

Original Research

The Effectiveness of MONOGAMIA (Monopoly to Prevent Anaemia) on Female Adolescent Knowledge about Anaemia Prevention and Consumption of Iron Supplement



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Article Info	Abstract
Article history: Received: 29 January 2024 Accepted: 20 April 2024	<p><i>Introduction:</i> The leading causes of anaemia in female adolescents are iron and nutrient deficiencies, excessive blood loss during menstruation, and incorrect diet due to a lack of knowledge of female adolescents about the prevention of anaemia and the consumption of iron supplement tablets. This study aimed to analyse the effectiveness of MONOGAMIA on the knowledge level of female adolescents.</p> <p><i>Methods:</i> The research design was a quasi-experiment pre-post-test with control group. The sample was 96 female students divided into two groups at Senior High School East Lombok from October 4-14, 2024. The intervention group used MONOGAMIA, and the control group used the CEMARI Flip Chart. The Fe tablet was given for four weeks. Data collection used questionnaires of knowledge and iron supplement consumption compliance cards. Knowledge pre-test and post-test were taken on the same day in both groups, and compliance with iron consumption was taken one week after education. The research data were analysed using Wilcoxon, Mann Whitney, and Chi-Square ($\alpha < 0.05$).</p> <p><i>Results:</i> Both groups had a significant difference in knowledge of anaemia prevention before and after education ($p < 0.001$). There was a significant difference in knowledge about anaemia prevention after education between two groups ($p = 0.000$). There was a significant difference in iron supplement consumption between the intervention and control group after education ($p = 0.028$).</p> <p><i>Conclusion:</i> MONOGAMIA is more effective in increasing knowledge about anaemia prevention and iron supplement consumption in female adolescents than CEMARI. MONOGAMIA can be used to educate female adolescents on how to prevent anaemia.</p>
Keywords: anaemia, game, female adolescent, knowledge	

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INTRODUCTION

The prevalence of anaemia is still relatively high globally, with anaemia up to two billion, covering 315 million in the Southeast Asian region, 50% caused by iron deficiency [1]. Based on WHO data in 2019, the prevalence of anaemia in women aged 15-49 years was 35% [2]. Based on the results of Riskesdas in 2018, 32% of female adolescents suffer from anaemia. This figure increased from the Riskesdas 2013 results by 18.4% [3]. Meanwhile, the prevalence of anaemia in NTB Province is 48% [4]. Based on data from the East Lombok District Health Office, in 2022, the number of anaemia cases in female adolescents was recorded at 1155 adolescents, and the highest cases of Anaemia in female adolescents were 165 people, the Rensing District was 137 people, and Dasan Lekong District was 132 people [5].

Anaemia is a condition in which the number of red blood cells or haemoglobin (red blood cells that bind oxygen in the Blood) is less than normal. Female adolescents suffer from Anaemia if haemoglobin levels show a value of ≤ 12 g / dl [6]. Adolescents are one of the vulnerable groups experiencing nutritional problems due to accelerated growth and development, lifestyle, eating habits, and physical activity. Female adolescents are prone to several health problems, one of which is anaemia [7].

Anaemia is a health problem in Indonesia that can be experienced by all age groups, ranging from toddlers, adolescents, pregnant women, and older adults. Female adolescents are prone to suffer from anaemia due to a lot of blood loss during menstruation

every month during growth. Hence, they need much nutrition, lack intake rich in iron and protein in the daily diet, and often go on the wrong diet to lose weight [1]. Anaemia in female adolescents impacts decreasing endurance, productivity, and learning achievement. Long-term impact if Anaemia occurs in female adolescents at risk during pregnancy, fetal growth disorders, premature, low weight, stunting, pregnancy complications, childbirth, and even death of mothers and children [8]. The causative factor of anaemia in female adolescents is caused by lack of it. Female adolescents lack information from health workers and facilities, mass media, electronic media knowledge about Anaemia, and consumption of iron supplement tablets [9]. Another factor causing anaemia is nutritional status, due to a lack of knowledge about the intake of nutrients needed by the body, namely those containing balanced nutrition, and iron [10].

Handling and efforts to prevent Anaemia in female adolescents can be made by applying a diet with a balanced nutritional menu every day, paying attention to protein intake, eating foods containing folic acid and vitamin b12, avoiding consumption of foods that inhibit iron absorption, and consuming Iron supplement tablets (TTD) regularly [11].

One way to overcome the problem of Anaemia in female adolescents is to provide Health Education, which aims to increase female adolescents' knowledge about Anaemia and blood tablets [12]. Knowledge is the result of knowing and occurs after a person senses a particular object through the senses he has [13]. Education is an activity carried out to motivate increased knowledge.

The use of communication, information, and educational media in providing health education to female adolescents can increase knowledge and change behaviour [14].

In this study, the media used were MONOGAMIA (Monopoly to prevent anaemia) and Flip Chart. The game MONOGAMIA is a game that contains pictures and materials related to Anaemia and its prevention that trains memory and mastery of material shaped like a picture game board that runs according to the number of dice, banker and with 3-5 players[15]. Flipchart media is media in the form of sheets of paper resembling an album or calendar that contains images, pictures, or photos and writing about health information. The back page (the reverse sheet) contains sentences as messages or information related to the image on the front page[16].

The study aimed to analyse the effectiveness of education with MONOGAMIA and CEMARI on the knowledge level of anaemia prevention and compliance with iron supplement consumption in female adolescents.

METHODS

Design and Settings

The research design used a quasi-experiment [17] *pretest and post-test with control group* [18]. This research was conducted at Senior High School Madrasah Aliyah Nahdlatul Wathan Kembang Kerang, Aikmel District, East Lombok Regency, West Nusa Tenggara Province, Indonesia, from 4 October 2023- 14 October 2023.

Samples

The population in this study was all female students or Female adolescents from classes X, XI, and XII, as many as 96 at Senior High School Madrasah Aliyah Nahdlatul Wathan Kembang Kerang in 2023. The sample in this study was 96 students, where each intervention and control group consisted of 48 female adolescents determined by using proportionate stratified random sampling to select into two groups[18]. The samples consisted of class X, 29 students (intervention=15; control=14); class XI, 34 students (intervention=15; control=19); and class XII, 33 students (intervention=18; control=15).

The inclusion criteria in this study were Female students aged 15-18 years at Senior High School Madrasah Aliyah Nahdlatul Wathan classes X, XI, and XII. The exclusion criteria in this study were Female adolescents or students who were not willing to be respondents.

Instrument

The questionnaire was used to measure knowledge on the prevention of anaemia in female students. It consists of 20 questions about understanding anaemia, its causes, signs, symptoms, the impact of anaemia, efforts to prevent and overcome anaemia, understanding iron supplement tablets, the benefits of consuming it, and how to consume it. The correct answer is scored 1, and the wrong is 0. The maximum value is 20, and the minimum is 0. The higher the score, the better the knowledge of adolescent girls about anaemia prevention and the consumption of

iron supplement tablets. The questionnaire has been tested for validity and reliability using Cronbach's alpha [18]. All question items were valid ($r = 0.361$) and reliable (0.860).

Iron (Fe) tablet consumption compliance was measured with an iron consumption compliance card. This card was made by researchers based on the guidebook for giving iron supplement tablets to female adolescents during the COVID-19 pandemic for health workers [7]. The card contains two pages; the first includes the respondent's biodata, like name, age, and class, and the second consists of the iron (Fe) tablet consumption schedule. If the respondent has taken iron supplement tablets, they will put a checkmark on the compliance card.

Data Analysis

Before carrying out the statistical test, the data of knowledge pre-test, knowledge post-test, and knowledge pre-post-test difference in both groups were checked for normality by using Shapiro Wilk ($p=0.009$; 0.000; 0.000) or $p<0.05$, which means the data was not normally distributed in both groups. Then, the data was analysed by Wilcoxon and Mann-Whitney test for knowledge and used Chi-Square test for compliance of consumption of iron supplement tablet [17].

Procedures

The study was conducted offline in 2 classrooms one day for both intervention and control groups. The intervention group was given education using MONOGAMIA, an educational media in the form of a board game

containing pictures and materials related to anaemia and its prevention, which is played using dice and pawns and played by 3-4 students. Meanwhile, the control group used the CEMARI Flip Chart. CEMARI Flip charts are media in the form of sheets of paper resembling albums containing pictures and writings about the prevention of anaemia and consumption of iron supplement tablets, and the back page contains sentences as informational messages related to the pictures on the front page.

Researchers explained the purpose and procedure of the study to students. Female adolescents who agreed to be respondents signed a consent form. The pretest and post-test in both groups were carried out on the same day. The students filled out a pretest questionnaire about the prevention of anaemia and consumption of iron supplement tablets, and then, female students were divided into 12 groups accompanied by one facilitator. Each group consisted of 4 players with one complete set of MONOGAMIA games and performed Suits to determine who was the 1st, 2nd, 3rd, and 4th player. The four players did the MONOGAMIA game, starting with the 1st player throwing dice, running PION, and reading the provided cards, followed by the 2nd, 3rd, and 4th players. The player who first gets to the finish (free parking) wins, and the game ends. After the students finished playing MONOGAMIA, they were given 30 minutes to understand the materials on the MONOGAMIA notification card. They filled out a post-test questionnaire about knowledge of the prevention of anaemia and the consumption of iron supplement tablets.

In the control group, students filled out a pretest questionnaire on knowledge of anaemia prevention and consumption of iron supplement tablets. Then, adolescent girls were divided into 12 groups with one facilitator. Each group consisted of 4 female students with a CEMARI Flips Chart and one accompanying facilitator. The students were given 30 minutes to understand the materials on the flip chart. Then, they filled out a post-test questionnaire of knowledge about anaemia prevention and the consumption of iron supplement tablets.

The iron supplement tablets (Fe) and compliance cards were distributed after education in both groups. The iron supplement tablets were taken one tablet/day during menstruation and one tablet/week during the non-menstruation period for a total of four weeks. The compliance of iron tablet consumption was measured in one week's aftermath.

Ethical Consideration

This research was conducted after obtaining ethical approval from the Health Research Ethics Commission of the Faculty of Medicine, University of Mataram, Mataram, Indonesia, on June 26, 2023, with number 258/UN18.F8/ETIK/2023.

RESULTS

The total sample that enrolled in this study was 96 female students. There were no female students who refused to join.

Based on Table 1, the data of age and class were homogeneous ($p=0.917$; $p=0.788$). Most respondents aged 16 in both groups

(35.4% and 43.8%). Most respondents in the intervention group were in class XII (37.5%), while in the control group were class XI (39.6%).

Table 2 shows that the knowledge score before education with MONOGAMIA was 8 to 16 in the intervention group, with a mean score of 11.79, then increased to 11 to 20 score of knowledge with a mean score of 17.21 after education. Meanwhile, the knowledge score in the control group before education with CEMARI was 3 to 17 with a mean score of 11.94, then increased to 7 to 19 with a mean score of 14.94. The results of the Mann-Whitney test showed that the value of $p = 0.000$ in both intervention and control groups, which means there is a difference in the level of knowledge of female students before and after being given education using MONOGAMIA and CEMARI Flip Chart.

Table 3 shows that 50% of students in the intervention group consumed iron (Fe) tablets that they had not consumed before, while the control group was only 25%. The Chi-Square test results showed p -value = 0.000 in both groups, meaning there is a significant difference before and after consuming iron (Fe) tablets in female students.

Table 4 shows the knowledge after education in the intervention and control groups. In the intervention group, the mean value of 17,21 was greater than the control group's value of 14,94. Based on the results of statistical tests using Mann Whitney with p -value = 0.000, there were differences in adolescent girls' knowledge about anaemia after being educated in the intervention and control groups.

Based on Table 5, the number of students who consume iron supplement tablets one week after education in the intervention group (40.6%) is greater than in the control

group (29.2%). The Chi-Square test results show a difference in the consumption of iron supplement tablets after education between the two groups.

Table 1

Respondent Characteristics in the Intervention Group and Control Group

Variables	Intervention		Control		p-value	
	n	%	n	%		
Age (y/o)	15	14	29,2	12	25,0	0,917
	16	17	35,4	21	43,8	
	17	16	33,3	12	25,0	
	18	0	0	3	6,3	
	19	1	2,1	0	0	
Class	X	15	31,3	14	29,2	0,788
	XI	15	31,3	19	39,6	
	XII	18	37,5	15	31,3	

Table 2

Knowledge of female adolescents about anaemia prevention before and after education between two groups

Group	N	Knowledge Pretest		Knowledge Post-test		p-value
		Min-Max	Mean ±D.S.	Min-Max	Mean ±D.S.	
Intervention	48	8-16	11,79 ± 2.5	11-20	17.21 ± 1,8	0,000
Control	48	3-17	11.94 ± 2.9	7-19	14.94 ± 2,8	0,000

Table 3

Consumption of iron supplement tablets (Fe) after education between two groups

			Post-test				Total		p-value
			Yes		No		N	%	
			n	%	n	%			
Intervention	Pretest	Yes	14	29,2	2	4,2	16	33,3	0,000
		No	24	50,0	8	16,7	32	66,7	
		Total	38	79,2	10	20,8	48	100	
Control	Pretest	Yes	16	33,3	0	0,0	16	33,3	0,000
		No	12	25,0	20	41,7	32	66,7	
		Total	28	58,3	20	41,7	48	100	

Table 4

The knowledge of female adolescents about anaemia prevention after education between two groups

Variable	Group	N	Mean ±D.S.	p-value
Knowledge	Intervention	48	17.21 ± 1,8	0,000
	Control	48	14.94 ± 2,8	

Table 4

Iron supplement tablet (Fe) consumption after education between two groups

Variable	Intervention		Control		p-value
	n	%	n	%	
Consumption of Fe tablets	Yes	39	40,6	28	0,028
	No	9	9,4	20	

DISCUSSION

Knowledge about Anaemia Prevention

In this study, female adolescents' knowledge about anaemia prevention in both groups, namely the MONOGAMIA group and CEMARI Flip chart Group, experienced a significant increase after being given education. There was a significant increase in knowledge score after education using MONOGAMIA compared to the control group, which was given education using the CEMARI Flip Chart. This is in line with previous research, which showed that education using snakes and ladders could increase students' knowledge about preventing premarital sexual behaviour [19]. In addition, puzzle games for adolescents could increase their knowledge level about depression management [20]. This is also supported by a previous study that found monopoly games could increase cadres'

knowledge about stunting [21]. Monopoly games provide exciting information so that players easily understand it because it trains memory in mastering the material contained in the Monopoly game board [21].

The research of Fitriyanti et al. (2021) showed that there was a difference in the level of knowledge of elementary school students about balanced nutrition between the intervention group that was given education using Monopoly games and the control group that was not given Monopoly education [22]. It stimulates students to learn independently and improves an active learning atmosphere that is not monotonous and passive. With the use of Monopoly game media, students can play and learn [22]. The use of monopoly games increased knowledge about HIV/AIDS before and after counselling in the intervention group compared to the control group given media leaflets, with a difference in the average of 14,563 greater than in the control group [23]. Providing education using

Monopoly games is more influential in increasing adolescent knowledge about HIV/AIDS than using leaflet media [23]. Other studies also showed that there was a significant influence before and after being given Monopoly games on students with students' speaking skills. Monopoly games are effective in improving students' speaking skills in the teaching and learning process [24].

There was a significant increase in adolescent girls' knowledge about anaemia prevention after being educated using Flip charts. This study aligns with Raikar's research, which showed increased knowledge of female adolescents before and after being given interventions using feedback sheets on nutrition[25]. The research showed that worksheet media can increase adolescents' knowledge about early marriage [26]. Feedback media helps promote health education that attracts interest and motivation to learn. Health promotion media with turning sheets can improve the knowledge skills of adolescents. Worksheet media helps motivate students to learn because it is interesting, readable, and can be used as a health education tool [26]. The use of flip charts can also increase the level of students' knowledge of basic sanitation in Islamic boarding schools. Flip chart educational media is an exciting health promotion because some pictures and materials can provide understanding and are not monotonous[27]. Other research showed that Sheetback was effective in increasing adolescent knowledge about the impact of early marriage[28]. According to Mitra (2020), there are differences in knowledge

before and after health education using PowerPoint slides, health posters, and video interventions [29]. Educating children using worksheet media effectively increases maternal knowledge about newborn care [30]. Flip charts as an educational medium effectively increase cadres' knowledge about tuberculosis prevention in children[31].

According to the assumptions of researchers. The intervention group that was given education using MONOGAMIA was more effective than the control group that used the CEMARI flips chart because MONOGAMIA is an educational medium that can attract young women to learn and stimulate students' learning abilities. MONOGAMIA is an educational medium in the form of a board game that contains information about the prevention of anaemia and the consumption of iron supplement tablets presented in pictures and cards containing material played in groups compared to the Flips chart. The previous study conducted by Baihaqi et al. (2023) showed that there were differences between groups who are given education using the monopoly of anaemia nutrition in adolescents and those who are not given $p = 0.000$. Monopoly games as a learning medium are beneficial in improving student learning outcomes. The use of monopolies has an impact on increasing adolescent knowledge[32]

Consumption of iron supplement

In this study, the consumption of Iron supplement Tablets (Fe) in female adolescents in both groups, namely the MONOGAMIA and CEMARI Flip chart,

experienced a significant increase after being given education. Educational games are effective in changing behaviour related to nutrition in adolescents [33]. Providing education about nutrition in schools and iron supplementation interventions every week is effective in increasing adherence to Fe tablet consumption, reducing side effects, and treating anaemia in female adolescents at school [34]. The previous study showed a significant effect between weekly iron supplementation in schools with haemoglobin levels and reducing the incidence of anaemia in female adolescents. The level of adherence of female adolescents in taking iron supplement tablets is one of the effective factors in increasing iron supplementation [35]. Giving health education about anaemia and nutrition effectively increased female adolescents' knowledge. However, there was no significant difference between the group given iron tablet supplementation and health education with the group given iron supplementation alone (against the increase in haemoglobin levels of female adolescents). It might be caused by low adherence to take iron tablet supplementation [36].

Based on the results of this study, providing education using Flip Charts media has an effect on increasing the consumption of iron supplement tablets (Fe) in female adolescents. The previous study showed that delivering education using nutrition diary books can increase female adolescents' compliance in consuming iron supplement tablets (iron) [37]. Another study showed that educating using worksheet media effectively improves hypertensive patients' quality of life

and dietary adherence [38]. According to Afrianti et al., in 2022, educational media using turning sheets effectively improved behaviour in the Atraumatic Care application[39]. Fe tablet consumption in female adolescents increased after being given education using MONOGAMIA because female adolescents after being given education experienced a significant increase in knowledge, resulting in a change in attitudes towards positive in female adolescents consuming iron supplement tablets compared to the control group given education using a flip chart. Monopoly games provide a deep understanding because its attract and motivate students to learn while playing. Compared to the CEMARI Flip chart, students only see pictures and brief explanations in the same direction described by researchers.

LIMITATION

This study has a limited sample size, and researchers checked the compliance of iron consumption one week after education before the total doses were finished (4 weeks) due to limited time.

CONCLUSION

MONOGAMIA (Monopoly Prevent Anaemia) as a media for educating female adolescents is more effective in increasing knowledge about anaemia prevention and iron supplement tablet consumption than the CEMARI flip chart. MONOGAMIA is an educational media in the form of a board game containing pictures and materials about the prevention of anaemia and consumption of iron

supplement tablets that stimulate students' interest in learning than CEMARI flip charts because it is presented in the form of a board game containing pictures and information about anaemia and consumption of iron supplement tablets so that young women can play while learning. Further research can check the adherence in female adolescents to consuming Fe tablets for long periods.

NURSING IMPLICATION

MONOGAMIA effectively increases knowledge about preventing anaemia and consuming iron supplement tablets in female adolescents because MONOGAMIA is an educational game that stimulates thinking skills. Health workers can educate female adolescents about preventing anaemia and consuming iron supplement tablets using media such as MONOGAMIA.

CONFLICT OF INTEREST

There is no conflict in the publication of this article.

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