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Knowledge and Attitudes in Relation to Compliance with Iron Supplement Tablet Consumption among Adolescent Girls at Maryam Junior High School, Surabaya

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ABSTRACT

Anemia remains a significant public health problem among adolescent girls, primarily caused by iron deficiency during the period of rapid growth and menstruation. The Indonesian government has promoted iron supplementation through the distribution of Tablet Tambah Darah (TTD) to reduce anemia prevalence. This study aimed to analyze the relationship between knowledge and attitude with compliance in consuming TTD among adolescent girls at Maryam Junior High School, Surabaya. This observational analytic study employed a cross-sectional design and involved 59 female students selected through proportional random sampling. Data were collected using a validated questionnaire covering knowledge, attitude, and compliance, and analyzed using the chi-square test. Of the total respondents, 50.8% had poor knowledge, 47.5% had moderate knowledge, and only 1.7% had good knowledge. Most participants (98.3%) had a positive attitude toward TTD consumption. However, only 40.7% were compliant with the recommended consumption, while 59.3% were classified as non-compliant. Statistical analysis showed a significant association between knowledge and compliance ($p = 0.035$), indicating that adolescents with better knowledge were nearly four times more likely to comply with TTD intake. Conversely, attitude was not significantly related to compliance ($p = 0.404$). These findings suggest that strengthening knowledge through structured health education and school-based campaigns is essential to improve adherence to iron supplementation programs, while attitude alone does not predict compliance.

Key Messages:

- Knowledge significantly influences adolescent girls' compliance with iron supplementation, while attitude alone does not guarantee adherence.
- Strengthening school-based health education and collaboration with families and health workers is crucial to improve compliance and reduce anemia prevalence.
- Practical strategies such as digital reminders and peer support can enhance the effectiveness of iron supplementation programs for adolescents.

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INTRODUCTION

Anemia is one of the most common nutritional problems among adolescent girls, mainly caused by iron deficiency during the period of rapid growth and the onset of menstruation(1). According to Dantham et al. (2024), Iron Supplement Tablets (TTD) are useful for preventing anemia in adolescents(2). The Indonesian government has provided TTD for adolescents and pregnant women through health programs. TTD can be in the form of tablets or capsules and functions to increase iron intake, especially for adolescent girls who start menstruating at the age of 11–19 years(3–5). After menstruation, iron requirements increase significantly so supplementation is needed to prevent anemia(6).

Iron adequacy from an early age is expected to reduce the risk of anemia during pregnancy, childbirth bleeding, low birth weight (BBLR), and stunting in toddlers(7). Although the national-scale TTD program has been running, its implementation is still not optimal because it is more focused on pregnant women. This condition is one of the causes of high anemia in adolescent girls(8).

The WHO has set the normal hemoglobin level for women aged >11 years is ≥12 g/dL. Anemia occurs when Hb levels are low due to a lack of essential nutrients, especially iron which plays a role in the formation of red blood cells. Iron deficiency anemia is the most common type(9). The global prevalence of anemia ranges from 40–80%(10). In Indonesia, the prevalence is around 15.6%(10), with higher rates in East Java (42%) and Surabaya (20.25%). Iron deficiency has an impact on decreased immunity and productivity. The best source of iron is animal proteins such as liver, fish, and meat, but for those who do not consume these foods, TTD is an important alternative.

The government's efforts in the last 12 months have succeeded in providing TTD to 46.5–73.9% of adolescent girls. However, the proportion who consume ≥52 tablets a year is still low: 4.2% (from health facilities), 3.0% (from schools), and 4.3% (on their own initiative)(11).

Adolescent girls' knowledge of anemia and the benefits of TTD affects consumption adherence. This understanding includes the symptoms of anemia, the role of iron, and the importance of regular consumption. Attitude also plays a role, because some adolescents are reluctant to take TTD for fear of side effects such as nausea or abdominal pain(5,12).

This study aims to identify factors that affect TTD consumption compliance in adolescent girls at Maryam Junior High School Surabaya, including environmental support. The health center has conducted counseling and counseling, but the coverage of TTD consumption is still low. Maryam Junior High School was chosen because the scope of TTD was relatively low. Of the total 287 students, 140 are young women.

A preliminary study on October 16, 2024 of 58 adolescent girls showed that only 40% took TTD as recommended, with only 3.6% regularly weekly. As many as 17.4% were non-compliant because of nausea after consuming TTD.

Based on these conditions, this study is focused on determining the relationship between knowledge and attitudes and compliance with consuming TTD in adolescent girls at Maryam Junior High School Surabaya. The results are expected to increase the effectiveness of the TTD program as a preventive measure against anemia in adolescent girls.

METHODS

This study is an observational analytical research with a *cross-sectional approach*. This approach was chosen because it is able to describe the relationship between independent and dependent variables at the same measurement time. The focus of the research was to analyze the relationship between knowledge and attitude with compliance with taking Iron

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Supplement Tablets (TTD) in adolescent girls at Maryam Junior High School Surabaya. With this design, risk factors (knowledge and attitudes) and outcomes (compliance) are measured simultaneously, so that there can be a relationship between these variables at the same time.

The location of the research was determined at Maryam Junior High School Surabaya which is located on Jl. Manyar Sambongan No. 119, Kertajaya, Gubeng District, Surabaya City, East Java Province. The selection of this location is based on preliminary data that shows that the coverage of giving TTD to young women in this school is still low. The research was carried out from October to November 2024, including the preparation, data collection, and analysis stages.

The population in this study is all students of Maryam Surabaya Junior High School for the 2024/2025 school year which totals 140 people. The research sample is students in grades VII, VIII, and IX who meet the inclusion criteria, namely active students at Maryam Junior High School Surabaya, able to communicate well, not sick, and willing to become respondents by signing *informed consent*. Respondents who were absent at the time of data collection or had a history of chronic diseases that could affect anemia status were excluded from the study. The number of samples was determined using the Slovin formula with a precision level of 10%, so that 59 respondents were obtained. Sample selection was carried out using *the proportional random sampling method* so that each class was represented according to its proportions.

The variables in this study consisted of two independent variables, namely knowledge and attitude towards TTD, and one dependent variable, namely compliance with consuming TTD. Knowledge is defined as the respondent's understanding of anemia, the benefits of TTD, and the importance of regular consumption. The assessment was carried out with a multiple-choice questionnaire, with a score of 1 and false 0, then categorized into good (≥76% correct answer), adequate (56–75%), and poor (≤55%). Attitudes are defined as adolescent girls' behavioral responses or tendencies to TTD consumption, measured on a four-point Likert scale that includes positive and negative statements. The attitude category is determined based on the median score, namely positive (median ≥ score) and negative (median < score). Compliance is defined as the degree to which TTD's consumption behavior conforms to the program's recommendations, i.e. a minimum of one tablet per week for a year. The compliance category was given to respondents who consumed ≥75% of the recommended frequency, while non-compliant if <75% were not compliant.

The research instrument is in the form of a structured questionnaire that has gone through validity and reliability tests. The validity test was conducted using Pearson Product Moment correlation of 20 respondents outside the study site, with the results of all items having an r-count value greater than the r-table (0.444). The reliability test was carried out using Cronbach's Alpha formula and obtained a value of 0.87, indicating high internal consistency.

The data collection process is carried out through coordination with the school to determine the implementation schedule. Before filling out the questionnaire, the researcher provided an explanation to the respondents about the purpose of the research, the filling procedure, and the rights of the respondents. Filling is done directly in the classroom with the assistance of the researcher to ensure that all questions are well understood. The primary data collected included respondents' identities, knowledge levels, attitudes, and compliance with TTD consumption. Secondary data were obtained from school documents, books, articles, journals, previous research reports, and online data related to anemia and the TTD program.

The ethical aspect of the research is considered by providing *informed consent* to all respondents, which contains information about the purpose of the research, data

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confidentiality, freedom of participation, and the right to resign at any time without consequences. This research has obtained permission from the school and ethical approval from the authorized health research ethics committee.

The collected data is analyzed through several stages. First, editing is carried out to check the completeness and consistency of the answers. Second, *coding* to provide a numerical code for each answer. Third, *data entry* into statistical software. Fourth, *cleaning* to ensure that there is no duplicate or illogical data. Univariate analysis was used to describe the characteristics of respondents and the frequency distribution of each variable. Bivariate analysis was conducted using the Chi-Square test to determine the relationship between knowledge and attitude and compliance with consuming TTD, with a significance level of $p < 0.05$.

To maintain the quality of the data, the researcher conducted a short training for data collection assistants, directly supervised the questionnaire filling process, and double-checked the questionnaire that had been filled out before leaving the research site. This study has limitations in *cross-sectional design* that cannot explain the cause-and-effect relationship definitively. In addition, compliance measurement is carried out by *the self-report method*, so it has the potential to cause memory or reporting bias. Nevertheless, this study design still provides an overview of the relationship between knowledge, attitudes, and adherence to TTD consumption in adolescent girls, which is useful as a basis for health interventions in schools.

RESULTS

Table 4. 1 Demographic Data of Adolescent Female Respondents at Maryam Junior High School Surabaya by Age

Age (Years)	n	(%)
12	12	20
13	21	36
14	10	17
15	15	25
17	1	2
Total	59	100

Source: Primary Data 2025

Based on Table 4.1, the dominance of respondents under the age of 13 was 21 people (36%) out of a total of 59 respondents. The age of 15 years ranks second with 15 people (25%), followed by the age of 12 years with 12 people (20%), the age of 14 years with 10 people (17%), and the age of 17 years with only 1 person (2%). This distribution pattern illustrates that the majority of respondents are in the age range of 12 to 15 years, which is the early phase of adolescence or the transition from childhood to adulthood.

Table 4.2 Distribution of Frequency of Knowledge of Consuming Iron Supplement Tablets (TTD) in Adolescent Girls at Maryam Junior High School Surabaya

Category	n	(%)
Good	1	1,7
Enough	28	47,5
Less	30	50,8
Total	59	100

Source: Primary Data 2025

Table 4.2 proves the level of knowledge of adolescent girls regarding the consumption of iron supplement tablets. Of the total 59 respondents, as many as 30 people (50.8%) were classified as having less knowledge. Meanwhile, 28 respondents (47.5%) had enough knowledge, and only 1 respondent (1.7%) had good knowledge.

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Table 4.3 Frequency Distribution of Attitude Consumption of Iron Supplement Tablets (TTD) To Young Women at Maryam Junior High School Surabaya

Category	n	(%)
Negative	1	1,7
Positive	58	98,3
Total	59	100

Source: Primary Data 2025

Table 4.3 proves that out of 59 respondents, 58 people (98.3%) have a positive attitude towards the consumption of iron supplement tablets. Meanwhile, only 1 respondent (1.7%) had a negative attitude. This shows that the majority of young women have a positive attitude towards TTD consumption.

Table 4.4 Distribution of Compliance Frequency of Consuming Iron Supplement Tablets (TTD) in Adolescent Girls at Maryam Junior High School Surabaya

Category	n	(%)
Non-compliant	35	59,3
Compliant	24	40,7
Total	59	100

Source: Primary Data 2025

Table 4.4 proves the frequency distribution of the adolescent girls' compliance levels for taking iron supplement tablets. From the data, it can be seen that in general, respondents are included in the non-compliant classification, which is a total of 35 respondents (59.3%). Meanwhile, only 24 respondents (40.7%) met the compliant criteria, namely taking at least 4 tablets in 1 month or 1 tablet every week according to the recommendations of the adolescent health program. ‘

Table 4.5 The Relationship of Knowledge with Compliance with Iron Supplement Tablets (TTD) in Adolescent Girls at Maryam Junior High School Surabaya

Knowledge	Compliance				Total		*p-value*
	Non-compliant		Compliant				
	n	%	n	%	n	%	
Good	1	100	0	0	1	100	
Enough	21	75	7	25	28	100	0,035
Less	13	43,3	17	56,7	30	100	
Total	35	59,3	24	40,7	59	100	

Source: Primary Data 2025

The results of the statistical test using *the chi-square* test method in Table 4.5 proved that respondents with knowledge were quite more non-compliant in consuming iron supplement tablets in 21 respondents (35.6%). The results of the analysis of *the chi-square* statistical test obtained a p-value = 0.035 (0.05) showing that there was a significant relationship between the level of knowledge and compliance with the consumption of iron supplement tablets in Maryam Junior High School students in Surabaya. This means that the difference in the level of knowledge possessed by the female students has an influence on their behavior in consuming iron supplement tablets.

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Table 4.6 The Relationship between Attitude and Compliance in Consuming Iron Supplement Tablets (TTD) in Adolescent Girls at Maryam Junior High School Surabaya

Attitude	Compliance				Total		*p-value*
	Non-compliant		Compliant				
	n	%	n	%	n	%	
Negative	1	100	0	0	1	100	0,404
Positive	34	58,6	24	41,4	58	100	
Total	35	59,3	24	40,7	59	100	

Source: *Primary Data 2025*

Table 4.6 describes the respondents with more positive attitudes by not complying in taking iron supplement tablets as a total of 34 respondents (57.6%). A *p-value* = 0.404 (0.05) was obtained from the results of the chi-square statistical test analysis ≥ by showing that there was no significant relationship between attitude and compliance in consuming iron supplement tablets in Maryam Junior High School students in Surabaya. This means that although the 34 female students may have a positive attitude towards the importance of iron supplemental tablets, this is not necessarily reflected in their actual behavior to consume them regularly.

DISCUSSION

Respondent Demographic Data

The results of the research showed that the dominance of respondents at the age of 13 years was 21 people (36%) out of a total of 59 respondents. The age of 15 years ranks second with 15 people (25%), followed by the age of 12 years with 12 people (20%), the age of 14 years with 10 people (17%), and the age of 17 years with only 1 person (2%). This distribution pattern illustrates that the majority of respondents are in the age range of 12 to 15 years, which is the early phase of adolescence or the transition from childhood to adulthood.

Knowledge Frequency Distribution

The results of the research show the level of knowledge of adolescent girls related to the consumption of iron supplement tablets. Of the total 59 respondents, as many as 30 people (50.8%) were classified as having insufficient knowledge. Meanwhile, 28 respondents (47.5%) had sufficient knowledge, and only 1 respondent (1.7%) had good knowledge.

This low level of knowledge is in line with the findings (13), by proving that before being given counseling, as many as 84.5% of adolescent girls have less knowledge about the consumption of iron supplement tablets. This condition has an impact on adolescents' lack of attention to diet and efforts to prevent health problems, including anemia. Adolescent girls with low knowledge are more at risk of anemia due to their lack of awareness and inability to independently monitor their health conditions (14).

In addition, research at SMPN 1 Kalijati by (16) also found that 55.2% of adolescent girls have lack of knowledge, which is caused by the uneven counseling program from the local health center (17) The same may also happen at the location of this study, where education related to anemia and the consumption of iron supplement tablets has not been optimally conveyed to all adolescent girls.

Attitude Frequency Distribution

The results of the research showed that out of 59 respondents, as many as 58 people (98.3%) had a positive attitude towards the consumption of iron supplement tablets. Meanwhile, only 1 respondent (1.7%) had a negative attitude. This shows that the majority of adolescent girls have a positive attitude towards TTD consumption.

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Similar results were also found in the study carried out from (18) proving that respondents had a positive attitude towards the consumption of iron supplement tablets and anemia prevention strategies proved the proportion was more dominant, namely 42.7%(19) Although the percentage has not reached the absolute majority, the trend of increasing positive attitudes has strengthened after nutrition education interventions have been implemented, which shows the importance of education as an attitude-shaping factor.

In line with these findings, the research carried out from (20) also proves that in general respondents have a positive attitude towards the consumption of iron supplement tablets, amounting to 61.4% (20,21) These two results reinforce the evidence that positive attitudes towards iron supplement tablets tend to dominate and can be improved through appropriate educational and socialization approaches.

Frequency Distribution of Compliance

The results of the research showed the frequency distribution of the level of compliance of adolescent girls in consuming iron supplement tablets. From the data, it can be seen that in general, respondents are included in the non-compliant classification, which is a total of 35 respondents (59.3%). Meanwhile, only 24 respondents (40.7%) met the compliance criteria, namely taking at least 4 tablets in 1 month or 1 tablet every week according to the recommendations of the adolescent health program.

This result was reinforced in a study conducted from (22) by reporting that only 13% of adolescent girls complied in taking iron supplement tablets on a weekly (23) In line with this, ((24) also proved that 47.9% of adolescent girls had a low level of adherence to the consumption of weekly iron supplement tablets (25) This indicates that there is still a high rate of adolescent non-compliance with supplementation programs, which can have an impact on the success of anemia prevention efforts.

The Relationship of Knowledge with Compliance with Consuming Iron Supplement Tablets (TTD)

Based on the results of the statistical test using *the chi-square* test method, it showed that respondents with knowledge were quite more non-compliant in consuming iron supplement tablets as many as 21 respondents (35.6%). A *p-value* = 0.035 (0.05) was obtained from the results of the chi-square statistical test analysis < proving that there was a significant relationship between the level of knowledge and compliance with the consumption of iron supplement tablets in Maryam Junior High School students in Surabaya. This means that the difference in the level of knowledge found in female students has an influence on their behavior in consuming iron supplement tablets.

This study is in line with the findings (22) conducted at SMPN 1 Karangnongko, where the results of the analysis prove that there is a significant relationship between compliance and the level of knowledge in consuming iron supplement tablets, in the significance value of *p-value* = 0.001 (0.05)< (26) Similar things were also shown in a study by SMP Negeri 1 Limboto, which recorded a *p-value* = 0.001 (<0.05) indicating that there was a meaningful relationship between knowledge about anemia and Fe tablets and adolescent girls' adherence to taking the tablets (27).

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The Relationship of Attitude with Compliance with Taking Iron Supplement Tablets (TTD)

Based on the results of the research, it was proven that respondents with a more positive attitude were non-compliant to take iron supplement tablets as many as 34 respondents (57.6%). A *p-value* = 0.404 (0.05) was obtained on the results of the chi-square statistical test analysis ≥ which indicated that there was no significant relationship between attitude and compliance in consuming iron supplement tablets in Maryam Junior High School students in Surabaya. This means that although the 34 female students may have a positive attitude towards the importance of iron supplement tablets, this is not necessarily reflected in their actual behavior to consume them regularly.

This study is in line with the findings of (5) identifying knowledge about anemia and understanding that supplementation programs have an important role in determining the level of adherence to the consumption of iron supplement tablets in adolescent girls (27). However, the results of bivariate analysis in the study proved that attitudes did not contribute significantly to compliance behavior. This suggests that having a positive view or feeling about supplementation alone does not automatically encourage individuals to act consistently in taking the tablet.

In line with this, the study conducted from (29) also did not find a meaningful relationship between adolescent girls' perception of anemia and their adherence to consuming TTD, in a significance value of p = 0.447 > 0.05(25). These findings confirm that although an individual is aware of the risk of anemia, it is not necessarily followed by concrete action to prevent it through regular consumption of tablets (29).

This study has several potential biases and limitations that should be considered when interpreting the findings. First, the use of a cross-sectional design restricts the ability to establish causal relationships, as the associations between knowledge, attitude, and compliance with iron supplementation were only observed at one point in time. Second, the measurement of compliance relied on self-reported data obtained through questionnaires, which may be subject to recall bias or social desirability bias, since respondents might forget or overreport their actual tablet consumption. Third, the study was conducted in a single school setting, Maryam Junior High School Surabaya, which may limit the generalizability of the results to other schools or adolescent populations with different socio-economic and cultural contexts.

This study highlights that knowledge plays a pivotal role in shaping compliance with iron supplementation among adolescent girls, while attitude alone is insufficient to ensure adherence. From a public health perspective, strengthening health education within schools is essential to improve understanding of anemia and the importance of regular Tablet Tambah Darah (TTD) consumption. Integrating structured nutrition education into the school curriculum and engaging teachers, peer educators, and school health units (UKS) can help reinforce compliance.

Collaboration between schools, health centers, and families is also critical to address practical barriers such as forgetfulness, side effects, or limited access. Health workers should provide counseling, routine monitoring, and side-effect management, while parents can encourage consistent habits at home.

Additionally, innovative approaches such as mobile reminders and social media campaigns could increase adolescent engagement. These combined strategies are expected to reduce anemia prevalence and improve long-term health outcomes in adolescent girls.

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CONCLUSION

This study concludes that knowledge has a significant relationship with compliance in consuming Iron Supplement Tablets (TTD) among adolescent girls at Maryam Junior High School Surabaya, while attitude alone does not predict adherence. These findings emphasize that improving knowledge is a key entry point to strengthen compliance with iron supplementation programs. From a practical perspective, schools and health centers need to collaborate more intensively in designing health education that is continuous, interactive, and tailored to adolescents. Teachers and school health units (*UKS*) should be actively engaged in delivering nutrition education through classroom activities or extracurricular programs, while puskesmas should reinforce their role in providing routine monitoring, counseling, and managing potential side effects that may discourage consumption. Such coordinated efforts can improve students' awareness and foster consistent supplementation behavior.

From an academic perspective, this study highlights the need to explore additional determinants of compliance beyond knowledge and attitude. Factors such as parental support, peer influence, school policies, and socio-cultural contexts may also play important roles in shaping adolescent health behavior. Future research should employ longitudinal or mixed-methods designs to establish causal relationships and provide a more comprehensive understanding of how compliance with TTD can be sustained over time.

In conclusion, strengthening adolescent knowledge through school-based interventions, ensuring consistent support from puskesmas, and advancing further academic inquiry into broader determinants of compliance are essential steps. These combined efforts will not only enhance the effectiveness of anemia prevention programs but also contribute to better health outcomes among adolescent girls, reducing long-term risks such as anemia during pregnancy, maternal complications, and stunting in future generations.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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