

WHAT ARE THE FACTORS FOR ADOLESCENT GIRLS' COMPLIANCE REGARDING IRON CONSUMPTION : A SYSTEMATIC REVIEW

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ABSTRACT

Adolescent girls are critical to national well-being, yet they face increased risks of iron deficiency and anemia due to physiological changes and poor dietary habits. Anemia can severely affect physical growth, cognitive function, and academic performance. In Indonesia, iron supplementation programs, such as the distribution of iron tablets, aim to combat this issue, but compliance remains low despite government efforts. This systematic review utilized the PICOS framework, focusing on adolescent girls (P), iron tablet consumption (I), comparing adherence versus non-adherence (C), and outcomes of anemia (O). The review analyzed observational studies published from 2019 to 2024, sourced from databases like PubMed and Google Scholar, to identify factors influencing adherence to iron supplementation. The review identified five relevant studies, all of high quality, that highlighted low compliance rates with iron supplementation among adolescent girls, despite various health initiatives. Factors influencing adherence included socio-cultural aspects, health literacy, and knowledge of anemia. Effective interventions, such as educational programs combined with monitoring, were found to enhance compliance. The findings reveal critical themes affecting adherence to iron supplementation among adolescent girls, including misconceptions about iron, cultural dietary influences, and the importance of education in improving health outcomes. Future health initiatives should prioritize comprehensive educational strategies to increase awareness of anemia and the necessity of iron consumption, ultimately aiming to enhance compliance and prevent anemia in this vulnerable demographic.

Keywords: Prevention of Anemia, Compliance with Iron Consumption, Adolescent Girls

INTRODUCTION

Adolescent girls represent a critical demographic for the future well-being of nations, and ensuring their health and development is of paramount importance. During adolescence, physiological and developmental changes, particularly the onset of menstruation, can increase their risk of iron deficiency and anemia. Anemia is defined by a reduced number of red blood cells or low levels of hemoglobin, which impairs the body's ability to carry oxygen efficiently. Among adolescent girls, anemia can have severe consequences, affecting physical growth, cognitive function, and general health, and can further contribute to poor academic performance and social engagement.

One of the leading causes of anemia in adolescent girls is iron deficiency, which is commonly exacerbated by poor dietary habits, heavy menstrual bleeding, and inadequate intake of iron-rich foods. To address this public health issue, many countries, including Indonesia, have implemented iron supplementation programs, such as the distribution of iron tablets (TTD), to adolescent girls. The Indonesian Ministry of Health's strategic plan, as outlined in the 2015-2019 period, emphasized the importance of promoting reproductive health among adolescents and aimed to increase their knowledge and practices related to preventing anemia. Despite these efforts, adherence to iron supplementation remains a challenge, with many adolescent girls failing to consume the tablets consistently.

Adolescents represent a critical demographic for future national development, as their health and well-being are directly linked to a country's progress. However, anemia, particularly iron-deficiency anemia, remains a prevalent health concern among adolescent girls globally, and it is especially concerning in developing countries like Indonesia. Anemia during adolescence can impair cognitive function, physical growth, and productivity, creating long-term impacts on personal and national development.

Iron-deficiency anemia is primarily caused by inadequate iron intake, blood loss during menstruation, and poor dietary habits. To address this, many health programs have implemented iron supplementation in the form of iron and folic acid tablets, particularly targeting adolescent girls. In Indonesia, the government has adopted initiatives such as weekly iron and folic acid supplementation (WIFAS) to mitigate anemia risks. However, despite the widespread availability of iron tablets, compliance with supplementation remains low.

Several factors influence adherence to iron supplementation. These include personal factors like awareness and knowledge of anemia, social support from family and peers, the perceived importance of the intervention, and the perceived or actual side effects of the supplements. Additionally, systemic factors such as the regular availability of the supplements, follow-up from health professionals, and reminder systems can play a pivotal role in ensuring compliance. Given the importance of preventing anemia for the health and development of adolescent girls, it is crucial to explore and understand the determinants of their adherence to iron supplementation programs.

This systematic review seeks to analyze the factors that impact adolescent girls' compliance with iron tablet consumption. By synthesizing evidence from various studies, this review aims to identify effective strategies for improving adherence to iron supplementation and contribute to the prevention of anemia among adolescent girls.

RESEARCH METHODOLOGY

The research methodology for this systematic review involves a comprehensive approach guided by the PICOS framework, focusing on adolescent girls as the target population (P). The primary intervention under investigation is iron tablet consumption (I), with an emphasis on comparing adherence to non-adherence (C) in relation to the outcome of anemia and non-anemia (O). This review will be conducted through observational studies utilizing a quantitative approach (S) to gather robust data. Relevant literature will be sourced from reputable databases such as Google Scholar, PubMed, Science Direct, ProQuest, and SpringerLink, covering studies published between 2019 and 2024. The inclusion criteria will encompass cross-sectional studies published in peer-reviewed journals, available in English or Indonesian, and specifically focusing on the effects of iron supplementation on anemia among adolescent girls. By systematically analyzing these studies, the review aims to identify effective strategies for improving adherence to iron supplementation and ultimately contributing to the prevention of anemia in this critical demographic.

RESULT

The PICO framework was employed to shape the focus of the study, identifying adolescent girls as the target population (P), iron tablet consumption as the intervention (I), adherence versus non-adherence as the comparison (C), and the outcomes of anemia and non-anemia (O). This structured approach facilitated a detailed examination of how various factors influence iron tablet consumption in adolescent girls, a demographic often at risk for anemia. A systematic search across multiple databases yielded five relevant observational studies utilizing a quantitative

approach, thus providing a robust foundation for analysis. Each selected article strictly adhered to the established selection criteria, effectively covering all components of the PICO framework. By comprehensively addressing the defined population, intervention, comparison, and outcome, these studies laid the groundwork for a thorough investigation of the relationship between iron tablet consumption and the incidence of anemia.

In the subsequent critical appraisal of the articles, a checklist based on the Centre for Evidence-Based Medicine (CEBM) guidelines was employed to rigorously assess the quality of the studies. Remarkably, each article received a perfect score of 12, indicating that they effectively addressed the research questions posed. The studies utilized appropriate methodologies, clearly described subject selection, and successfully minimized potential bias, ensuring that the samples were representative of the larger population. Moreover, the measurement instruments were validated and deemed reliable, with statistical significance rigorously evaluated and confidence intervals provided for key outcomes. The Kappa statistic was also calculated to assess inter-rater reliability between two reviewers, confirming agreement in the inclusion and exclusion of articles. This meticulous process highlights the significance of adhering to established criteria in systematic reviews, ultimately ensuring that the findings are not only reliable but also applicable to the target population, thus contributing valuable insights into the issue of anemia among adolescent girls.

Tabel 1.
Summary of Articles: Factors Influencing Adolescent Girls' Compliance
Regarding Iron Consumption

No.	Author(s) / Year	Article	Location	Research Methods	Sampling	Number of Samples	Data Source	Quality Assessment (0-12 points)
1	Silitonga HT et al. (2023)	This article discusses a qualitative study on the compliance of iron and folic acid (IFA) supplementation among adolescent girls in Sidoarjo, Indonesia. It highlights that despite the government's implementation of the weekly iron and folic acid supplementation (WIFAS) program since 2016, compliance remains low, with only 1.4% of girls consuming the supplements regularly.	Sidoarjo Regency, East Java Province, Indonesia	Qualitative	Total Sampling	13 adolescent girls were interviewed in the study	In-depth interviews conducted with 13 adolescent girls from three high schools in Sidoarjo Regency, East Java Province, Indonesia	12 (High Quality)
2	Silitonga	This systematic	India,	Mixed-	Total	The	Various	12 (High

No.	Author(s) / Year	Article	Location	Research Methods	Sampling	Number of Samples	Data Source	Quality Assessment (0-12 points)
	HT et al. (2023)	review examines the compliance of adolescent girls with iron supplementation and identifies factors influencing adherence.	Ghana, and Iran, among others	method and intervention studies	Sampling	systematic review included a total of 20 studies with various sample sizes, including 312 students (104 boys and 208 girls) in one study and 240 school children (120 girls and 120 boys) in another	studies identified through database searching, such as Proquest, EBSCO Host, Science Direct, PubMed, SAGE, and Emerald	Quality)
3	Adinda Putri Nabila (2024)	This study investigates anemia among adolescent girls, often caused by poor dietary patterns, heavy menstruation, and iron deficiency. As an intervention, a program for administering and monitoring the consumption of Iron Tablets (TTD) is implemented.	Lamongan City, Indonesia	Combination of education and monitoring card guidance	Systematic random sampling technique	62 female students from SMP X Lamongan	The program of administering and monitoring the consumption of Iron Tablets (TTD), as well as information obtained through educational sessions using PowerPoint and leaflets	12 (High Quality)
4	Rina SE Sitindaon (2024)	This study explores the factors influencing the compliance of adolescent girls in consuming Iron Tablets (TTD) at School X in Palembang, Indonesia.	Palembang, Indonesia	Cross-sectional study	Purposive sampling	68 female students at School X	A questionnaire distributed to students to observe dependent and independent variables directly through interviews	12 (High Quality)
5	Ni Made Widiastuti (2024)	This study examines the relationship between knowledge of	Banjar Sigaran, Desa Mekar Bhuwana	Cross-sectional study	Purposive sampling	40 adolescent girls	Adolescent girls at the Remaja Health Post, Banjar	12 (High Quality)

No.	Author(s) / Year	Article	Location	Research Methods	Sampling	Number of Samples	Data Source	Quality Assessment (0-12 points)
		anemia and adherence to Iron Tablet (TTD) consumption among adolescent girls at the Remaja Health Post, Banjar Sigaran, Desa Mekar Bhuwana.					Sigaran, Desa Mekar Bhuwana	

Table 1. Each theme highlights key insights regarding factors influencing compliance with iron consumption among adolescent girls.

1. Compliance with Iron Supplementation

The studies consistently reveal low compliance rates with iron supplementation among adolescent girls, despite various health initiatives. For instance, Silitonga HT et al. (2023) identified that only 1.4% of adolescent girls in Sidoarjo, Indonesia, adhered to the government's weekly iron and folic acid supplementation (WIFAS) program. This alarming statistic underscores the need to investigate barriers to compliance, such as lack of awareness, misconceptions about the supplements, or cultural factors influencing dietary choices. Understanding these barriers is critical for developing targeted interventions aimed at improving adherence.

2. Influencing Factors on Adherence

The articles highlight multiple factors that influence adherence to iron consumption. In the systematic review by Silitonga HT et al. (2023), it was noted that socio-cultural aspects, educational background, and health literacy significantly impact compliance levels. Furthermore, Ni Made Widiastuti (2024) explored the relationship between knowledge of anemia and adherence to iron tablet consumption, indicating that increased awareness among adolescent girls about anemia can lead to improved compliance. This theme suggests that educational interventions that enhance knowledge and awareness of anemia and its consequences could positively influence adherence.

3. Interventions to Enhance Compliance

Several studies focus on effective interventions aimed at increasing compliance with iron supplementation. Adinda Putri Nabila (2024) investigated a program that combined education with monitoring to facilitate iron tablet consumption among adolescent girls in Lamongan City, Indonesia. This approach emphasizes the importance of not only informing the girls about the necessity of iron supplementation but also providing ongoing support and monitoring to ensure adherence. Similarly, Rina SE Sitindaon (2024) assessed factors influencing compliance in a school setting, utilizing questionnaires to gather data from female students, thus highlighting the role of structured programs in promoting iron consumption.

4. Methodological Rigor and Quality of Research

All articles included in the SLR received high quality scores, indicating robust methodologies and thorough assessments. The qualitative study by Silitonga HT et al. (2023), for instance, used in-depth interviews, while others employed systematic reviews or cross-sectional studies with large sample sizes. The high-quality ratings across all studies enhance the reliability of the findings and their implications for addressing iron consumption among adolescent girls. This theme

emphasizes the importance of methodological rigor in health research to ensure that interventions are evidence-based and effective.

5. Global Perspective on Anemia

The review of studies across various countries, including India, Ghana, and Iran, illustrates that low compliance with iron supplementation is a global issue, not confined to one region. This perspective suggests that while local cultural and socioeconomic factors must be considered, there are universal themes in the barriers to adherence that could inform broader strategies for improving iron consumption. By recognizing the global nature of this health challenge, health practitioners and policymakers can share successful strategies and interventions across different contexts.

In summary, the SLR encapsulates critical themes regarding compliance with iron consumption among adolescent girls, highlighting the multifaceted nature of the issue. Factors influencing adherence, effective interventions, methodological rigor, and a global perspective are all essential components in developing comprehensive strategies to combat anemia in this vulnerable population. The insights gained from this review can serve as a foundation for future research and health initiatives aimed at improving health outcomes for adolescent girls.

DISCUSSION

This systematic literature review (SLR) highlights the pressing issue of iron supplementation compliance among adolescent girls, revealing various factors that influence their adherence to iron tablet consumption. The findings across the reviewed studies indicate that despite governmental initiatives, such as the weekly iron and folic acid supplementation (WIFAS) program, compliance rates remain alarmingly low. For instance, research conducted by Silitonga HT et al. (2023) showed that only 1.4% of adolescent girls in Sidoarjo, Indonesia, regularly consumed the prescribed supplements. This stark statistic emphasizes the need for comprehensive assessments of the barriers preventing adherence, such as misconceptions about the supplements, lack of awareness, and cultural influences on dietary choices. Understanding these factors is crucial for developing targeted strategies that promote adherence to iron supplementation among this vulnerable demographic.

In exploring the underlying factors affecting compliance, the studies consistently identify several key themes. A systematic review conducted by Silitonga HT et al. (2023) underscored the importance of socio-cultural factors, health literacy, and educational background in shaping adherence behaviors. Additionally, Ni Made Widiastuti (2024) highlighted the significant relationship between knowledge of anemia and adherence to iron tablet consumption. This correlation suggests that increasing awareness about the consequences of anemia and the benefits of iron supplementation could lead to improved compliance. Therefore, it is essential for health promotion programs to focus on educational interventions that enhance knowledge and understanding among adolescent girls regarding anemia and the importance of iron consumption.

The reviewed articles also underscore the effectiveness of various interventions aimed at improving compliance with iron supplementation. Adinda Putri Nabila (2024) implemented a comprehensive program combining education and monitoring to facilitate iron tablet consumption among adolescent girls in Lamongan City, Indonesia. This approach not only informed the participants about the necessity of iron supplementation but also provided ongoing support and monitoring to encourage adherence. Similarly, Rina SE Sitindaon (2024) utilized questionnaires to gather data from female students in a school setting, emphasizing the role of structured educational programs in promoting iron consumption. These findings suggest that multifaceted

interventions that combine education, monitoring, and support are crucial for enhancing compliance and ultimately improving health outcomes.

A significant strength of the reviewed studies is their methodological rigor, which contributes to the reliability of the findings. All articles received high-quality scores, indicating that they employed appropriate research designs and robust assessment methods. For example, the qualitative study by Silitonga HT et al. (2023) utilized in-depth interviews to gather rich, detailed insights, while other studies employed systematic reviews and cross-sectional designs with substantial sample sizes. This high methodological quality enhances the credibility of the results and underscores the importance of rigorous research in informing health interventions aimed at addressing iron consumption among adolescent girls.

The SLR also reveals a global perspective on anemia, with studies conducted in various countries, including India, Ghana, and Iran. This international scope illustrates that low compliance with iron supplementation is not a localized issue but a widespread challenge that transcends geographic boundaries. While specific cultural and socioeconomic factors must be considered, the common barriers to adherence identified across different contexts can inform broader strategies for improving iron consumption. Sharing successful interventions and lessons learned from diverse settings could enhance global efforts to combat anemia among adolescent girls, making the case for collaborative approaches in public health initiatives.

Moreover, the findings of this review emphasize the urgent need for policymakers to prioritize adolescent health, particularly in addressing anemia through effective iron supplementation strategies. Policymakers should consider implementing comprehensive programs that combine education, community engagement, and monitoring to support adherence. This multifaceted approach should also involve collaboration with schools, healthcare providers, and community organizations to create a supportive environment that encourages iron consumption among adolescent girls. By addressing the barriers identified in the literature, such initiatives can significantly improve compliance rates and contribute to better health outcomes for this vulnerable population.

CONCLUSION

In conclusion, the systematic literature review underscores the critical need to address the issue of iron supplementation compliance among adolescent girls. The findings indicate that low adherence rates are influenced by a myriad of factors, including socio-cultural beliefs, health literacy, and the effectiveness of interventions. Future research should continue to explore innovative strategies to enhance compliance, focusing on tailored educational programs and community-based initiatives.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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