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The Relationship between Knowledge, Attitude, and Practice of Iron Supplementation and the Incidence of Anemia

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Abstract
Introduction: *Anemia is a major health problem among women of reproductive age, including female university students, and iron tablet consumption is an important preventive measure.* ***Objective:*** *To analyze the relationship between knowledge, attitudes, and practices of iron tablet consumption and anemia among female medical students.* ***Method:*** *An analytical cross-sectional study was conducted involving 84 female medical students from the 2023 cohort at University X, selected through convenience sampling. Data were collected using a structured questionnaire on knowledge, attitudes, and practices of iron tablet consumption, and hemoglobin levels were measured by finger-prick tests. The relationship between independent variables and anemia status was analyzed using the chi-square test.* ***Result and Discussion:*** *Most respondents had good knowledge and positive attitudes, but unsatisfactory practices regarding iron tablet consumption. Higher knowledge, more positive attitudes, and appropriate practices were associated with a lower prevalence of anemia, indicating a gap between what students know and what they actually do.* ***Conclusions:*** *Knowledge, attitudes, and practices of iron tablet consumption showed a significant relationship with anemia incidence, so targeted interventions are needed to improve adherence to iron tablet consumption among female students.*

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Introduction

Anemia remains a major global public health problem, especially in low- and middle-income countries, and disproportionately affects women of reproductive age, including female university students (Andani, 2020). Iron deficiency anemia is the most common type of anemia and accounts for a substantial proportion of cases worldwide. Globally, around 30% of women of reproductive age are affected, most of them due to iron deficiency. In Southeast Asia, the burden is higher, with approximately 40% of adolescent girls experiencing iron deficiency anemia (Widiastuti, 2019). In Indonesia, the 2018 National Basic Health Research survey reported that approximately 32% of women aged 15–24 years are anemic, with iron deficiency being a predominant cause (DAMANIK, 2023). Among adolescents and young adults, iron deficiency anemia is not only a hematological condition but is also associated with fatigue, decreased physical endurance, impaired cognitive function, reduced academic performance, and poorer quality of life (Rahman, 2023).

Iron supplementation in the form of iron tablets (commonly known in Indonesia as Tablet Tambah Darah) is a key preventive strategy to address iron deficiency anemia. These tablets are intended to meet daily iron requirements and support adequate hemoglobin synthesis (Keya, 2023). Despite long-standing national and institutional programs promoting iron tablet consumption, adherence remains suboptimal, especially among students. Previous studies indicate that knowledge, attitudes, and practices related to iron tablet consumption strongly influence compliance and the effectiveness of anemia prevention programs (Andani, 2020; Widiastuti, 2019). Although many adolescents demonstrate adequate knowledge, actual consumption practices are often poor, commonly due to perceived side effects such as nausea, misconceptions about long-term risks, lack of support from families or educational institutions, and discomfort with the tablet's taste or smell (Widiastuti, 2019; Siyami, 2023).

However, evidence focusing specifically on female medical students remains limited. As future health professionals, medical students are expected to have better access to health information and more positive attitudes toward preventive behaviors, including iron supplementation (Fatimah, 2022; Muliariati, 2024). It is not yet clear whether adequate knowledge and attitudes among female medical students are consistently translated into appropriate iron tablet consumption practices, nor whether these factors are significantly associated with anemia status in this group. This lack of evidence constrains the development of targeted, academically grounded interventions to reduce iron deficiency anemia among female medical students (Putri E. R., 2024).

Therefore, this study aims to analyze the relationship between the level of knowledge, attitudes, and practices regarding iron tablet consumption and the incidence of anemia among female medical students of the Faculty of Medicine, University X, Class of 2023 (Naldaroza, 2024; Putri E. R., 2024). Specifically, the study seeks to describe the age distribution and the levels of knowledge, attitudes, and practices related to iron tablet consumption, determine the prevalence of anemia in this cohort, and examine whether knowledge, attitudes, and practices regarding iron tablet consumption are significantly associated with anemia status in this population.

Method

This study employed an analytical cross-sectional quantitative design. The target population consisted of 105 female medical students of the Faculty of Medicine, University X, Class of 2023; a sample of 84 students was determined using Slovin's formula and selected through convenience sampling based on predefined inclusion and exclusion criteria. Data on age and levels of knowledge, attitude, and practice regarding iron tablet consumption were collected using a structured, validity- and reliability-tested questionnaire distributed via Google Forms, while hemoglobin levels were measured using Quik-Check hemoglobin strips through capillary finger-prick sampling. All data were processed in SPSS version 27 following standard procedures (editing, coding, entry, and cleaning) and analyzed using univariate statistics to describe variable distributions and chi-square tests to assess the association between knowledge, attitudes, and practices of iron tablet consumption and anemia status (Pallant, 2020).

Result and Discussion

1. Result

A total of 84 female medical students from the Faculty of Medicine, University X, Class of 2023, were included in the analysis. Most respondents demonstrated good knowledge regarding iron tablet supplementation, with 66 students (78.6%) classified as having good knowledge and 18 students (21.4%) having moderate knowledge; none fell into the poor knowledge category. In contrast, attitudes and practices toward iron tablet consumption were less favorable. While 43 respondents (51.2%) showed a positive attitude and 41 (48.8%) a negative attitude toward iron tablet use, as many as 68 respondents (80.0%) reported inadequate (moderate–poor) practices, and only a small proportion (8.3%) reported good practice.

Analysis of the relationship between knowledge and anemia status showed that the largest subgroup consisted of non-anemic students with good knowledge (45 respondents; 53.5%), whereas the smallest subgroup was non-anemic students with only moderate knowledge (3 respondents; 3.6%). Chi-square testing demonstrated a statistically significant association between knowledge regarding iron tablet supplementation and anemia status ($p = 0.000$), indicating that students with better knowledge were less likely to be anemic. This finding supports the hypothesis that higher knowledge contributes to improved anemia outcomes and is consistent with the study by Sri et al. (2023), which identified knowledge of iron tablet supplementation as a factor associated with anemia among adolescents. At the same time, it contrasts with the findings of Erlinda et al., who reported no significant association between knowledge level and anemia occurrence, suggesting that contextual factors such as program implementation or environmental support may modulate the impact of knowledge on health outcomes. The present results also align with Restia et al. (2024), who reported that good knowledge tends to foster better compliance and practices related to iron tablet consumption.

Regarding attitudes, slightly more than half of the respondents (51.2%) exhibited a positive attitude toward iron tablet supplementation. The majority of non-anemic students were found in the group with positive attitudes (37 respondents; 44.0%), whereas only a small portion of anemic students had a positive attitude (6 respondents; 7.1%). Bivariate analysis revealed a significant relationship between attitude and anemia status ($p = 0.000$), indicating that students with favorable attitudes toward iron tablets were less likely to be anemic. These results corroborate previous findings by Lestari et al. (2018), who observed that adolescent girls with positive attitudes were more likely to adhere to iron

tablet consumption, and by Sari et al. (2023), who also reported a significant association between attitude toward iron tablet supplementation and anemia incidence. Taken together, these findings support the hypothesis that attitude functions as an important mediating factor between health knowledge and actual preventive behavior.

In terms of practice, the majority of respondents reported inadequate practice in consuming iron tablets as recommended, with 80.0% categorized as having moderate–poor practice. The largest subgroup in the cross-tabulation was non-anemic students with moderate–poor practice (41 respondents; 48.8%), while there were no anemic students in the good-practice category (0 respondents). Despite the high proportion of inadequate practice overall, chi-square analysis still demonstrated a statistically significant association between practice and anemia status ($p = 0.017$), indicating that better adherence to iron tablet consumption is linked to a lower likelihood of anemia. These findings are in line with studies by Fatmawaty et al., who reported that adherence to iron tablet consumption was associated with reduced anemia prevalence among adolescent girls, and by Reina et al. (2023), who found a significant relationship between iron tablet compliance and anemia incidence. The present study therefore supports the notion that, even in a population with relatively good knowledge and partially positive attitudes, suboptimal practices can remain a critical barrier to effective anemia prevention.

Overall, the results of this study confirm the initial hypothesis that knowledge, attitude, and practice related to iron tablet consumption are significantly associated with anemia status among female medical students. High knowledge alone is not sufficient if it is not accompanied by supportive attitudes and consistent practice. The pattern observed—good knowledge and relatively balanced attitudes but predominantly inadequate practices—highlights a gap between what students know and believe and what they actually do in daily life. This underscores the need for interventions that not only increase knowledge but also address behavioral barriers, perceived side effects, motivation, and institutional support to improve adherence to iron tablet supplementation and reduce the burden of iron deficiency anemia in this population.

2. Discussion

A total of 105 female medical students from the Faculty of Medicine, University X, Class of 2023 met the inclusion and exclusion criteria. Therefore, the required sample size was 84 students.

Table 1
Frequency Distribution of Respondents' Characteristics by Age

Variable	Frequency (n)	Percentage (%)
Age		
17 years	1	1.2 %
18 years	9	10.7 %
19 years	55	65.5 %
20 years	17	20.2 %
21 years	2	2.4%
Total	**84**	**100%**

Table 1. presents the characteristics of respondents based on age from a total of 84 respondents. For the age variable, the largest group was 19 years old, with 55 respondents (65.5%). The second largest group was 20 years old, with 17 respondents (20.2%). The

third largest group was 18 years old, with 9 respondents (10.7%). This was followed by 21 years old with 2 respondents (2.4%) and 17 years old with 1 respondent (1.2%).

Table 2
Frequency Distribution Based on Level of Knowledge

Variable	Category	Frequency (n)	Percentage (%)
Attitude	Good	43	51.2%
	Poor	41	48.8%
Total		**84**	**100%**

Based on Table 2, it is known that of the 84 respondents, 43 respondents (51.2%) had a good attitude toward iron tablet supplementation, while 41 respondents (48.8%) had a poor attitude toward iron tablet supplementation. Thus, it can be concluded that the majority of students (51.2%) had a good attitude toward iron tablet supplementation, although this proportion was nearly equal to those with a poor attitude (48.8%).

Table 3
Frequency Distribution Based on Practice

Variable	Category	Frequency	Percentage (%)
Practice	Good	7	8.3%
	Fair	9	10.7%
	Poor	68	80%
Total		**84**	**100%**

Based on Table 3, it is shown that of the 84 respondents, 68 respondents (80.0%) demonstrated poor practice regarding iron tablet supplementation, 9 respondents (10.7%) had fair practice, and 7 respondents (8.3%) had good practice. Thus, it can be concluded that the majority of respondents (80.0%) had poor practice related to iron tablet supplementation, while only a small proportion showed good practice (8.3%).

Table 4
Frequency Distribution of Anemia Incidence

Variable	Category	Frequency (n)	Percentage (%)
Anemia	Yes	36	42.9%
	No	48	57.1%
Total		**84**	**100%**

Based on Table 4, it is shown that of the 84 respondents, 48 respondents (57.1%) did not have anemia, while 36 respondents (42.9%) had anemia.

Table 5
Distribution of the Relationship Between Knowledge Level and Anemia Incidence Among Female Medical Students of University X, Class of 2023

Knowledge Level	Anemia Status	n	%	Total n	Total %	p-value	OR
Good	Non-anemic	45	53.5%	66	78.5%		
	Anemic	21	25.0%				
Fair	Non-anemic	3	3.6%	18	21.5%	0.000	15.326
	Anemic	15	17.9%				
Total	Non-anemic	**48**	**57.1%**	**84**	**100%**		
	Anemic	**36**	**42.9%**				

Based on Table 5, regarding the distribution of knowledge level about iron tablets and anemia incidence, the largest group was non-anemic students with good knowledge, totaling 45 respondents (53.5%). The second largest group was anemic students with good knowledge (21 respondents; 25.0%), followed by anemic students with fair knowledge (15 respondents; 17.9%). The smallest group was non-anemic students with fair knowledge, totaling 3 respondents (3.6%).

Chi-square analysis using a 2×2 table yielded a p-value of 0.000, which is below the significance level of 0.05, indicating a statistically significant association between knowledge level about iron tablets and anemia incidence among female medical students at University X. The odds ratio was 15.326, meaning that students with only fair knowledge had a 15.326-times higher risk of experiencing anemia. In other words, the better the students' knowledge about iron tablets, the lower their risk of developing anemia.

Table 6
Distribution of the Relationship Between Attitude and Anemia Incidence Among Female Medical Students of the Faculty of Medicine, University X, Class of 2023

Attitude	Anemia Status	n	%	Total n	Total %	p-value	OR
Good	Non-anemic	37	44.0%	43	51.1%		
	Anemic	6	7.1%				
Poor	Non-anemic	11	13.1%	41	48.9%	0.000	30.053
	Anemic	30	35.8%				
Total	Non-anemic	48	**57.1%**	**84**	**100%**		
	Anemic	36	**42.9%**				

Based on Table 6, the largest group was non-anemic students with a good attitude toward iron tablets (44.0%), while the smallest group was anemic students with a good attitude (7.1%). Chi-square analysis showed a significant association between attitude and anemia incidence (p = 0.000), with an odds ratio of 30.053, indicating that students with a poor attitude toward iron tablet supplementation were about 30 times more likely to experience anemia. Thus, a more positive attitude toward iron tablets is associated with a lower risk of anemia.

Table 7
Distribution of the Relationship Between Practice and Anemia Incidence Among Female Medical Students of the Faculty of Medicine, University X, Class of 2023

Practice	Anemia Status	n	%	Total n	Total %	p-value	OR
Good	Non-anemic	7	8.3%	7	8.3%		
	Anemic	0	0.0%				
Fair–Poor	Non-anemic	41	48.8%	77	91.7%	0.017	5.727
	Anemic	36	42.9%				
Total	Non-anemic	48	57.1%	84	100%		
	Anemic	36	42.9%				
Practice	Anemia Status	n	%	Total n	Total %	p-value	OR

Based on Table 7, most respondents had fair–poor practice regarding iron tablet consumption, both among non-anemic (48.8%) and anemic students (42.9%), while only 8.3% of non-anemic students showed good practice. Chi-square analysis showed a significant association between practice and anemia incidence (p = 0.017), with an odds

ratio of 5.727, indicating that students with fair–poor practice were about 5.7 times more likely to develop anemia than those with good practice.

Conclusion

Based on this study of 84 female medical students from the Faculty of Medicine, University X, class of 2023, it can be concluded that most respondents were 19 years old (55 students; 65.5%) and that anemia remains a substantial problem, affecting 36 students (42.9%), while 48 students (57.1%) were not anemic. The majority of respondents had good knowledge about iron–folic acid (IFA) or iron supplementation tablets (tablet tambah darah, TTD), with 78.6% demonstrating a good level of knowledge. There was a statistically significant association between knowledge of TTD and the occurrence of anemia ($p = 0.000$), where respondents with only moderate knowledge had a 15.326-fold higher risk of developing anemia compared to those with good knowledge.

In addition, 51.2% of respondents showed a positive attitude toward TTD, and attitude was also significantly associated with anemia status ($p = 0.000$). Students with a poor attitude toward TTD had a 30.053-fold higher risk of anemia than those with a positive attitude. However, despite relatively good knowledge and generally positive attitudes, most students (80%) reported suboptimal practice regarding TTD consumption. Practice was significantly related to anemia ($p = 0.017$), with respondents who had only fair or poor practice being 5.727 times more likely to experience anemia.

These findings indicate that good knowledge and positive attitudes toward TTD do not automatically translate into good adherence or practice. Therefore, a more comprehensive and integrated approach is needed to improve TTD consumption behavior, including consistent health education, behavioral change strategies, monitoring, and support systems, so that increased knowledge and positive attitudes can be effectively reflected in daily practice and ultimately reduce the prevalence of anemia among female medical students.

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