International Journal of Contemporary Sciences (IJCS)
Vol. 1, No. 12, 2024: 884-893

Optimizing Compliance and Reducing Anemia: The Impact of Self-Monitoring Pocket Books on Iron Tablet Intake Among Adolescent Girls at Taruna Utama Vocational School, East Lampung

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A R T I C L E I N F O

Keywords: Anemia, Iron Tablets, Self-Monitoring Pocket Book, Adolescent Girls, Health Education

Accepted : 22, August
Revised : 14, September
Accepted: 29, October

A B S T R A C T

Anemia is a significant health issue among adolescent girls, driven by increased iron needs during growth and menstruation. This study aims to assess the effectiveness of a self-monitoring pocket book in improving compliance with Fe tablet consumption and reducing anemia among adolescent girls at Taruna Utama Vocational School, East Lampung Regency. Using a quantitative quasi-experimental one-group pretest-posttest design, 51 female adolescents were selected through stratified random sampling. Compliance and anemia status data were collected before and after a one-month intervention, during which participants received a pocket book with anemia education and a consumption tracking table. The results show that compliance with Fe tablet consumption increased from 56.9% to 82.4%, and the proportion of non-anemic participants rose from 62.7% to 88.2%. The McNemar test revealed significant improvements in compliance (p = 0.001) and anemia status (p = 0.002).

INTRODUCTION

Anemia remains a significant public health issue, particularly among adolescent girls, due to increased iron requirements during growth and menstruation. In Indonesia, the prevalence of anemia among adolescents is alarmingly high, contributing to fatigue, reduced academic performance, and long-term health complications. To address this, the government has implemented various initiatives, including the distribution of iron (Fe) tablets to adolescent girls. However, compliance with Fe tablet consumption remains a challenge, often due to lack of awareness, motivation, and self-discipline. This study explores the use of a self-monitoring pocket book as an intervention to enhance compliance with Fe tablet intake and improve anemia status among adolescent girls at Taruna Utama Vocational School in East Lampung Regency.

Anemia, characterized by low red blood cell levels or a deficiency in blood, often results from insufficient iron intake (Podungge et al., 2022) and is diagnosed when hemoglobin (Hb) levels fall below 12 gr/dL. It can impair physical health, including reproductive organ development in adolescent girls, and arises from increased iron needs, poor iron absorption, or bleeding (Nurbadriyah, 2019). Iron tablet supplementation serves as a preventive and treatment measure, with compliance playing a crucial role in reducing anemia risk, as girls who consistently consume iron tablets are less likely to develop anemia (Lovendra Naingalis & Olla, 2023). The success of anemia prevention programs among adolescents depends not only on the coverage of iron tablet distribution but also on ensuring consistent consumption through regular monitoring. Measurement of compliance with iron tablet consumption is carried out with the following calculations:

$$\% \text{ compliance} = \frac{\text{number of iron tablets received-number of remaining iron tablets}}{\text{Number of iron tablets received}} \times 100\%$$

Note: Subjects were declared compliant if they consumed at least 75% of the total tablets given.

Anemia is a significant global health issue, particularly among adolescent girls, with prevalence rates ranging from 40-88% worldwide and 53.7% in developing countries. In Southeast Asia, the prevalence of anemia in adolescent girls reaches 55% (Simbolon et al., 2023), while in Indonesia, it stands at 32% for the 15-24 age group (Ministry of Health, 2018). One of the primary strategies for anemia prevention in adolescent girls is the provision of Fe tablets in schools, with national coverage at 78.9% and 69.4% in Lampung Province (Ministry of Health, 2023). However, 43.5% of adolescent girls still fail to comply with Fe tablet consumption (Simbolon et al., 2023). Compliance is crucial as it is closely linked to the reduction of anemia incidence (Handayani & Budiman, 2022; Simamora & Ristiani, 2024), and regular consumption of Fe tablets can lower the risk of anemia by 6.94 times (Simbolon et al., 2023). Failure to address anemia in adolescents may increase the risk of anemia during pregnancy, leading to negative consequences for fetal growth and complications during pregnancy and childbirth (Ministry of Health of the Republic of Indonesia, 2018).

Table 1. Pre-Survey Results of Iron Tablet Provision

Survey Category	Percentage/Value
Iron Tablet Coverage	100%
Anemia Incidence	40%
Students Not Consuming Iron Tablets	30%
Students Not Consuming Iron Tablets Regularly	50%
Students Consuming Iron Tablets Regularly	20%

The pre-survey results at SMK Taruna Utama showed that while iron tablet provision to female adolescents was 100%, the incidence of anemia remained high at 40%. Interviews with 10 students revealed that 30% did not consume iron tablets, 50% were inconsistent in taking them weekly, and only 20% adhered to consuming one tablet per week. Despite teachers distributing iron tablets regularly each month, anemia cases persisted. This prompted researchers to explore the use of a self-monitoring pocket book as a tool to assess and improve compliance with iron tablet consumption among female adolescents.

The Iron Supplementation Tablet (TTD) program for adolescent girls in Indonesia, initiated in 2014, provides one tablet containing 60 mg of ferrous sulfate and 400 mcg of folic acid each week, totaling 52 tablets annually (Ministry of Health of the Republic of Indonesia, 2018). Despite these efforts, anemia prevalence among adolescents remains high, largely due to non-compliance in consuming the tablets regularly (Andi Yulia Kasma, Sitti Nurhadijah, Andi Ayumar, 2024).

Previous studies have shown that pocket books can serve as effective interventions to enhance knowledge about anemia (Ayu Oktavia & Atin Karjatin, 2021), and the use of self-monitoring books has been linked to improved compliance with iron tablet consumption among pregnant women (Desi et al., 2023). Additionally, compliance with iron tablet intake has a significant relationship with the reduction of anemia incidence (Istiningsih & Meyasa, 2024). However, there is limited research on the effectiveness of using self-monitoring pocket books specifically to improve compliance with iron tablet consumption among adolescent girls, highlighting a gap in understanding how such tools can influence compliance and anemia outcomes in this population.

This research aims to assess the effectiveness of a self-monitoring pocket book as an intervention to improve compliance with Fe tablet consumption and reduce anemia among adolescent girls. Specifically, the study seeks to determine the frequency distribution of compliance with Fe tablet consumption and anemia status before and after the intervention. It also aims to analyze the differences in compliance and anemia status among participants pre- and post-intervention, hypothesizing that the use of the self-monitoring pocket book will lead to improved adherence to Fe tablet intake and a corresponding reduction in anemia cases. The research is a collaborative effort, with Beniqna and Asih Widiawati developing the main concept. Asih Widiawati is responsible for collecting the research data, while Yuni Sulistiawati oversees the preparation of the self-monitoring pocket book. Iis Tri Utami plays a role in creating research

instruments and compiling the content of the pocket book. Beniqna Maharani Besmaya conducts data analysis and handles manuscript formatting. Through this study, the researchers aim to contribute to public health efforts by providing insights into the effectiveness of self-monitoring tools in enhancing compliance with iron supplementation programs, which is crucial for reducing anemia prevalence in adolescents. If successful, the findings could offer a practical strategy to improve adherence to iron supplementation and inform future interventions for anemia control among adolescent populations.

LITERATURE REVIEW

Anemia in adolescent girls is a significant health concern, as their growing bodies require increased iron, especially due to menstruation. Insufficient iron intake can impair physical development and lead to fatigue, reduced academic performance, and long-term health risks. Compliance with iron (Fe) tablet consumption is crucial for reducing anemia, as regular intake of iron supplements significantly lowers anemia incidence. However, non-compliance remains high, often due to a lack of motivation, awareness, and self-discipline. Self-monitoring tools, such as pocket books, have shown promise in improving health-related behaviors by encouraging self-tracking and accountability. Previous studies highlight that self-monitoring can improve adherence to health interventions, including compliance with iron supplementation among adolescents and pregnant women. Therefore, exploring the use of a self-monitoring pocket book could offer valuable insights into improving Fe tablet adherence and reducing anemia rates among adolescent girls, providing a practical and empowering approach to address this persistent public health issue.

The following is the framework in this study:

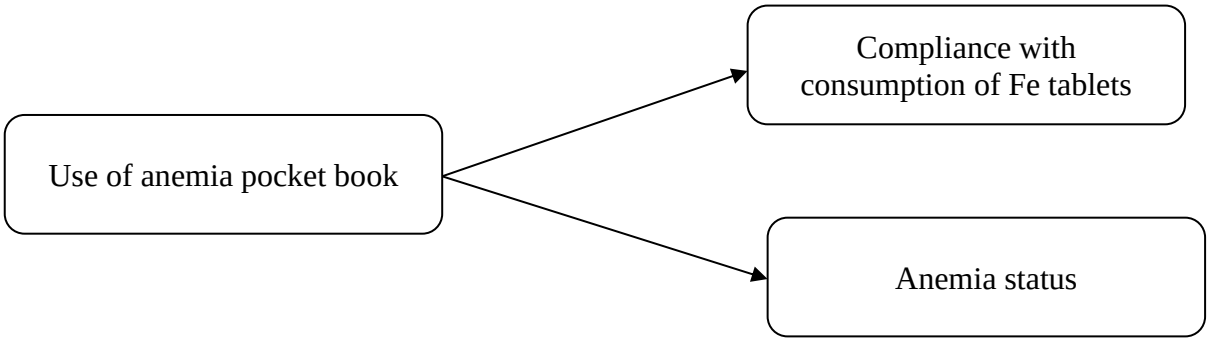

Figure 1. Conceptual Framework

METHODOLOGY

This quantitative quasi-experimental study utilizes a one-group pretest-posttest design to evaluate the impact of a self-monitoring pocket book on compliance with Fe tablet consumption and anemia status among adolescent girls. The research was conducted at SMK Taruna Utama, East Lampung Regency, Lampung Province, Indonesia, from May to June 2024. The population

includes all female students aged 15-18 years, totaling 102 individuals. A sample of 51 female adolescents was selected using stratified random sampling, with participants proportionally drawn from the first, second, and third levels. Inclusion criteria were applied to determine eligibility. The study used an observation sheet to record the participants' identity, compliance data with Fe tablet intake, and digital hemoglobin (Hb) levels in g/dL, measured with the Easy Touch Hb meter (Tambunan & Maritalia, 2023).

Pretest data on compliance were gathered by checking the remaining Fe tablets distributed at school over the past month (May 2024). Pre-intervention Hb levels were recorded from school register data from the same period. Following the intervention, posttest data were collected using observation sheets to assess adherence to Fe tablet consumption and anemia status, with Hb levels re-evaluated after participants used the self-monitoring pocket book for one month. Data analysis was performed using IBM SPSS Statistics 25, with univariate analysis to determine the frequency distribution of compliance and anemia status before and after the intervention. A bivariate McNemar test was employed to identify significant differences in Fe tablet consumption compliance and anemia status pre- and post-intervention. This method ensures that any changes in compliance or Hb levels are accurately captured and attributed to the intervention, providing valuable insights into the effectiveness of self-monitoring tools in improving adherence to anemia prevention programs.

RESULT AND DISCUSSION

The study sample consisted of 51 female adolescents, comprising 17 first-year, 14 second-year, and 20 third-year students. Before the research began, the researcher obtained the necessary research permit and secured informed consent from all participants, ensuring their voluntary participation. No participants dropped out during the study. Pretest data were collected on Fe tablet consumption compliance and anemia status. Following this, each participant received a self-monitoring pocket book containing educational content on anemia and a self-monitoring table to record their tablet intake. Additionally, the researcher provided 10 Fe tablets per student, instructing them to document every instance of consumption. The posttest data on compliance and anemia status were collected after the one-month intervention. The results are presented in Table 2, showing compliance with Fe tablet consumption, and Table 3, detailing changes in anemia status before and after the intervention.

Table 1. Compliance of Fe tablet consumption among female adolescents before and after intervention

Compliance with consumption of Fe Tablets	Before		After		P value
	n	%	n	%	
Obedient	22	43.1	42	82.4	0.001
Not obey	29	56.9	9	17.6	
Amount	51	100	51	100	

The results of this study demonstrate a significant improvement in compliance with Fe tablet consumption among adolescent girls following the use

of a self-monitoring pocket book. Prior to the intervention, 56.9% (29 participants) were non-compliant in consuming Fe tablets. However, after the introduction of the pocket book, compliance increased to 82.4% (42 participants), indicating that the intervention effectively promoted better adherence. This finding aligns with research by Marselina et al. (2023), which emphasizes that accessibility to health information plays a crucial role in improving adolescents' knowledge and adherence to iron supplementation programs. The pocket book's portable and easy-to-use format ensures that adolescents can access information consistently, reinforcing their understanding and supporting sustained behavior change, which is critical for improving adherence (Permatasari et al., 2018b).

The use of pocket books as educational tools aligns with the Health Belief Model proposed by Rosenstock, which suggests that individual health behaviors are influenced by perceptions of susceptibility, severity, benefits, and barriers (Pakpahan et al., 2021). The sense of personal responsibility that comes with owning a pocket book fosters greater awareness and motivation to adhere to preventive health measures, such as regular Fe tablet consumption. This study supports findings from Desi et al. (2023), who observed a significant improvement in compliance following pocket book interventions ($p = 0.000$). Furthermore, Ekayanthi and Purnamasari (2020) found that there was a statistically significant difference in Fe tablet consumption between intervention and control groups ($p < 0.05$), further highlighting the effectiveness of pocket book-based interventions. Researchers conclude that the concise and structured format of the pocket book, which includes consumption records, promotes consistent monitoring, reinforces behavior, and encourages young women to take ownership of their health. The ease of repeated recording contributes to long-term adherence, ultimately helping to prevent anemia among adolescents.

Table 2. Anemia statusadolescent girls before and after intervention

Compliance with consumption of Fe Tablets	Before		After		P value
	n	%	n	%	
No anemia	32	62.7	45	88.2	0.002
Anemia	19	37.3	6	11.8	
Amount	51	100	51	100	

The findings of this study indicate a positive shift in anemia status among adolescent girls following the use of a self-monitoring pocket book. Before the intervention, 62.7% (32 respondents) did not experience anemia. After the intervention, the number of non-anemic respondents increased to 88.2% (45 respondents), highlighting a significant improvement in anemia prevention. These results suggest that the self-monitoring pocket book effectively supported better compliance with iron supplementation, contributing to improved hemoglobin levels and reduced anemia cases among the participants.

The anemia pocket book is an educational tool designed to enhance the knowledge of various stakeholders, including health workers, teachers, and family members, with a particular focus on adolescent girls. It provides accessible

information on anemia, including its causes, symptoms, and impacts, while emphasizing the importance of regular iron tablet consumption (TTD) (Ministry of Health of the Republic of Indonesia, 2020). The pocket book is written in simple language to facilitate understanding and practical implementation. Previous research has confirmed the effectiveness of such educational tools in improving both knowledge and adherence to iron supplementation among adolescent girls (Ayu Oktavia & Atin Karjatin, 2021).

Increasing hemoglobin levels is influenced by several factors, including iron bioavailability, absorption efficiency, and the individual's overall health. These biological complexities suggest that the effectiveness of pocket books in increasing Hb levels should be evaluated within a broader, long-term intervention framework. A comprehensive approach, including consistent follow-ups, is crucial to observe sustainable health improvements among adolescents.

The findings of this study align with research by Permatasari et al. (2018), which demonstrated that pocket book-based nutrition education can significantly improve knowledge, attitudes, and hemoglobin levels in adolescent girls. Their study emphasized the importance of cognitive and behavioral changes in achieving better health outcomes, showing that educational interventions positively influence hemoglobin levels. This reinforces the idea that providing targeted education on anemia plays a key role in motivating adolescents to maintain regular consumption of iron supplements.

Researchers recommend that the use of anemia pocket books be complemented by continuous monitoring and evaluation to ensure sustained improvements. This is essential to verify that the information provided not only enhances knowledge but also leads to meaningful behavioral changes that positively impact nutritional status and overall health. Such follow-up efforts will help maintain increased hemoglobin levels, thereby preventing anemia and promoting long-term well-being among adolescent girls.

CONCLUSION AND RECOMMENDATION

The study concludes that the self-monitoring pocket book significantly improved compliance with Fe tablet consumption and reduced anemia among adolescent girls. Before the intervention, 56.9% (29 respondents) adhered to Fe tablet consumption, increasing to 82.4% (42 respondents) post-intervention. Similarly, 62.7% (32 respondents) did not experience anemia before the intervention, rising to 88.2% (45 respondents) after the pocket book was introduced. The McNemar test results confirmed a significant effect of the pocket book on compliance ($p = 0.001$) and anemia status ($p = 0.002$). However, the study had limitations, including the absence of dietary analysis and menstrual duration data, which could influence results, and the short one-month compliance measurement period.

The findings highlight the potential of the self-monitoring pocket book as an effective tool to enhance awareness, compliance, and health outcomes among adolescent girls. It is recommended that adolescent girls use the pocket book to access easy-to-understand information about anemia, leading to improved Fe

tablet adherence and better hemoglobin levels, which positively impact health and productivity. The pocket book can serve as a valuable educational resource for future anemia prevention programs. Further research should incorporate confounding factors such as nutritional status and menstrual duration to gain a more comprehensive understanding of the factors affecting compliance and anemia outcomes.

ADVANCED RESEARCH

Future research on self-monitoring tools for improving compliance with iron tablet intake among adolescents could expand by incorporating additional variables to gain a more comprehensive understanding of the factors influencing adherence. Variables such as dietary habits, socioeconomic status, family support, and educational interventions could provide deeper insights into the external and internal motivators that impact compliance. Additionally, studies could explore the long-term effects of using self-monitoring pocket books and evaluate their integration into broader public health initiatives to sustainably reduce anemia among adolescents. By examining these factors, future research could strengthen public health strategies, making self-monitoring tools a more effective part of nationwide efforts to combat anemia.

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