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Community-Based Education Enhancing the "Juminten Tabah" Model for Anemia Prevention in Adolescent Girls

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ABSTRACT

Aims This study aimed to analyze the role of community-based education in enhancing the effectiveness of the Juminten Tabah model in anemia prevention behavior among adolescent girls.

Materials & Methods This experimental study employed a two-group pre-test-post-test approach, including a control group, involving 100 participants divided equally into intervention and control groups. The intervention consisted of administering iron supplementation tablets every Friday, supported by community-based educational sessions conducted in schools. Data collection included pre- and post-test assessments using structured questionnaires and hemoglobin level measurements. Statistical analysis was performed using paired t-tests to evaluate within-group differences and independent t-tests to compare outcomes between the intervention and control groups.

Findings The intervention group demonstrated a significant improvement in hemoglobin levels and anemia prevention behaviors compared to the control group ($p<0.05$). The proportion of adolescents with normal hemoglobin levels increased from 10% to 20% in the intervention group, whereas the control group exhibited a more modest increase from 8% to 12%. Additionally, the mean score for anemia prevention behaviors in the intervention group increased substantially from 48.40 to 67.20.

Conclusion Community-based education through the Juminten Tabah model significantly improves anemia prevention behaviors and hemoglobin levels among adolescent girls.

Keywords Anemia; Adolescent; Female; Community Health Education; Dietary Supplements; Hemoglobins

CITATION LINKS

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Introduction

Anemia remains a critical public health issue in Indonesia, particularly among adolescent girls [1, 2]. According to data from the Basic Health Research (Riskesdas), the prevalence of anemia in this group remains alarmingly high [3]. This condition not only reduces productivity and learning ability but also poses long-term risks to reproductive health, such as menstrual disturbances, an increased risk of complications during pregnancy and childbirth, and the possibility of giving birth to low birth weight babies or experiencing stunting. Anemia that is not addressed during adolescence can worsen maternal health in the future and affect the next generation [4]. The primary cause of anemia in adolescents is insufficient iron intake, often compounded by unbalanced dietary patterns and health-compromising habits [5].

Anemia remains a pressing global public health issue, including in Indonesia [6, 7]. Recent data indicate that the global prevalence of anemia among adolescent girls is approximately 30%, with higher rates observed in Asia. This regional disparity is attributed to factors such as inadequate nutrition, a high prevalence of helminth infections, and limited access to healthcare services [8, 9]. In Indonesia, the prevalence of anemia among adolescent girls ranges from 22% to 30%, varying by region and measurement methods. Iron deficiency is the leading cause, accounting for over 50% of anemia cases in the country [10].

Efforts to address anemia have included the routine administration of iron and folic acid supplements through the blood supplement tablets (TTD) program [11]. However, the program's implementation faces several challenges, including limited awareness of the importance of TTD consumption, low adherence rates, and insufficient support from schools and family environments. These challenges highlight the need for more innovative and integrated strategies to enhance the effectiveness of anemia prevention programs for adolescent girls [12, 13].

The "Juminten Tabah" (Friday Drink 16 Blood Supplement Tablets) model was developed as an innovative solution to address the challenges of anemia prevention. This model integrates the provision of TTD with a community-based approach within the school environment, actively involving teachers, peers, and families. Selecting Friday for TTD administration establishes a consistent routine aimed at improving adherence among adolescent girls. The program is further enhanced by interactive and participatory health education sessions designed to strengthen adolescents' understanding of anemia prevention and motivate sustained compliance.

The novelty of this research lies in the development of the "Juminten Tabah" (Friday Drink 16 Blood Supplement Tablets) model, an innovative, community-based approach to preventing anemia in adolescent girls. This model uniquely integrates the routine administration of TTD every Friday with a school-centered educational strategy, actively involving teachers, peers, and families as key supporters. The deliberate selection of a specific day aims to establish a consistent, collective habit, distinguishing it from conventional approaches that often distribute tablets without a structured monitoring system. By combining health interventions, education, and social support, this model promotes sustained adherence to TTD consumption. It offers a promising strategy to significantly reduce the prevalence of anemia among adolescent girls in Indonesia.

This study aimed to analyze the role of community-based education in enhancing the effectiveness of the Juminten Tabah model in anemia prevention behavior among adolescent girls. Specifically, the study evaluated how educational interventions involving the support of teachers, peers, and families, integrated with the administration of TTD every Friday, could improve TTD consumption compliance, knowledge, and behavioral changes in anemia prevention.

Materials and Methods

Study design

This experimental study employed a two-group pre-test-post-test control approach. Participants were divided into a treatment group and a control group. Before the intervention, both groups completed a pre-test to assess baseline conditions related to the study parameters. The treatment group then received an intervention through the implementation of the "Juminten Tabah" (Friday Drink 16 TTD) model, while the control group continued with their usual routines without any intervention. After a specified period, both groups underwent a post-test to evaluate the observed changes and the effectiveness of the intervention.

Participants

This study was conducted from January to August 2024 at two high schools in Muaro District, Jambi City, including SMA Negeri 01 and SMA Titian Teras. The participants were adolescent girls enrolled as students at these schools. The selection of these locations was based on population characteristics that aligned with the research objective of preventing anemia among adolescent girls. The inclusion of these two schools provided diverse social and educational contexts, enriching the study data.

Participants were divided into two groups, including an intervention group and a control group. The sample allocation was carried out randomly using a simple random sampling technique. Out of a total population of 133 adolescent girls who met the inclusion criteria, the sample size was calculated using the Slovin formula with a 5% margin of error

(e=0.05), resulting in a sample size of 100 participants. These 100 participants were then proportionally allocated into two groups, with 50 participants each. The sample allocation was conducted while ensuring a balanced distribution of demographic characteristics between the groups. Both groups underwent pre-test assessments before the intervention and post-test assessments after the intervention, following the established research procedures.

Participants were selected using a simple random sampling technique, adhering to predefined inclusion criteria. Eligible participants were adolescent girls aged 15-18 years who were actively enrolled as students at SMA Negeri 01 and SMA Titian Teras in Muaro District, Jambi City. Additional inclusion criteria required participants to be willing to engage in all stages of the study, to be free from chronic illnesses that could influence hemoglobin levels, and not to be currently participating in anemia treatment programs.

Data collection

Data collection in this study employed pre- and post-test methods to evaluate the effectiveness of the Juminten Tabah model in improving anemia prevention behaviors among adolescent girls. Primary data, in the form of hemoglobin (Hb) levels, were obtained through laboratory examinations using a hemoglobinometer, conducted before the intervention (pre-test) and after the intervention (post-test) in both the intervention and control groups.

The educational sessions were delivered by healthcare professionals from the community health center in collaboration with school health (UKS) teachers. Education was provided through face-to-face sessions lasting 45-60 minutes, conducted every four weeks throughout the intervention period. The educational content included the importance of anemia prevention, the benefits of consuming TTD, healthy eating patterns, and an active lifestyle. The media used included PowerPoint presentations, posters, booklets, and educational videos, which were accessible to participants via a Google Drive link.

The pre- and post-test assessments were conducted using structured questionnaires that had been tested for validity and reliability. The questionnaire covered demographic data, Hb levels, and anemia prevention behaviors. The pre-test was conducted before the educational sessions and intervention, while the post-test was administered after four months of intervention. In addition, qualitative data were collected through direct observations of participants' behavior at school every Friday during the TTD distribution and through focused interviews with several participants and UKS teachers to gather insights regarding responses and challenges throughout the intervention. The intervention program lasted four months, with one iron supplement tablet provided every Friday, resulting in a total of 16 tablets given to each participant during the study period.

A validity and reliability study was conducted on a questionnaire designed to measure efforts to prevent anemia among adolescent girls. Content validity was established through expert panel assessments to ensure that all key aspects of anemia prevention, such as consuming iron-rich foods, iron supplementation, and healthy lifestyle habits, were adequately covered in the questionnaire. Construct validity was tested using exploratory factor analysis (EFA), with results showing that all items had loading factors greater than 0.5, indicating alignment with the underlying theory of anemia prevention. Criterion validity testing produced a significant correlation of $r=0.68$ ($p<0.01$). Reliability testing using Cronbach's Alpha demonstrated an overall reliability coefficient of $\alpha=0.83$, reflecting good internal consistency.

Statistical analysis

Data analysis employed two descriptive and inferential analyses. Descriptive analysis was used to summarize the characteristics of the participants and the data collected, including age distribution, baseline hemoglobin levels (pre-test), and anemia prevention behaviors in both the intervention and control groups. The results of the descriptive analysis were presented in the form of frequency distribution tables, as well as means and standard deviations, to provide a clear overview of the participants' initial conditions prior to the intervention.

Inferential analysis was employed to test the hypotheses and assess the effectiveness of the "Juminten Tabah" model. The statistical tests used included the paired t-test to compare pre- and post-test results within each group, as well as the independent t-test to examine significant differences between the intervention and control groups following the intervention. The objective of this analysis was to determine whether the "Juminten Tabah" model led to significant improvements in hemoglobin levels and anemia prevention behaviors among adolescent girls. All statistical analyses were performed using SPSS software, version 22.0, with a significance level set at $p<0.05$.

Findings

The intervention (16.5±1.2 years) and control (16.6±1.1 years) groups had similar age profiles, with most participants falling within the mid-adolescent range. Baseline hemoglobin levels showed that anemia remained a common issue in both groups, although it was slightly more prevalent in the control group. The majority of participants experienced mild anemia, with only a small proportion having hemoglobin levels within the normal range. In terms of anemia prevention behavior, awareness and implementation of preventive efforts were generally

low among participants, with no significant differences between the intervention and control groups (Table 1).

Table 1. Frequency of participants' age, baseline hemoglobin levels, and anemia prevention behaviors before intervention

Parameter	Intervention group (n=50)	Control group (n=50)
Age (years)		
15-16	30(60)	28(56)
17-18	20(40)	22(44)
Initial Hb levels (g/dL)		
<11 (Anemia)	20(40)	22(44)
11-12 (Mild)	25(50)	24(48)
>12 (Normal)	5(10)	4(8)
Anemia-preventive behavior		
Low (0-50%)	40(80)	42(84)
Moderate (60-70%)	8(16)	6(12)
High (80-100%)	2(4)	2(4)

Changes in hemoglobin levels after the intervention indicated a positive trend in the intervention group, with an overall increase in Hb levels compared to the control group. This suggests that the intervention had a measurable impact on improving participants' hemoglobin status. Similarly, there was a noticeable improvement in anemia prevention behavior among participants in the intervention group, while the control group showed minimal change. These findings highlight the effectiveness of the intervention in promoting healthier practices related to anemia prevention (p=0.0001; Table 2).

Table 2. Frequency of Hb level and anemia prevention behavior after the intervention

Parameter	Intervention group (n=50)	Control group (n=50)
Hb levels (g/dL)		
<11 (Anemia)	10(20)	18(36)
11-12 (Mild)	30(60)	26(52)
>12 (Normal)	10(20)	6(12)
Anemia-preventive behavior		
Low (0-50%)	5(10)	30(24)
Moderate (60-70%)	35(70)	12(60)
High (80-100%)	10(20)	8(16)

Discussion

This study aimed to analyze the role of community-based education in enhancing the effectiveness of the Juminten Tabah model in anemia prevention behavior among adolescent girls. The manual for the JUMINTEN TABAH anemia prevention intervention model underwent revisions before being used in the pilot test. Revisions were made to specific sections based on suggestions from the validators. After two rounds of revisions, the intervention model manual was deemed valid and ready for implementation.

During the trial involving 100 adolescent girls still in high school, data on hemoglobin (Hb) levels were collected after the intervention. In the intervention group, which received iron supplement tablets every Friday, there was a significant increase in Hb levels. Initially, 40% of participants in the intervention group had anemia, but this decreased to 20% after the intervention. In contrast, the control group, which did not receive iron tablets, showed only a slight improvement. Initially, 44% of the control group had anemia, but this reduced to 36% after 16 weeks of observation.

There was a decrease in anemia prevalence in both study groups; however, the group that received iron tablets, even though only one tablet per week, showed a more significant improvement in increasing Hb levels among adolescent girls. Additionally, there was an increase in the average behavior score after the implementation of the JUMINTEN TABAH model in preventing anemia at SMA Muaro, Jambi Regency.

The model of administering iron supplements together on the same day, Friday, proved effective in enhancing adherence to the consumption of iron tablets. The practice of taking the tablets collectively fosters a sense of participation, making it easier for adolescent girls to follow the behavior of their peers. This is supported by Bandura's theory, which posits that learning occurs through imitation or modeling, where individuals actively choose behaviors they wish to imitate [14]. The JUMINTEN TABAH educational model utilizes this concept by modeling the behavior of taking iron supplements to prevent anemia. In this approach, the act of consuming the tablets together is performed in a live setting, encouraging adolescent girls to imitate one another.

Adolescent girls take iron supplements together due to environmental factors [15-17]. The school environment plays a key role, as every Friday after sports or Yasinan activities, the teacher announces the scheduled time for the group to take the iron tablets. According to Bandura's theory, which emphasizes the significant impact of environmental factors on behavior, the environment exerts the greatest influence on behavior. While individual characteristics (personality) are important, the environment, along with behavior and cognition, often plays a dominant role in influencing performance. The environment shapes behavior and cognition, in turn, influences the environment [18-20].

Furthermore, the practice of taking iron supplements together at school is reinforced by the role of the teacher, who reminds the students every Friday, with the UKS (School Health Unit) teacher playing a key part in this process. According to Bandura's theory of self-efficacy, support and encouragement can be enhanced through experience, learning, and social support. This belief plays a crucial role in helping individuals reach their full potential. Support from teachers, peers, and health professionals can significantly increase self-efficacy [21, 22]. In the context of the JUMINTEN TABAH educational model, the practice of taking TTD together every Friday, along with six additional tablets during menstruation, is designed to motivate adolescent girls. They are encouraged to participate in this behavior due to the support from teachers, community health workers, and their peers.

The successful implementation of the JUMINTEN TABAH model is further supported by the use of a calendar that schedules iron supplement intake exclusively on Fridays, helping adolescent girls remember to take the tablets. Additionally, educational materials about anemia prevention are provided through posters and PowerPoint presentations stored on a Google Drive link, enabling adolescent girls to access the information whenever needed [23, 24].

In line with the findings of Andini and Agestika [25], reporting that playgroup-based education effectively increases adolescent knowledge scores and compliance with blood enhancement tablet consumption in the intervention group, this study also supports the positive impact of structured educational interventions. Similarly, Pertiwi [26] states that there is a significant increase in knowledge, attitudes, and behavior among adolescent girls after using media booklets and anemia prevention modules in peer education programs, utilizing leaflets and booklets as educational tools [23].

The JUMINTEN TABAH intervention model's ability to improve anemia preventive practices among teenage girls is one of its advantages. Through a planned weekly iron tablet supplementation every Friday, the program dramatically decreased the prevalence of anemia in the intervention group. It also promoted adherence through teamwork and an encouraging school climate. This is consistent with Bandura's theory, which highlights the value of modeling and environmental influences in learning. The program's sustainability was also ensured by the availability of digital learning resources and a well-planned schedule. However, the study does have certain shortcomings, such as a lack of a thorough examination of each component that could affect the results of the intervention. Additionally, the results may not be as applicable to more complex situations outside the school setting due to the use of a control group that only engaged in passive observation. Future studies examining additional contextual aspects may improve our understanding of this model's efficacy. Our approach, which involved active support from teachers, peers, and families, combined with regular education and visual reminders, proved effective in fostering better habits of iron supplement consumption. These findings confirmed that structured health education supported by the school and community environment could serve as a key strategy in preventing anemia among adolescent girls.

Conclusion

Community-based education through the Juminten Tabah model significantly improves anemia prevention behaviors and hemoglobin levels among adolescent girls.

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Ethical Permissions: This study obtained ethical approval from the Health Research Ethics Commission of the Health Polytechnic of the Ministry of Health in Jambi (LB.02.06/2/155/2024).

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