Directly Observed Treatment for Iron Tablet Supplements Consumption Among Female Senior High School Students

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Article Info

Abstract

Anemia is one of the reproductive health problems in adolescents. The incidence of anemia is still high in Indonesia. Supplementation of Iron tablets per week is one of the policies to decrease the anemia incident. This study aims to determine the effectiveness of the implementation of Directly Observed Treatment (DOT) for Iron Tablet Supplements. Consumption was observed in high school students for 12 weeks. This study was a quantitative study with a quasi-experimental design, with the experiment group being peers as DOT and the control group being guidance counseling teachers. This research was conducted from July to October 2019 in Sleman and Bantul. Samples used for both groups were 70 respondents. Data analysis used univariate and bivariate. The results of this study showed that the incidence of anemia for both groups was still high at 51.4% before giving the iron tablets to 34.3% after the tablets were given. The implementation of DOT in the consumption of iron tablets in the teacher group showed non-adherence to drinking iron tablet only 2.9% and by peers up to 31.4%. Observed by the teacher showed an effect on the difference in Hemoglobin levels before and after treatment with p=0.037 and peer as observed with p=0.247.

Introduction

Adolescents are estimated 1.2 million worldwide. In some countries, the proportion of adolescents is almost a quarter of the total population (WHO, 2019). Adolescence is the most vulnerable period of life for reproductive health problems such as anemia. The incidence of anemia is still high. Based on Riskesdas 2018 showed that the prevalence of anemia among females adolescents more than 15 years old is about 48.9% (Indonesian Ministry of Health, 2018).

Female adolescents are the vulnerable groups to nutritional deficiencies, including anemia. Anemia among females can cause by heavy blooding during menstruation. Female adolescents with anemia are at risk of developing anemia during pregnancy. It is a negative impact on the growth and development of the fetus during pregnancy and potential to cause complications in pregnancy and labor,

even causing maternal and neonatal death. The Maternal Mortality Rate (MMR), according to the 2015 Inter-Census Population Survey, is 305 per 100.000 live births and the major causes of maternal death are pre-eclampsia and eclampsia (32.4%) and postpartum hemorrhage (20.3%). A previous study suggests that severe prenatal anemia increases postpartum hemorrhage risk (Omotayo et al., 2021).

Anemia among pregnant women was related to did not prenatal take iron supplementation (Derso, Abera and Tariku, 2017). In the baby, no consumption of iron tablets is related to low birth weight (Oktriyanto et al., 2022). Therefore, it is necessary for female adolescents aged 12-18 years to consume iron supplementation to prevent anemia in adolescents as preparation to prevent anemia in the future during pregnancy and childbirth (Ministry of Health, 2016).

The agreement between UNICEF

(United Nations Children's Fund) and UNFPA (United Nations Fund for Population Activity) as well as WHO on adolescent reproductive health 1989, stated that efforts to solve adolescent health problems were needed. This period is commonly crucial, considering that adolescence is a process of physical, psychological, and behavioral changes that highly affect the health status of adolescents. It is also known that during this period, there is a deficiency of several essential nutrients in adolescents, and most of them occur in developing countries (Patil, Wasnik and Wadke, 2009).

WHO recommendations in 2011 regarding anemia prevention among adolescents focused on promotion and prevention activities, such as increasing the consumption of iron-rich foods, supplementing iron supplement tablets, and increasing the fortification of foodstuffs with iron and folic acid. Professionals and the private sector are expected to contribute to supporting these comprehensive activities. The success of prevention and control of anemia among female adolescents requires SMART (Specific, Measurable, Attainable, Relevant, Timely) management support. Behavior change intervention starts by providing rules or guidelines and information education and communication (IEC) (Ministry of Health, 2016).

Previous studies showed some problems related to the consumption of iron tablets among female adolescents. For example, a study in Iran reported that 24.6% of adolescents didn't consume the iron tablets. Some reasons given 41% said they forgot, 28.2% gave reasons related to the side effects they felt, and several other reasons (Nikfallah et al., 2017). A previous study in India also reported that female adolescents that the adherence to consume iron tablets was still low. For 6 months, it was found that adherence to iron tablets consumption is as much as 36.3% of female adolescents (V. and Jacob, 2017). The low adherence to iron tablets consumption requires strategy. The concept of DOT is known in the consumption treatment for TB and ARVs therapy for patients. DOT or an accompanying person/'buddy' is a strategy that will likely be a component of any comprehensive HIV program.

Family and friends can play the role of 'buddy' and may be enough to provide needed support to improve adherence, optimize clinical and social outcomes and minimize drug resistance and stigma (Reid, Reid and Vermund, 2004).

DOT is also the effective TB control policy recommended by the World Health Organization (WHO). Implementing DOT is the best strategy to scale up CB-DOT in low-to-middle income countries with high TB burdens because it is cost-effective and acceptable (Zhang et al., 2016). The previous disease, such as Tuberculosis and HIV treatment, proved DOT was considered effective (Hassard, Ronald and Angella, 2017). Previous studies found that the DOT intervention was effective in increasing adherence to taking medication. In this study, the concept of facilitation for the consumption of iron tablets is school-based. The purpose of implementing DOT for iron tablet supplementation was to change the behavior, which is expected to change the knowledge and attitudes of students so they will consume iron tablets as recommended. Giving iron tablets in schools, the involvement of companions is from friends and teachers (Ministry of Health RI, 2016).

The role of friends/peers is considered vital based on the results of previous research. The role of peers/friends is very important in providing information to adolescents and also as an accompanying person for remembering the iron tablet consumption. This study also states that the delivery of information about reproductive health by the peer group in three meetings can increase reproductive health knowledge (Lestari, no date; Huriah, T; Nisma, 2008). Other studies also prove that peer education is an effective method for adolescents. Peer education can increase the average score before and after the intervention for adolescent knowledge and attitudes about reproductive health (Sriasih, 2013; Hatami, Kazemi and Mehrabi, 2015). Other research showed that school-based healthcare in adolescent sexual, reproductive, and mental health is very effective. The teacher's role is very vital in this program (Hull, Hasmi and Widyantoro, 2004). This study aims to know the effectiveness of the implementation of DOT for iron tablet supplementation among senior high

female students by peer educators and guidance counseling teachers on adherence to iron tablets consumption to increase hemoglobin levels among female adolescents in senior high school students in Yogyakarta.

Methods

This study is a quantitative study with a quasi- experimental nonequivalent control group design. The treatment group was DOT for iron tablets through the peer educator and the control group was DOT for iron tablets through the teacher. This study was to determine the effectiveness of DOT for iron tablets in increasing hemoglobin levels among female adolescents. This research used behavioral science according to the Procede Precede theory approached (Green, 2000).

This study investigated the DOT for iron tablets on increasing the Hemoglobin levels of high school students after being given iron tablets with the brand Fermia consisting of Fumarate 60 mg, Folic acid 0.25 mg, and Vitamin B6 37.5 mg. DOT implementation by peer and teachers. Peers and teachers were given 12 tablets and a control card, for each respondent. These buddies/ accompanying persons have been trained using the same module. This research took place at SMA 1 Gamping Sleman and SMA 1 Kasihan Bantul from July to October 2019. Ethical clearance for this study from the ethical committee of Poltekkes Kemenkes Yogyakarta No. e-KEPK/ POLKESYO/0101/V/2019.

The sample in this study was calculated by Lemeshow, as many as 35 for each treatment group, resulting in 70 respondents. The inclusion criteria in this study were students who were willing to be respondents and to be treated and signed the agreement after the explanation. While the exclusion criteria in this study were students who did not take the hemoglobin levels. The hemoglobin level measurement is by a digital measuring device. Both in the pre and post-tests. The treatment was carried out for 12 weeks. The analysis used is univariate and bivariate. The variables in this study include the income of parents divided by < Index and > Index, Body Mass Index (Thin, Normal and Fat), and adherence to iron tablets consumption are categorized as obedient if students consume all iron tablets and disobedient if students do not consume all iron tablets as many as 12 tablets iron tablet were written according to the notes in the control book.

Results and Discussion

The research was conducted on XI grade students at SMA 1 Gamping Sleman in the role of peer educator and SMA 1 Kasihan Bantul as the rule of the experiment group. These two schools have not been programmed for iron tablets from the government at the time of the research. In this study, a peer and teacher give 1 tablet to female students every week. In practice, the teacher assists by asking students to drink iron tablets in front of the teacher, and then the teacher fills it in the control book. Meanwhile, the peer gives it to his friend and gives him the freedom to drink at that time or before going to bed to be more comfortable with the side effects. This study was followed by 70 respondents. They had signed the consent and also their parents/guardians. This research took 12 weeks, from July to October 2019. The age range of the respondents was 15-17 years. The largest age group is 16 years (81.4%).

Table 1. Frequency Distribution of Respondents in the Two Research Groups

Variables	Experiments/Peers		Counseling Control/Teacher	
	n	%	n	%
Parent's income				
<Index	12	34.3	9	25.7
≥ Index	23	65.7	26	74.3
BMI				
Thin	6	17.1	4	11.4
Normal	20	57.1	20	57.1
Fat	9	25.7	11	28.6

Source: Primary data, 2019

Table 1 describes the proportion of the income of the respondent's parents, which is also the majority more than the minimum wage in each district. Most respondents also have a BMI in the normal category, which is 57.1%.

Table 2. Distribution of the Frequency of Anemia in the Pre and Post Test in Each Study Group

Variables	Peers		Counseling guidance teacher	
	n	%	n	%
Pre-Test				
Anemia				
Yes	10	28.6	18	51.4
Not	25	71.4	17	48.6
Post-Test				
Anemia				
Yes	10	28.6	12	34.3
Not	25	71.4	23	65.7
Iron tablet compliance				
Disobedient <12	11	31.4	1	2.9
Obedient (12)	24	68.6	34	97.1

Source: Primary data, 2019

Table 2 shows that before treatment there was a difference in the proportion of anemia. In the peer group, the incidence of anemia was 28.6%, while in the teacher group, the incidence of anemia was higher at 51.4%. After 12 weeks, this research showed that the proportion of anemia in the peer group remained at 28.6%, while in the teacher mentor group, the incidence of anemia decreased up to 34.3%. Compliance with taking iron tablets was seen from the number of iron tablets consumed based on the respondents' answers recorded in the control book. The results showed that some of the companions who drank iron tablets were obedient to drinking 12 items given one item per week at 68.6%. Those who were accompanied by teachers were 97.1%. Compliance was lower in the peer compared to the teacher group. Where adherence was very high or almost all of the iron tablets given were consumed by students.

Table 3. Analysis of the Pair t Test of the Difference in Hb Levels before and After the Study in the 2 Research Groups

Groups		Mean	95% CI		t	p
Peers	HB_pre	12.6886	-.16553	.62267	1.179	.247
	HB_post	12.4600				
Counseling guidance teacher	HB_pre	12.0343	-.84581	-.02847	-2.174	.037
	HB_post	12.4714				

Source: Primary data, 2019

Table 3 showed that in the peer group, there was no difference in hemoglobin levels before and after the study with p-value = 0.247. Meanwhile, in the teacher group, there were differences in HB levels before and after treatment with p-value = 0.037.

Table 4. Analysis of the Difference in Hb Levels Before and After the Study in the 2 Research Groups

Variable	Difference in Hb Levels				
	N	Mean	Levens's test	t	p
Research Group					
Peers	35	-0.23	0.459	-2.383	0.020
Teacher	35	0.44			

Source: Primary data, 2019

Table 4 shows that statistically, the difference in Hb data is homogeneous data as indicated by lavender's test with the result of 0.459. In the bivariate analysis, it was proven that there was an effect of giving iron tablets with the difference in hemoglobin levels for 12 weeks with p-value = 0.020. Anemia is mostly experienced by young women, who are a population group prone to nutritional deficiencies, especially iron deficiency. During adolescence, physiological demands increase to accommodate rapid growth and development. Adolescent girls and women (10 to 19 years), in particular, are at increased risk of iron deficiency owing to menstrual blood loss and increased requirements during pregnancy for maternal metabolism and fetal growth (Finkelstein et al., 2018). The results also showed that the anemia rate was still commonly high, namely 28.6% in the case group and 51.4% in the control group. These data support data on the high prevalence of anemia in Indonesia. Anemia has many consequences, including low IQ in children and adolescents (Kusmiyati, Meilani and Ismail, 2013; Ministry of Health, 2016).

Adolescent girls as a vulnerable group require supplementation of iron tablets containing at least 60 mg of elemental iron and 400 mcg of folic acid. This program is carried out throughout to optimize the prevention of anemia. In this study, iron tablet consumption for 12 weeks had a statistically significant effect on changes in adolescent Hb levels before and after the study. This result refers to the policy of the government of the Republic of Indonesia, which is to give iron tablets to adolescent girls aged 12-18 years one tablet per week to prevent anemia (Indonesian Ministry of Health, 2016).

Nevertheless, other studies showed no increasing hemoglobin levels in iron tablet consumption. This study refers to the result of the peer groups. But the previous data that the peer groups had fewer tablets compared to the teacher groups. So, that's better than the recommendation. Iron tablets should be given throughout the year and consumed per a week (Soekarjo et al., 2004; Ministry of Health, 2016; Jalambo et al., 2018).

In addition to consuming iron tablets, to prevent anemia is recommended to increase iron consumption and fulfill balanced nutrition. The most common cause of anemia is iron deficiency and folic acid deficiency due to an imbalance in nutritional intake and inadequate food intake, both in terms of pattern and nutritional quality food (Helliyana, Aritonang and Sanusi, 2019). Increasing the consumption of iron-rich foods is a strategy for dealing with anemia (Seaharattanapatum et al., 2020). Iron can be obtained from the consumption of healthy foods such as shrimp, liver, red meat, shellfish, green vegetables, etc. (Mansour, Hofmann and Gemzell-Danielsson, 2021). A previous study in 2020 showed that consumption of 200 mg/day long bean leaf extract in combination with iron supplementation for 14 days improved hematological status as indicated by an increase in hemoglobin levels, hematocrit, and erythrocyte counts (Nurjanah, Hadisaputro and Fatmasari, 2020). A balanced nutritional diet and iron supplementation help to treat anemia and reduce the risk of complications (Mishra et al., 2021).

Several studies state that iron consumption can be accompanied by the consumption of vitamin C or vitamin C supplementation. Vitamin C intake can be sourced from several food ingredients, especially vegetables and fruits such as guava, oranges, tomatoes, and several other sources (Mansour, Hofmann and Gemzell-Danielsson, 2021). A high intake of vitamin C has an effect

on the absorption of iron intake in the body. Another study stated a significant relationship between vitamin C intake and Hb levels. Vitamin C intake affects hemoglobin levels in young girls (Wahyurin and Rahmah, 2021).

This study showed that adherence to iron tablets consumption is better in the guidance counseling teachers group compared to the peers' group. The proportion of non-compliance with drinking iron tablets in the peer group was 31.4%. This result showed that the teacher's role is more than pursuing but also controlling and accompanying the students at the time they consume the iron tablet. And as a friend, peers feel more comfortable and close, and not to give the compulsion to consume the iron tablet. Peers only share the iron tablets and ask their friends to drink as soon as possible or at night if they have any doubts or side effects. The peers only record in their notebooks even their friends deny consuming iron tablet in front of them. Peers cannot replace teachers in their role of providing knowledge about reproductive health and also in this role as DOT for iron tablet consumption. Teachers have a vital role in the world of education. It is because teachers interact directly with students in providing education. Adolescent Reproductive Health Education by teachers is an effort to address student reproductive health problems (Pit-Ten Cate et al., 2018).

Conclusion

There is an effect of consuming iron tablets for 12 weeks on hemoglobin levels before and after treatment. The role of the guidance and counselor teacher cannot be replaced by the presence of a peer so these two roles can be carried out together to be more optimal. Consumption of iron tablets is very vital for female adolescents. Directly Observed Treatment (DOT) as a "buddy" or companying person is needed to bring this program successful. The involvement of the formal sector, such as schools, is very vital, including teachers and synergizing with peers, as well as the role of parents in reducing the incidence of anemia.

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