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Specific educational program for adolescent anemia prevention (Progres MIRA) to adolescent girls in remote areas of Bengkulu, Indonesia

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Abstract

Background: Anemia prevalence worldwide ranges from 30-50%, mostly occurring in developing countries, predominantly affecting adolescent groups. In Indonesia, the prevalence of anemia in females aged ≥15 years is 22.7%. Cases in Indonesia include 45% in Denpasar City and 62% in Bengkulu Province. Generally, adolescent girls are vulnerable to anemia due to significant blood loss during menstruation, posing risks of Low Birth Weight (LBW) and stunting during childbirth.
Purpose: To determine the effectiveness of Progres MIRA (Specific Education Program for Anemia Prevention in Adolescents) on compliance with iron supplement consumption and hemoglobin levels in adolescent girls on Enggano Island, North Bengkulu Regency in 2023.
Method: This study used a quasi-experimental post-test only method with a control group. The Progres MIRA research intervention involved a specific education program for anemia prevention in a special classroom setting. The independent variable was Progres MIRA, the dependent variables were hemoglobin levels and compliance with consuming iron supplement tablets, and external variables included menstrual duration, menstrual cycle, nutrient intake, and economic status.
Results: The research findings showed that 82.9% of adolescent girls had a menstrual duration of >6 days, which influenced the amount of iron supplement tablet consumption among them. The menarche age among adolescent girls in the Progres MIRA group was 28.6% at an age <12 years. Compliance levels in treatment related to the menstrual duration variable obtained a ρ-value= 0.01, menarche age obtained a ρ-value= 0.57, malnutrition deficiency index obtained a ρ-value= 0.04, and MUAC obtained a ρ-value= 0.10. This indicates that Progres MIRA effectively increases compliance with iron supplement tablet consumption among adolescent girls.
Conclusion: Progres MIRA is effective in improving compliance with iron supplement tablet consumption among adolescent girls. Recommended Dietary Allowance (RDA) significantly affects compliance with iron supplement tablet consumption among adolescent girls.

Keywords: Adolescent; Anemia; Fe Tablets; Girls; Knowledge; Menstruation

INTRODUCTION

In developing countries, the prevalence of anemia is ranging from 30-50%, predominantly affecting adolescent groups (World Health Organization, 2008; Andriastuti, Ilmana, Nawangwulan, & Kosasih, 2020). In Indonesia, the prevalence of anemia in females aged ≥15 years is 22.7%, with rates in certain areas such as Denpasar city at 45% and Bengkulu Province at 62%. The high prevalence of anemia among adolescent girls makes them vulnerable due to significant blood loss during

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menstruation, posing risks of delivering Low Birth Weight (LBW) babies and stunted growth (Ningsih, 2020). Accelerated efforts to improve nutrition are through specific and integrated interventions targeting anemia in adolescent girls and women of reproductive age, focusing on promotion, prevention, increased consumption of iron-rich foods, Iron Supplementation Tablets (IST), and food fortification. One of the public health center's programs involves distributing IST to adolescent girls in schools at a rate of 1 tablet per week and daily during menstruation (minimum of 10 tablets per month). However, the compliance rate is low due to insufficient education, monitoring, and evaluation of adherence (World Health Organization, 2008; Widyanthini, & Widyanthari, 2021; Ministry of Health of the Republic of Indonesia, 2018). Limitations in geographic conditions, infrastructure, access to information, human resources, and lack of suitable media result in low awareness and compliance with IST consumption in remote, islands, and border areas such as Enggano Island in Bengkulu Province (Idramsyah, & Novira, 2019; Novira, 2020). The percentage of adolescent girls not consuming provided iron supplementation tablets from schools is 56.6% (Mardiah, Amin, Pratiwi, & Yanuarti, 2021). Compliance in consuming IST is less than 50% due to parental education and occupation factors, knowledge, and awareness in consuming iron supplementation tablets (Widiastuti, & Rusmini, 2019). Therefore, there's a need for education on anemia, the benefits of IST, consistent supply availability, parental involvement, and peer groups to enhance adolescent knowledge. Innovative methods and specific education, monitoring IST consumption involving peer groups, are needed to improve compliance among adolescent girls, especially in remote and low-income communities (Psaki, Haberland, Mensch, Woyczynski, & Chuang, 2022; Chaparro, & Suchdev, 2019).

Insufficient intake of energy from macronutrients (carbohydrates, proteins, and fats) and micronutrients, especially vitamin A, vitamin D, folic acid, iron, zinc, calcium, and iodine, and other micronutrients in women of reproductive age, lead to Chronic Energy Deficiency (CED) during pregnancy, starting from the "risk" of CED and characterized by a low energy reserve for a prolonged period, measured by the Mid-Upper Arm Circumference (MUAC) less than 23.5 cm or Body Mass Index (BMI) before pregnancy or in Trimester I (gestational age ≤12 weeks) below 18.5 kg/m2. BMI is the ratio of weight (in kg) to height (in meters), calculated by the formula weight/(height)^2 (kg/m^2) (Ministry of Health of the Republic of Indonesia 2023). The decreased survival of erythrocytes may be related to increased phagocytic activity by activated macrophages. Bone marrow response disorders are partially caused by limited iron supply, but there is strong evidence of additional defects in erythropoietin secretion (Lee, 1983). Green bean extract can increase hemoglobin levels in the blood of adolescent girls suffering from anemia (Carolin, Suprihatin, Indirasari, & Novelia, 2021).

Anemia found in patients with chronic infectious, inflammatory, and neoplastic conditions, known as Anemia of Chronic Disease (ACD), is one of the most common syndromes in the medical world (Means, 1999).

RESEARCH METHOD

This study used a quasi-experimental post-test-only method with a control group. The research intervention, Progres MIRA, involved a specific education program for preventing adolescent anemia in a specialized classroom setting. Adolescents were then provided with one iron tablet weekly and daily during menstruation. Specific education was conducted by peer groups, who also supervised the medication intake. Before the intervention, measurements of hemoglobin levels and compliance with iron supplement tablet consumption were taken. The independent variable was Progres MIRA, the dependent variable was adherence to iron supplement tablet consumption, and external variables included menstrual duration, menarche age, nutritional adequacy, and MUAC. The research was conducted in the Enggano Island area of North Bengkulu Regency from January to October 2023. The study population comprised all junior high school adolescents on Enggano Island, North Bengkulu Regency, in 2023, with a sample of

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70 respondents divided into two groups: 35 respondents in the treatment group and 35 in the control group selected purposive. Inclusion criteria were junior high school students willing to participate in the study, able to read and write. Exclusion criteria included adolescents with severe/chronic illness, blood disorders, and severe anemia.

The treatment group consisted of junior high school students from Enggano Island who received the Progres MIRA package in a special and structured education class, followed by the administration of one iron tablet weekly and daily during menstruation. Specific education was conducted by peer groups, who also supervised the medication intake, with a dosage of 1 iron supplement tablet per week and 1 tablet per day during menstruation for 3 months. For respondent hemoglobin levels, measurements of iron conjugation levels in the blood were conducted, expressed in gr%dl, which were further compared. Age was categorized as ≤12 years and 13-16 years. Compliance with iron supplement tablet consumption was measured using observation sheets (Morisky scale). Menstrual duration was categorized as ≤5 days and >6 days, while MUAC was measured with <23.5 cm categorized as CED and >23.5 cm as normal. Menstrual cycle, economic status, and nutritional consumption were measured using questionnaire sheets and interviews.

This research obtained permission and recommendation from the Ministry of Health of the Republic of Indonesia, Directorate General of Health Resources, Bengkulu Health Polytechnic, with ethical clearance certificate No.KEPK.BKL/114/03/2023, dated March 24, 2023.

RESEARCH RESULT

Table 1. Participant Characteristics and Association with Treatment Adherence (N=70)

Variables	Group		p-value	OR	95% CI
	Intervention (n=35)	Control (n=35)			
Age (Mean±SD)(Range)(Year)	(13.47 ±1.271)	(10-16)			
Age at Menarche (n/%)					
≤ 12 years	10/28.6	1/2.9	0.95	0.79	0.65-1.38
13-16 years	25/71.4	34/97.1			
Duration of Menstruation (n/%)					
≤ 5 days	6/17.1	14/40.0	0.00	1.18	1.24-2.66
> 6 days	29/82.9	21/60.0			
Recommended Dietary Allowance (n/%)					
Unmet	9/25.7	35/100.0	0.01	0.52	0.29-0.92
Met	26/74.3	0/0.0			
MUAC (n/%)					
CED	7/20.0	11/31.4	0.22	0.75	0.49-1.14
Normal	28/80.0	24/68.6			

In Table 1, it shows that the respondents' ages ranged from 10 to 16 years, with a mean of 13.47 and a standard deviation of 1.271. Meanwhile, for the Progres MIRA group aged ≤ 12 years, it was 28.6%, and for the

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control group, it was 2.9%. As for the Progres MIRA group aged 13-16 years, it was 71.4%, while for the control group, it was 97.1%, with a pValue of 0.95. Regarding the duration of menstruation, for the Progres MIRA group with a duration ≤ 5 days, it was 17.1%, and for the control group, it was 40.0%. For the Progres MIRA group with a duration of > 6 days, it was 82.9%, and for the control group, it was 60.0%, with a pValue of 0.00. The RDA for the Progres MIRA group that did not meet the requirements were 25.7%, while for the control group, it was 100.0%. Conversely, for the Progres MIRA group that met the requirements, it was 74.3%, and for the control group, it was 0.0%, with a pValue of 0.01. The MUAC for the Progres MIRA group with CED, it was 20.0%, and for the control group, it was 31.4%. For the Progres MIRA group with a normal status, it was 80.0%, and for the control group, it was 68.6%, with a pValue of 0.22. For the non-compliant Progres MIRA group, the percentage was 28.6% and for the control group, it was 2.9%. Meanwhile, for the compliant Progres MIRAgroup, the percentage was 71.4% and for the control group, it was 97.1% with a p-value of 0.00

Table 2. Factors Associated with Treatment Adherence

Variable	B	SE	Exp B	p-value
Duration of Menstruation	1.64	0.66	5.18	0.01
Age at Menarche	0.43	0.78	0.64	0.57
RDA	1.16	5.93	0.31	0.04
MUAC	1.03	0.63	0.35	0.10

*Logistic regression

In Table 2, Logistic Regression indicates that the relationship between treatment compliance and the variable of menstrual duration obtained a pValue=0.01, Age at Menarche obtained a pValue=0.57, RDA received a p-value=0.04, and MUAC attained a pValue=0.10.

DISCUSSION

The Progres MIRA effectively improves compliance with iron supplement tablet consumption in adolescent girls, demonstrating that education can enhance adherence to taking iron supplements. In this study, the education on anemia included the definition, symptoms, causes, effects on mothers and fetuses, behaviors, diets associated with anemia, prevention, and treatment methods. The best treatment for chronic anemia involves addressing its underlying cause. However, this is not performed in patients undergoing treatment with transfusions, intravenous iron supplementation, and erythropoiesis-stimulating drugs (Fraenkel, 2015)

In this research, the education package bundled in Progres MIRA was conducted through three structured classes by peer groups trained in adolescent anemia, adherence to iron tablets, and medication intake monitoring practices. Among adolescent girls who had knowledge about taking iron tablets during menstruation, 55.6% did not suffer from anemia (Angrainy, Fitri, & Wulandari, 2019). The intervention groups were divided into seven groups of five individuals each with one peer facilitator. There's a necessity for peer group programs already existing in communities as an optimization step, integrating promotive and preventive efforts against anemia (Astuti, & Suryani, 2020).

The educational material encompassed nutritional functions, nutritional problems, signs and symptoms of anemia, its impacts, causes, factors, foods to prevent nutritional anemia, and medication intake monitoring. Educational media used in this research, based on needs analysis and trials, included modules, short film leaflets, pocketbooks containing anemia education, and adherence records (Hossain, & Luies, 2017)

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This comprehensive education increased mothers' interest and knowledge, consequently enhancing positive behaviors in iron supplement consumption. This aligns with prior findings stating the necessity for early and frequent antenatal healthcare promotion, health education about anemia increasing adherence to iron supplementation. Proper nutrition education will improve dietary patterns, proving effective in reducing anemia. Anemia diagnostic approaches can be clinically done, but a combination of clinical and laboratory approaches is more beneficial (Bakta, 2017)

The above analysis indicates that menstrual duration and RDA influence compliance with iron supplement tablet consumption in adolescent girls. Those with inadequate nutrition correlate with anemia, which is also related to insufficient nutrient intake. Menstrual duration also affects adherence because adolescents with longer menstruation periods require longer duration of iron supplement tablet consumption.

CONCLUSION

Progress MIRA is effective in increasing compliance with iron supplement tablet consumption among adolescent girls. RDA influences compliance with iron supplement tablet consumption in adolescent girls.

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