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Determinants of adolescent girls' adherence to weekly iron supplementation

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Abstract

Iron supplements are nutritional supplements that effectively prevent and treat anemia. Anemia is one of the nutritional problems that until now has not been resolved, especially in adolescent girls. It was found that adolescent girls who were obedient to taking iron supplements were only 1.4%. This study aims to determine the barriers and drivers that affect adherence to iron supplement consumption in adolescent girls. This research was conducted on female students at SMA Negeri 1 Tarakan using a cross-sectional design with a sample of 270 randomly selected. Data were analyzed univariate, bivariate, and multivariate. Data were analyzed to determine the influence of knowledge, school support, family support, peer support, health worker support, and side effects of iron supplements on adherence to iron supplement consumption in adolescent girls. This research shows that the factors that influence adherence to consuming iron supplements are school support (OR = 10.266; 95%CI = 3.916-26.916; p-value = 0.000) and side effects of iron supplements (OR = 10.763; 95%CI = 4.335 -26.772; p-value = 0.000). Logistic regression analysis shows that side effects of iron supplements are the factor that most influences compliance with iron supplement consumption in adolescent girls. Through this research, it is hoped that the school will increase its support by routinely supervising and monitoring the iron supplementation program. Carrying out regular outreach and education regarding the importance of consuming iron supplements to increase compliance with iron supplement consumption and reduce the problem of anemia in adolsescent girls.

Keywords: Iron supplement, adolescent girls, Adherence, Anemia.

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1. Introduction

Anemia is still a global problem, especially in developing countries [1]. One group prone to anemia is adolescent girls. The World Health Organization states that the prevalence of anemia in 2021 ranges from more than 29.9%, meaning that it is equivalent to more than half a billion women aged 15-49 years experiencing anemia [2]. Southeast Asia is reported to have the highest prevalence of anemia, at over 35% [3]. Anemia is characterized by a lack of blood hemoglobin (Hb) levels below normal 12 g/dl [4]. Adolescent girls are more at risk of anemia than boys, this is due to the menstrual cycle experienced by adolescent girls every month. In the menstrual process, hemoglobin is wasted with menstrual blood, this will be exacerbated if daily nutrient intake is also lacking so adolescent girls are vulnerable to hemoglobin deficiency [5]. Anemia in adolescent girls can impact psychomotor development, and impair cognitive performance, and scholastic performance. Adolescent girls who suffer from anemia have low body resistance so easily sick, motor and mental development decreases, and intelligence and learning achievement are hampered [6]. In Indonesia, anemia due to iron deficiency (Iron Nutrition Anemia) is one of the main nutritional problems, both in pregnant women and adolescents[7]. Based on RISKESDAS data in 2018, the high prevalence of anemia in adolescent girls is 25%, meaning that 3-4 out of 10 adolescents in Indonesia suffer from anemia[8]. WHO recommends iron supplementation in schools which is considered an effective measure to increase hemoglobin levels and overcome anemia problems in adolescent girls [9], this is stated in the circular letter of the Director General of Public Health of the Ministry of Health Number 4 HK.03.03/V/0595/2016 concerning Granting Iron supplements in adolescent girls and Women [10]. The provision of iron supplements to adolescent girls with an age range of 12 to 18 years is carried out through the School Health Unit in educational institutions [4]. Previous studies have also shown that weekly iron supplementation at school is effective in increasing blood hemoglobin and reducing anemia among adolescent girls [11]. In fact, iron

supplementation in Indonesia as an effort to prevent and control anemia in adolescent girls has not been effective due to low adherence to iron supplementation [5]. Based on Riskesdas 2018 data, as many as 76.2% of adolescent girls who get iron supplements, only 1.4% regularly consume iron supplements as much as ≥52 tablets [8]. Low adherence is the main factor in the low effectiveness of iron supplementation programs so the problem of anemia in adolescent girls has not been resolved [12].

2. Methode

2.1. Study Design and Participants

This research was carried out in October-November 2023 at the highway school of Tarakan City, North Kalimantan Province, Indonesia. This type of research is an analytical survey that uses a cross-sectional design. From a population of 868 female students, a sample of 270 was obtained through calculations using the Lemeshow formula, then the sample was randomly selected using a simple random sampling technique. Data collection was carried out through the distribution of questionnaires consisting of 9 categories to all samples to be answered.

2.2. Dependent Variable

Adherence to iron supplement consumption in adolescent girls as measured by the amount of iron supplement consumed over the past 3 months. Adolescent girls fall into the obedient category if they consume ≥12 tablets.

2.3. Independent Variables

The independent variables consisted of knowledge, school support, family support, peer support, health worker support, and side effects of iron supplements. Knowledge categories were measured using a questionnaire consisting of 20 items, school support levels consisting of 12 items, family support, peers, and health workers consisting of 10 question items. The questionnaire item was presented with 2 answer choices "yes" for value 1 and "no" for value 0. All items on the questionnaire have been validated and tested for reliability involving 30 respondents who were not included in the research sample. The validity test showed that all question items on the questionnaire were valid and reliable, with a Cronbach alpha value of 0.839; 0.653; 0.777; 0.789; and 0.733. Therefore, all questionnaire items can be used to measure research variables. The data generated in this study were processed and analyzed using the Statistical Package For Social Science (SPSS) program version 22. Data were analyzed univariately, bivariately, and multivariately. Univariate analysis is used to describe the characteristics of research variables that describe the frequency and percentage distribution of each variable. Bivariate analysis was used to identify the relationship between the independent variable and the dependent variable using the *Chi-Square* statistical test with a confidence level of 95%. Multivariate analysis aims to analyze the relationship between all independent variables to the dependent variable. The multivariate analysis used in this study was multiple logistic regression analysis. Multiple logistic regression analysis aims to determine the independent variable that has the most influence on the dependent variable. The condition for the independent variable that can be tested in multivariate analysis is an independent variable that has a p-value of <0.25.

3. Result

In Table 1, the majority of respondents aged 15-18 years were 209 female students (77.4%) and most of them came from class X as many as 95 female students (35.2%). Of the 270 female students, it is known that in general respondents experienced anemia, namely as many as 159 female students (58.9%) consisting of 60 female students (22.2%) with mild anemia conditions, 84 female students (31.1%) with moderate anemia and 15 female students (8.6%) with severe anemia conditions. **Table 2** shows that in general, respondents did not comply with taking iron supplements, which was 224 female students (83.3%). Where students who have high knowledge, namely 199 female students (73.7%), 147 female students (54.4%) lack school support, 171 female students (63.3%) lack family support, 143 female students (53.%) receive enough support from peers, 146 female students (54.1%) had lack health worker support and 153 female students (56.7%) experience side effects after taking iron supplements. **Table 3** shows the results of the bivariate analysis with the Chi-Square test, where the variables of school support, family support, health worker support, and the presence of side effects showed significant values with a p-value of < 0.05. The variables of knowledge and peer support showed no significant value with a p-value of >0.05. **Table 4** shows the results of multiple logistic regression analyses of variables that have a significant relationship to adherence to iron supplement consumption in adolescent girls. All independent variables that have significant value are carried out by multivariate analysis tests, namely school support variables, family support, health worker support, and side effect variables. The results showed that 2 variables influence adherence to iron supplement consumption in adolescent girls, namely school support and side effects. Based on *the Odd Ratio* value, it shows that adolescent girls with high school support have a 10,266 times greater risk of adherence than adolescent girls who lack support from school. Adolescent girls who did not experience side effects had a 10.73 times greater risk of adherence than adolescent girls who experienced side effects after taking iron supplements. Among the 2 variables that influence consumption adherence, the side effect variable is the variable that has the highest risk value and is the most influential on the adherence to iron supplement consumption in adolescent girls.

4. Discussion

Prevention of anemia in adolescent girls is one of the priorities of nutrition programs that are integrated with stunting control [9]. However, school-based adolescent anemia management by providing iron supplementation is considered not yet effective in overcoming adolescent girl's anemia. successful implementation of the supplementation substance Iron at the school level needs synergy between the Health Office and the Education Office [5]. The health office plays a role in the procurement and distribution, supervision, and periodic evaluation of the implementation of supplementation substance iron.

Table 1: Frequency of distribution of respondent characteristics

Characteristics of Respondents	n=270	Percentage (%)
Age		
12-14	55	20.4
15-16	209	77.4
18-21	6	2.2
Class		
Class X	95	35.2
Class XI	91	33.7
Class XII	84	31.1
Hemoglobin(gr/dL)		
Normal (≥ 12)	111	41.1
Mild anemia (11-11.9)	60	22.2
Moderate anemia (8- 10.9)	84	31.1
Severe Anemia (≤ 8)	15	5.6

Source: Primary Data 2023

Table 2: Distribution of Adherence, Knowledge, School Support, Family Support, Peer Support, Health Officer Support and Side Effects of Iron Supplements

Variable	n=270	Percentage (%)
Adherence		
Yes	46	17.0
No	224	83.0
Knowledge		
Enough	199	73.7
Less	71	26.3
School Support		
Enough	123	45.6
Less	147	54.4
Family Support		
Enough	99	36.7
Less	171	63.3
Peer Support		
Enough	143	53.0
Less	127	47.0
Health Officer Support		
Enough	124	45.9
Less	146	54.1
Side Effects of Iron Supplement Tablets		
No.	117	43.3
Yes	153	56.7

Source: Primary Data 2023

Table 3: Knowledge Relationship, School Support, Family Support, Peer Support, Health Care Worker Support and Side Effects of Iron Supplements to Adherence to Iron Supplement Consumption in Adolescent Girls.

Variable	Compliance				P-Value
	Yes		Not		
	N	%	N	%	
Knowledge					
Enough	29	14.6	170	85.4	**0.105**
Less	17	23.9	54	76.1	
School Support					
Enough	40	32.5	83	67.5	**0.000**
Less	6	4.1	141	95.9	
Family Support					
Enough	24	24.2	75	75.8	**0.026**
Less	22	12.9	149	87.1	
Peer Support					
Enough	28	19.6	115	80.4	**0.309**
Less	18	14.2	109	85.8	
Health worker support					
Enough	28	22.6	96	77.4	**0,038**
Less	18	12.3	128	87.7	
Side Effects of Iron Supplements					
No	39	33.3	78	66.7	**0,000**
Yes	7	4.6	146	95.4	

Source: Primary Data 2023

Table 4 : Variables Affecting Adherence to Iron Supplement Consumption in Adolescent Girls.

Variable	Adj. OR	95%CI	p-Value
School Support	10.266	3.916 – 26.916	0.000
Side Effects	10.763	4.335 – 26.772	0.000

Source: Primary Data 2023

Meanwhile, the Education Office plays a role in implementing and monitoring iron supplementation activities by involving all school communities, especially school teachers. This study found that schools play an important role in the management of anemia in adolescents, with more than 86% of adolescent girls enrolled in school [13]. School support can increase adherence and awareness of adolescent girls to take iron supplements every week thereby reducing the prevalence of anemia in adolescent girls. Research conducted by Gosdin showed that weekly iron supplementation in school was effective in increasing blood hemoglobin and reducing anemia among adolescents [11]. The study also showed that 80.4% of adherent adolescent girls had normal hemoglobin levels. In line with Permatasari's research that conducts supplementation interventions substance of Iron in anemic adolescent girls results in a decrease in anemia by 5.5% [14]. Schools need to involve all teachers in the implementation of the supplementation substance iron where adolescent girls will more easily accept and follow the commands given by the teacher [15]. In line with the research of Sing et al which states that the education provided by teachers is routinely related to anemia and supplementation substance Iron Increases awareness and adherence in adolescent girls [16]. In addition, the mechanism and schedule of complementation substance Iron correlate positively with adherence, the implementation of iron supplementation together at a predetermined time will educate adolescent girls to take supplements substance Iron regularly, which will reduce the risk of adolescent girls forgetting[17]. To involve all teachers in the implementation of supplementation substance Iron must certainly be balanced with the ability of teachers to provide education and motivation to their students [18]. Therefore, there is a need for cooperation with health workers in providing training and ensuring teachers understand the impact of anemia and the benefits of supplementation substance Iron for adolescent girls [19]. Supervision and monitoring of complementary activities substance Iron need to be done on an ongoing basis, in addition to the provision of decisive action that will increase obedience in adolescent girls [17]. In addition to mobilizing all teachers, the success of iron supplementation in schools also needs to involve the families of female students. Families of female students need to be given socialization and education related to anemia and supplementation activities with the substance iron, this is so that the family provides support to his daughter to regularly

consume supplements substance iron to prevent anemia in line with research conducted by Patnaik et al which states that involving parents is a strategy that can increase adolescent awareness and compliance [20]. Dubik et al (2019) found that families exert a positive influence by providing support in the form of ensuring that adolescent girls live healthy habits by always reminding them to regularly take supplements such as iron [21]. School support is a driving factor in improving adherence to supplement consumption substance iron in adolescent girls. But that is one of the main obstacles to the supplementation program substance Iron is a Side Effect of Supplements substance iron. Supplements substance Iron has side effects that occur in some adolescent girls. Side effects are unpleasant or unwanted reactions after taking supplements such as the substance iron [11]. Supplement Side Effects substance Iron in general in the form of nausea, abdominal pain, diarrhea, and vomiting [22]. The results of this study showed that adolescent girls who experienced side effects 95% of them did not comply with taking supplements such as iron. Side effects felt after taking the supplement substance Iron is one of the reasons adolescent girls do not want to take iron supplements [11]. Research by Gagan et al in line with the results of this study states that the reason adolescent girls are not obedient to taking iron supplements is not liking the taste that causes nausea [23]. So that side effects do not become an obstacle in iron supplementation, it is necessary to increase knowledge on how to minimize the incidence of side effects when taking iron supplements without reducing the benefits [13].

5. Limitations

The limitation of this study is that it uses questionnaires that are filled out together so that it allows respondents to discuss answers that they have the potential to give answers that are not in with the real situation. In addition, this study only assessed several factors that affect the adherence to iron supplement consumption in adolescent girls, so it needs to be developed with further research to examine the influence of other factors that have not been studied.

6. Conclusion

The results of this research analysis found that the main factor that became a barrier to adherence in adolescent girls was the side effects experienced after taking iron supplements, while the main factor that encouraged adherence in adolescent girls was school support. Therefore, there is a need for increased support by the school in implementing the weekly iron supplementation program in the form of 1) involving all teachers, 2) carrying out weekly joint iron supplementation activities regularly, 3) monitoring, and 4) periodic evaluations.

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Ethical Permissions

This research has been approved by the Ethics Committee of the Faculty of Public Health, Hasanuddin University with number 5262/UN4.14.1/TP.01.02/2023.

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