THE EFFECTIVENESS OF THE HEALTHY MILLENNIAL CARD MEDIA *GAME* IN INCREASING YOUNG WOMEN'S KNOWLEDGE ABOUT ANEMIA PREVENTION

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ABSTRACT
Background: Anemia is a significant public health problem, particularly among adolescent girls in developing countries such as Indonesia. Innovative and interactive health education media are needed to improve adolescents' knowledge regarding anemia prevention. The Healthy Millennial Card Game is an educational tool designed to increase awareness and understanding through participatory learning.
Objective: This study aimed to analyze the effect of health education using the Healthy Millennial Card Game on the knowledge of adolescent girls regarding anemia prevention.
Methods: This study used a pre-experimental design with a one-group pretest–posttest approach. The population consisted of 73 female students, with 62 participants selected using purposive sampling based on inclusion and exclusion criteria. Data were collected using a structured knowledge questionnaire and analyzed using the Wilcoxon test.
Results: Before the intervention, 37 respondents (59.6%) had poor knowledge of anemia prevention. After the intervention, 41 respondents (66.1%) demonstrated good knowledge. Statistical analysis showed a significant improvement in knowledge after the intervention ($p = 0.000$; $p < 0.05$).
Conclusion: Health education using the Healthy Millennial Card Game significantly improved adolescent girls' knowledge of anemia prevention. This interactive educational media can be considered an effective alternative for school-based health education programs to reduce anemia prevalence among adolescents.

Keywords: Anemia, Healthy Millennial Card Game, Knowledge

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BACKGROUND

Anemia is a global health problem that deserves attention, especially in developing countries such as Indonesia. Lack of knowledge is one of the factors that contribute to anemia. (Izdihar et al., 2022) Adolescents are an age group at high risk of developing anemia because their iron needs are higher than other age groups. Rapid growth and increased physical activity make adolescent girls ten times more likely to develop anemia than adolescent boys. This is because adolescent girls experience menstruation and therefore require three times more iron than adolescent boys. (Hisanah *et al* ., 2023)

Based on data *from the World Health Organization* (WHO), in 2023 the global prevalence of anemia is half a billion women aged 15-49 years, which means 30% (539 million) of non-pregnant women will be affected by anemia. According to WHO, Africa and Southeast Asia are the most affected regions with an estimated 106 million women and 103 million children affected by anemia in Africa, while in Southeast Asia 244 million women and 83 million children will be affected. Based on data from the Indonesian Ministry of Health in 2024, 32% of adolescents aged 15–24 in Indonesia suffer from anemia.

According to data from the East Java Provincial Health Office in 2020 (East Java Health Office, 2020) , the incidence of anemia in teenage girls in East Java is classified as severe, namely 42% of teenage girls in 10 regencies in East Java have anemia. Based on data from the Kediri Regency Health Office (Kediri Health Office, 2024) in 2023-2024, there were 3,343 teenage girls out of a total of 16,611 who were screened had anemia or around 20.13%. Based on the results of the initial study with interviews with 10 female students in grades VII, VIII & IX of the YBPK Sidorejo Christian High School conducted by the researcher, it was found that 6 people stated that they often experienced symptoms of weakness, fatigue, lethargy, in addition, the female students also stated that they did not know about anemia and did not understand the symptoms of anemia, headaches and lethargy, while 4 people experienced symptoms of anemia, headaches, dizziness. The students stated that they had known about anemia but did not understand the symptoms and causes of anemia.

Anemia in adolescents has a significant negative impact on health and quality of life. Adolescents who suffer from anemia tend to experience decreased physical and cognitive abilities, resulting in difficulty concentrating, frequent fatigue, tiredness, lethargy, and dizziness, which can interfere with their productivity. Furthermore, factors that influence the occurrence of anemia include a lack of willingness to seek and explore information about the symptoms, causes, and prevention of anemia. A study conducted by (Kusnadi, 2021) showed that a factor that influences anemia is knowledge. Adolescent girls who have good knowledge about anemia tend to have a lower risk of developing anemia. Meanwhile, adolescent girls who have less knowledge about anemia tend to have a higher risk of developing anemia. This shows a relationship between knowledge and the risk of anemia in adolescent girls. One way to increase adolescent girls' knowledge about anemia is to provide health education to minimize the risk of worsening anemia. A study conducted by (Styaningrum & Metty, 2021) showed that education using *a healthy millennial card game* about anemia prevention proved effective in increasing adolescent girls' knowledge.

OBJECTIVE

This study aimed to examine the effect of health education using the Healthy Millennial Card Game on adolescent girls' knowledge of anemia prevention. Specifically, this research sought to evaluate changes in knowledge levels before and after the educational intervention, considering the high prevalence of anemia among adolescents and the identified gaps in their understanding of anemia symptoms, causes, and prevention. By utilizing an interactive and participatory educational approach, this study is expected to provide evidence on the effectiveness of innovative learning media as an alternative strategy for improving health knowledge and supporting anemia prevention programs among adolescent girls in school settings.

METHODS

Study Design

This research uses a quantitative approach and the study design that will be used is *pre-experimental design* with *one group pre-test-post-test.*

Study Subject

The sample used in this study was based on inclusion criteria, namely respondents willing to sign *Informed Consent* and exclusion criteria, namely respondents who were not present at the time of the study such as: illness and permission, with a calculation using the Slovin formula, totaling 62 respondents. The sampling technique in this study was *purposive sampling.*

Instruments

The first measuring tool used in this study was the collection of sociodemographic data using a questionnaire covering (age, gender, first menstruation) to measure knowledge related to anemia among adolescent girls using *the Healthy Millennial Card Game (KMS)* , which is a card containing questions and answers related to anemia and balanced nutrition. The questions in *the KMS Game* have been adjusted to statements that have passed the validity and reliability tests of the anemia knowledge questionnaire. The KMS card contains 15 questions containing the definition of anemia, diagnosis of anemia, causes of anemia, symptoms of anemia, short-term and long-term effects of anemia, reasons why adolescent girls are susceptible to anemia, ways to prevent anemia, foods to prevent anemia and foods that trigger anemia.

Intervention (this title is for experimental studies only)

[1] Form small groups of 10-11 by counting 1-6, young women are given a pre-test before treatment. [2] Teenage girls are grouped according to number, [3] Each group will be divided into groups A and B consisting of A1, A2, A3 who will hold 15 question cards. while groups B1, B2, B3 hold 15 answer cards so that there are 6 groups. [4] The game in the card will be played by 2 groups in turns, namely group A holds the question card and is answered by group B by showing the answer card, and vice versa. [5] The group that gets the highest score is the group that answers the most questions correctly. [6] The group that gets the highest score will receive a reward as motivation. [7] *The healthy millennium card game* is carried out once a day for 60

minutes. *Post-testing* was conducted 1 week after the intervention by administering a questionnaire.

Data Analysis

Data analysis in this study used SPSS 16 software to describe gender data, first menstruation . Frequency distribution and percentage were used. Meanwhile, knowledge was presented in the form of average. median, minimum-maximum value. For further analysis, to determine the difference between the pre-test and post-test mean values because the data was not normally distributed, the Wilcoxon test was performed with a significance value (p value < 0.005).

Ethical Considerations

This research involves human participants, the procedures given to respondents have been approved and stated in accordance with the procedures and ethical standards of the Health Research Ethics Committee (KEPK) of Stikes Husada Jombang with number 01008-KEPKSHJ. All participants in this research have received explanations and expressed their willingness to sign the consent that has been given.

RESULT

Table 1. Distribution of responden of the age of female students

No	Age	Frequency	Percentage (%)
1	11-12 years old	2	3.2%
2	13-14 years old	39	62.9%
3	15-16 years old	21	33.9%
	Total	**62**	**100%**

Based on table 5.1 above, almost all respondents were aged 13-14, which was 39 (62.9%) female students.

Table 2. Distribution of respondents based on the level of menstrual age

No	Menstrual Age	Frequency	Percentage (%)
1	10-12 years old	27	43.5%
2	13-14 years old	35	56.5%
3	15-16 years old	0	0%
4	Not Menstruating Yet	0	0%
	Total	**62**	**100%**

Based on table 5.2 above, it shows that almost all respondents experienced menstruation at the age of 13-14 years, which is a total of 35 (56.5%) female students.

Table 3. Distribution of respondents based on the information about anemia prevention of female students

No	Information about Anemia Prevention	Frequency	Percentage %
1	Once	0	0%
2	Never	62	100%
	Total	**62**	**100%**

Based on table 5.3 above, it shows that all respondents have never received information about anemia prevention, namely 62 (100%) female students.

Table 4. Distribution of knowledge related to anemia prevention before being given the healthy millennial card game to teenage girls .

No	Knowledge	*Pre-Test*	
		Total	**Percentage %**
1	Good	0	0%
2	Enough is enough	25	40.3%
3	not enough	37	59.6%
	Total	**62**	**100%**

Based on table 5.4, it shows that before being given the game, *the results of* the healthy millennial cards show that 0 respondents (0%) had good knowledge, 25 respondents (40.3%) had sufficient knowledge, and 37 respondents (59.6%) had insufficient knowledge .

Table 5. Distribution of knowledge related to anemia prevention after being given the healthy millennial card game to teenage girls .

No.	Knowledge	*Post-Test*	
		Total	**Percentage %**
1	Good	41	66.1%
2	Enough is enough.	21	33.8%
3	not enough	0	0
	Total	**62**	**100%**

Based on table 5.5, it shows that after being given *the healthy millennial card game* , the results showed that 41 respondents (66.1%) had good knowledge, 21 respondents (33.8%) had sufficient knowledge, and 0 respondents (0%) had insufficient knowledge.

Table 6. Result *of the Wilcoxon signed rank test* before and after being given the healthy millennial card game

Variable	N	*Median (min-max)*	*Mean ± SD*	*p-value*
Knowledge				

Pre-test	62	53(27-77)	54.37±12.531	0.000
Post-test	62	80(60-93)	81.06±10.929	

Based on table 5.6, it shows that knowledge about anemia prevention before the healthy millennial card *game was played had a mean value of* 54.37 with a minimum value of 27 and a maximum of 77. After being given the healthy millennial card game *, the mean value* was 81.06 with a minimum value of 60 and a maximum of 93. The *mean difference* between *the pre-test* and *post-test* was 26.69.

Based on the results *of the Wilcoxon signed rank test* , $p = 0.000$ where $p < 0.05$ so that H1 is accepted means that there is an influence of health education through the media of *healthy millennial card games* on the knowledge and attitudes of teenage girls towards anemia prevention .

DISCUSSION

Based on the results of data analysis using *the Wilcoxon test,* it shows that the test results or analysis results from the *Wilcoxon statistical test* obtained *Sig. (2-tailed)* or probability value (0.000) which is much lower than the significant standard of 0.05 or (〉< 〈), then the H1 data is accepted, meaning that there is an Influence of Health Education Through the Media *of Healthy Millennial Card Games* on the Knowledge and Attitudes of Adolescent Women Towards Anemia Prevention .

Previous research by (Styaningrum & Metty, 2021) explained that providing a planned intervention *for the healthy millennial card game produced good results. Health education through the healthy millennial card game* can generate many ideas and opinions and can share various information in groups, thus motivating and encouraging interest in learning among female students. Better learning outcomes can help adolescents achieve optimal health levels from previously unknown to knowledgeable. The results of the study showed an increase in respondent knowledge after the healthy millennial card *game was played with a p value* (0.000) < alpha value (0.05). This indicates that there is a difference in anemia prevention in adolescent girls before and after the healthy millennial card *game* was played. Therefore, it can be concluded that *the healthy millennial card game* is effective in increasing knowledge about anemia prevention among adolescent girlS.

This research is also supported by a study conducted by (Efri Susanti Mesi et al., 2024) that health education is effective in increasing awareness and understanding of adolescents regarding early anemia prevention. And based on the results of statistical tests of the difference in knowledge before and after being given health education about anemia prevention using the *pre-experimental design method with a one-group pre-test and post-test design approach* model , the bivariate p value is 0.000, so it can be concluded that there is an influence of health education on adolescent girls' knowledge about anemia prevention.

From the analysis above, there is an influence of health education through the media of the *healthy millennial card game* on the knowledge and attitudes of teenage girls about anemia prevention . Based on the results of the researcher's observations, the respondents have the willingness and awareness that arises in female students in accepting *the healthy millennial*

card game about anemia prevention provided by the researcher, which is a new learning method for teenage girls so that female students can increase their knowledge about anemia prevention.

CONCLUSION

Significant influence of health education through the *Healthy Millennium Card Game Media* on Female Adolescents' Knowledge About Anemia Prevention with the results of *Sig. Value (2-tailed)* 0.000 < α (0.05) means that it has a strong level of proximity. Providing health education through *the Healthy Millennium Card Game Media* as a stimulant in an effort to increase students' knowledge in preventing early anemia. This can be seen when *the game* has started, they are very enthusiastic to answer every question from the card. Until the process begins with stimulation, occurs based on concentration of attention, there is a thought processing process in the right brain that can increase imagination and creativity, the *Healthy Millennium Card Game* which is an interactive discussion allows for variations in the level of participation, respondents have the willingness and awareness that researchers are looking for new learning methods for female adolescents, so that their students can prevent anemia, so that their students can prevent anemia emerged in students in receiving the healthy millennial card *game* about preventing anemia given

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CONFLICT OF INTEREST

No Conflict of Interest

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