Kementerian Kesehatan Republik Indonesia. (2023). *Standar pelayanan kesehatan remaja*. Jakarta: Ministry of Health.
- Kementerian Kesehatan Republik Indonesia. (2023). *Survei Kesehatan Indonesia (SKI) 2023*. Jakarta: Ministry of Health.

- Kumar, A., Sharma, E., Marley, A., Samaan, M. A., & Brookes, M. J. (2022). Iron deficiency anaemia: Pathophysiology, assessment, practical management, and emerging therapies. *British Medical Journal*, 378, e069864.
- McLoughlin, I. J., Hodge, A., & Gill, T. K. (2020). Epidemiology of anemia among adolescents: A systematic review. *Nutrients*, 12(11), 3514.
- Nurbaiti, N., Wahyuni, S., & Rahmawati, D. (2021). Factors associated with anemia prevention behavior among adolescent girls. *Belitung Nursing Journal*, 7(6), 547–554.
- World Health Organization. (2023). *Guideline on haemoglobin cut-offs to define anaemia in individuals and populations*. Geneva: World Health Organization.
- World Health Organization. (2024). *Anaemia*. <https://www.who.int/news-room/fact-sheets/detail/anaemia>