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Differences In Knowledge Levels About Anemia Before And After Health Education Among Eighth- -Grade Female Students At MTS Plus Roudhotul Muhibbin Bekasi

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Abstract

Anemia among adolescent girls remains a health issue that can affect their health, concentration in school, and productivity. The prevalence of anemia among adolescents in Indonesia reaches 15.5%. Low knowledge about anemia, an unbalanced diet, and non-compliance with iron supplement intake contribute to the occurrence of anemia. The health education program in this study was followed by an increase in knowledge about anemia among the respondents. Preliminary findings at MTs Plus Roudhotul Muhibbin in Bekasi indicated that most female students did not understand the effects and prevention of anemia, followed diets without considering nutritional balance, and did not regularly take iron supplements. To determine differences in the level of knowledge about anemia before and after health education was provided to eighth-grade adolescent girls at MTs Plus Roudhotul Muhibbin in Bekasi. A quantitative study with a one-group pretest-posttest pre-experimental design. The sample consisted of 36 respondents selected using proportionate stratified random sampling. Data were analyzed univariately and bivariately using the Wilcoxon Signed-Rank Test. The median level of knowledge increased from 13 on the pretest to 16 on the posttest. The results of the Wilcoxon test showed a Z-value of -5.189 and a p-value < 0.001 (α < 0.05). There is a difference in the level of knowledge about anemia before and after health education was provided to eighth-grade female students at MTs Plus Roudhotul Muhibbin in Bekasi.

Keywords: ***Knowledge, Anemia, Health Education, Adolescent Girls.***

INTRODUCTION

Anemia is a health problem that remains prevalent among adolescent girls and can impact their health, ability to concentrate in school, productivity, and future reproductive health. Adolescent girls are at a higher risk of developing anemia compared to adolescent boys due to increased iron requirements during growth and blood loss from menstruation. If iron needs are not met, hemoglobin levels may decrease, leading to anemia. Data from the 2023 Indonesian Health Survey (SKI) indicate that the prevalence of anemia among adolescents in Indonesia reached 15.5%, signaling that anemia remains a public health issue requiring special attention, particularly among adolescent girls (Munira et al., 2023) .

Various studies indicate that low knowledge about anemia is one of the factors contributing to its occurrence among adolescent girls. A lack of understanding regarding the causes, impacts, and prevention of anemia can influence adolescents' behavior in meeting their nutritional needs and taking iron supplements regularly. Health education is one strategy that can be used to improve adolescents' knowledge and awareness regarding anemia prevention. A study conducted by the ") showed that health education improves adolescent girls' knowledge about anemia. These findings reinforce the importance of health education as a promotive and preventive intervention in efforts to reduce the risk of anemia among adolescents.

Although the effectiveness of health education in improving knowledge about anemia has been reported in several studies, the results of a preliminary study at MTs Plus Roudhotul Muhibbin in Bekasi indicate that there are still adolescent girls with limited understanding of anemia and its prevention. Some students still follow diets without considering nutritional balance and do not regularly consume iron supplements even though they have received them from the school or health workers.

This situation indicates a gap between the health information provided and the adolescent girls' level of understanding in implementing behaviors to prevent anemia. Based on our review, no previous study with these specific characteristics—examining the effect of health education on the level of knowledge about anemia among adolescent girls at MTs Plus Roudhotul Muhibbin in Bekasi—has been identified. Therefore, this study offers a novel approach in applying health education as an intervention to improve knowledge about anemia among adolescent girls at MTs Plus Roudhotul Muhibbin in Bekasi. Based on the above, this study aims to determine the difference in the level of knowledge about anemia before and after health education is provided to eighth-grade adolescent girls at MTs Plus Roudhotul Muhibbin in Bekasi.

RESEARCH METHODS

This study employed a pre-experimental design with a one-group pretest-posttest approach. Respondents' knowledge was measured before and after the health education intervention using the same instrument. This design was used to determine changes in knowledge scores following the intervention. However, since the study did not include a control group, the changes in scores cannot be fully attributed solely to the health education intervention, as there is a possibility of influence from other factors outside the intervention.

The study population consisted of all 115 eighth-grade female students at MTs Plus Roudhotul Muhibbin in Bekasi. The sampling technique used was *proportionate stratified random sampling* because the population was divided into several classes with varying numbers of students. The sample size was determined using the formula for a paired t-test with a 5% significance level, 80% *power*, and *a moderate effect size* of 0.5, resulting in a minimum sample size of 32 respondents. To account for a 10% *dropout* rate, the sample size was increased to 36 respondents. Next, the sample was distributed proportionally across each class: 7 respondents from Class VIII A, 10 from Class VIII B, 9 from Class VIII C, and 10 from Class VIII D. Respondents in each class were selected randomly based on the established inclusion and exclusion criteria.

Inclusion criteria included active eighth-grade female students who were present during the pretest and posttest, were willing to participate in the study, and had obtained parental/guardian consent. Exclusion criteria included respondents who were absent, withdrew, did not complete the questionnaire, or were ill during the study. The intervention was delivered once using a lecture method with PowerPoint (PPT) slides based on the Education Program Outline (SAP). The material presented included the definition of anemia, its causes, signs and symptoms, effects, prevention, and the importance of taking iron supplements (TTD).

Data collection was conducted using an anemia knowledge questionnaire consisting of 20 true-false questions. Correct answers were scored 1 and incorrect answers were scored 0, with a total score range of 0–20. Knowledge levels were categorized as good (76–100%), adequate (56–75%), and poor (≤55%).

The instrument's validity was tested using Pearson's product-moment correlation on 30 respondents. With 28 degrees of freedom (df) at a 5% significance level, a table r-value of 0.361 was obtained. The test results showed that all 20 questionnaire items had calculated r-values greater than the table r-value (0.361); therefore, all items were deemed valid and suitable for use in the study. The instrument's reliability was tested using Cronbach's Alpha on the 20 questionnaire items among 30 pilot study respondents. The analysis results showed a Cronbach's Alpha value of 0.724. This value indicates that the instrument has adequate internal consistency; therefore, the 20 questionnaire items were deemed reliable and suitable for use in the study.

The research procedure began with a pretest to assess the respondents' baseline knowledge. This was followed by a health education session lasting approximately 60 minutes, consisting of an opening, presentation of the material, discussion, and closing. After the intervention was completed,

the respondents took a posttest to measure their level of knowledge following the health education session.

Data were analyzed using IBM SPSS version 30. Univariate analysis was used to describe the distribution of scores and knowledge level categories in terms of frequency, percentage, median, and range. Bivariate analysis was performed using the Wilcoxon Signed-Rank Test to test for differences in knowledge levels before and after the intervention at a 95% significance level ($\alpha = 0.05$). Ethics approval number 0098/VI/AUEC/2026 was granted by the Ethics Committee of 'Aisyiyah University Surakarta.

RESULTS AND DISCUSSION

A total of 36 eighth-grade female students from MTs Plus Roudhotul Muhibbin Bekasi participated in this study. The results of the univariate analysis showed an increase in knowledge scores regarding anemia after health education was provided.

Table 1. Distribution of Knowledge Scores Before and After Health Education

Statistics	Pretest	Posttest
n	36	36
Median	13	16
IQR	3	1
Minimum	10	13
Maximum	15	17

Based on Table 1, the median knowledge score increased from 13 on the pretest to 16 on the posttest. The minimum score increased from 10 to 13, and the maximum score increased from 15 to 17. Additionally, the IQR decreased from 3 to 1, indicating that the variation in respondents' knowledge scores after the intervention became more homogeneous.

Table 2. Distribution of Knowledge Levels Before and After Health Education

Knowledge Level	Pretest n (%)	Posttest n (%)
Low	9 (25.0)	0 (0.0)
Sufficient	27 (75.0)	12 (33.3)
Good	0 (0.0)	24 (66.7)
Total	36 (100)	36 (100)

Based on Table 2, before receiving health education, most respondents had a "fair" (75%) or "poor" (25%) level of knowledge, while no respondents had a "good" level of knowledge. After the intervention, most respondents fell into the "good" category (66.7%), and no respondents were found to have a "poor" level of knowledge.

Bivariate analysis using the Wilcoxon Signed-Rank Test showed that nearly all respondents experienced an increase in their knowledge scores after the intervention.

Table 3. Distribution of Changes in Knowledge Scores Based on the Wilcoxon Test

Category	N
Negative Ranks (Posttest < Pretest)	0
Positive Ranks (Posttest > Pretest)	35
Ties (Posttest = Pretest)	1
Total	36

Based on Table 3, 35 respondents showed an increase in their knowledge scores, one respondent's score remained the same, and no respondents showed a decrease in their scores after the health education session.

Table 4. Results of the Wilcoxon Signed-Rank Test

Variable	N	Z	p-value
Pretest and Posttest Knowledge Levels	36	-5.189	<0.001

The results of the Wilcoxon test showed a Z-value of -5.189 with a p-value of <0.001. A p-value less than 0.05 indicates that there is a statistically significant difference between knowledge levels before and after health education was provided.

Discussion

The results of the study show a change in the level of knowledge about anemia following the health education intervention. Before the intervention, the majority of respondents—27 respondents (75%)—were in the "sufficient" knowledge category, while 9 respondents (25%) were in the " " or "inadequate" categories, and there were no respondents in the "good" category. After the intervention, the proportion of respondents in the "good" knowledge category increased to 24 respondents (66.7%), those in the "adequate" category to 12 respondents (33.3%), and there were no longer any respondents in the "poor" category. These changes indicate a shift in the distribution of knowledge levels toward higher categories following the health education program.

This shift in categories was supported by changes in overall knowledge scores. The median score increased from 13 on the pretest to 16 on the posttest, with the minimum score rising from 10 to 13 and the maximum score from 15 to 17. Additionally, the interquartile range (IQR) decreased from 3 to 1, indicating that respondents' knowledge scores after the intervention showed less variation. The results of the Wilcoxon Signed-Rank Test showed a significant difference between knowledge scores before and after health education ($Z = -5.189$; $p < 0.001$). A total of 35 respondents experienced an increase in their scores, no respondents experienced a decrease, and 1 respondent's score remained unchanged. These findings indicate that changes in scores occurred in nearly all respondents following the health education program.

The increase in knowledge following the health education program can be understood through the process of information reception and processing. The health education in this study provided structured information regarding the definition of anemia, its causes, signs and symptoms, impacts, and prevention efforts, including the importance of taking Iron-Folic Acid Tablets (TTD). The systematic delivery of the material provided more targeted information to the respondents, thereby helping to broaden their understanding of anemia. Thus, health education can serve as one approach to providing health information to adolescent girls.

The findings of this study are consistent with the research by , which showed an increase in knowledge about anemia among adolescent girls after they received health education. These results are also consistent with the study by Nahak et al. (2022) , which found a difference in knowledge levels before and after health education delivered via lectures and leaflets to adolescent girls, with the Wilcoxon test yielding a p-value of 0.024. The similarity of these findings suggests that providing health information about anemia through educational activities can lead to changes in knowledge levels among adolescent girls.

The lecture method used in this study was supported by PowerPoint as a tool to aid in the delivery of material. This medium allowed the material on anemia to be presented in a structured manner and accompanied by visual information that supported the explanations during the intervention. The study also demonstrated a change in knowledge following health education delivered via a lecture method combined with leaflets. Furthermore, the use of media in the learning process can help convey information in a more targeted manner. However, this study did not compare the use of PowerPoint with other media or health education methods; therefore, the specific contribution of PowerPoint to changes in knowledge scores cannot yet be determined.

The presence of 35 respondents with positive ranks indicates that the majority of respondents achieved higher knowledge scores on the posttest compared to the pretest. Meanwhile, one respondent had the same score on both measurements. The lack of change in the score for one respondent suggests

that the increase in knowledge did not occur uniformly across all respondents. Differences in baseline knowledge, attention during instruction, ability to absorb information, and prior experience may be some of the factors influencing individual changes in knowledge. However, this study did not specifically measure these factors; therefore, the cause of the unchanged score cannot be directly determined.

Although statistically significant differences in scores were found, the results of this study must be interpreted with the study design in mind. The study used a one-group pretest-posttest design without a control group; therefore, changes in scores cannot be fully attributed to health education. Other factors, such as exposure to information from the school environment, family, the media, or other sources, may also influence respondents' knowledge. Furthermore, the use of the same instrument for both the pretest and posttest allows for the possibility of a measurement repetition effect or the respondents' ability to recall previous questions. Therefore, the findings of this study are more accurately understood as indicating a change in knowledge following the provision of health education, rather than as causal evidence that health education is the sole factor causing such changes.

The findings of this study suggest that health education can be one approach to improving adolescent girls' knowledge about anemia. Increased knowledge is an important aspect of health education, but it does not directly indicate changes in behaviors to prevent anemia. This study assessed only knowledge and did not evaluate changes in attitudes, adherence to iron-rich food consumption, dietary patterns, or behaviors to prevent anemia. Therefore, future research could employ a controlled-group design, involve a more diverse sample in terms of number and characteristics, and evaluate changes in attitudes and behaviors to gain a more comprehensive understanding of the impact of health education on anemia prevention among adolescent girls.

CONCLUSION

There was a change in the level of knowledge about anemia following the provision of health education to eighth-grade adolescent girls. The proportion of respondents with good knowledge increased from 0% on the pretest to 66.7% on the posttest, while the proportion of respondents with insufficient knowledge decreased from 25% to 0%. The Wilcoxon Signed-Rank Test revealed a significant difference between knowledge scores before and after the intervention ($Z = -5.189$; $p < 0.001$). These findings suggest that health education has the potential to be an effective strategy for improving adolescent girls' knowledge about anemia, despite the study's design limitations—specifically, the absence of a control group.

However, several limitations should be considered: the study did not use a control group, the sample was limited to eighth-grade students, and the posttest was administered shortly after the health education session. These conditions mean that the study results primarily reflect a short-term increase in knowledge. This study was unable to assess the extent to which the knowledge acquired by the respondents could be retained over a longer period.

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