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Direct Supervision of Daily Consumption of Blood Supplement Tablets During Menstruation Can Increase Adolescent Hemoglobin Levels

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Abstract

Consumption of blood supplement tablets (TTD) during menstruation is one effort to prevent anemia. The Ministry of Health recommends taking one tablet supplements weekly and one tablet daily during menstruation. However, adherence of TTD consumption still low among adolescence. The purpose of this study was to determine the effect of direct supervision of tablets consumption on hemoglobin level of adolescent girls. This research is a quasi-experimental with pretest-post-test with control group. Samples are female students of Islamic Boarding School at Bengkulu City. A total sample of 56 female students consisting of 28 intervention group and 28 control group was taken by systematic random sampling. Data were analyzed using t-test. TTD were given every day during menstruation until 2 months. Hemoglobin levels baseline were measured at the first day after menstruation and post HB level were measured at the third month of menstruation. The results showed that the baseline of mean HB in intervention group was 12.2 gr and control group was 12.74 gr and after intervention, the mean of HB increases in intervention group by 1.13 gr and in control group by 0.4 gr. There was a difference in average of hemoglobin levels before and after intervention between the two groups, the difference was 0.79 gr (p 0.000 < α 0.005). Supervision of TTD consumption by the closest person like teacher was important for students, it can promote adherence of TTD consumption, which can increase HB levels and lower anemia among adolescent.

Keywords: anemia; hemoglobin; menstruation; adolescent; blood supplement tablet

INTRODUCTION

Anemia is a public health problem that has become a global health problem and until now is still one of the first causes of death. The World Health Organization (WHO) reports the highest prevalence of anemia occurs in children (42.6%) and in women who are not pregnant (29.0%). The prevalence of anemia in adolescent girls in Asia reaches 191 million people and Indonesia ranks 8th out of 11 countries in Asia with 75 million adolescent anemia sufferers aged 10-19 years (WHO, 2015). Anemia is a decrease in the concentration of hemoglobin circulating in the blood. Globally, iron deficiency anemia is a trigger for illness and death in adolescents aged 10-19 years. Children aged 12-14 years are said to be anemic if their hemoglobin level is less than 12.0 g / dl which is influenced by various causative factors (WHO, 2015). Studies on the prevalence of iron deficiency anemia in Indonesia are still rare and the results of various studies are still very variable, especially in school-age children and adolescents. A study conducted on 50 school-age children (6-12 years) in Indonesia found that the prevalence of Fe deficiency anemia reached 32% with a retrospective study involving 709

laboratory results and the prevalence of iron anemia in children aged 5-11.9 years as much as 16%, at the age of 12-18 years as much as 15.2% (Utami Seminar et al., 2020)

Based on data of Riset Kesehatan Dasar (2018), the prevalence of anemia in Indonesia is 21.7%, with a proportion of 20.6% in urban areas and 22.8% in rural areas. The prevalence of anemia is more prevalent in adolescent girls in the age group of 5-14 years by 26.4% and at the age of 15-24 years by 18.4%. The prevalence of anemia due to iron deficiency in adolescent girls ranges from 27.50% in the first year of menstruation with an average of menarche at the age of 13 years (Balitbangkes Kementerian Kesehatan RI, 2018). The prevalence of anemia in adolescent girls in Bengkulu City is included in the severe category or reaches 43% (Suryani et al., 2017). More than 50% of people experience anemia spread throughout the world due to low iron absorption and directly due to lack of iron intake (Sya`Bani & Sumarmi, 2016), bleeding, malaria, worm infections and other infections, stressful conditions, late eating and menstruation every month (WHO, 2015). Symptoms of anemia that are often lethargic, tired, weak, tired, negligent, accompanied by headaches, firefly eyes, easy sleepiness, fatigue and difficulty concentrating (Properawati, 2011). The negative consequences of anemia in the short term are decreased immune function, decreased metabolic capacity that can trigger increased disease, weakness, fatigue, and lack of concentration. Long-term impacts can result in reduced work capacity, cognitive which can reduce *human capital* and loss of academic potential (WHO, 2015). Iron deficiency can have an impact on the learning activities of young women in their schools (Sya`Bani & Sumarmi, 2016).

Government efforts to reduce anemia through the program of giving blood supplementtablets (TTD) to adolescent girls, women of childbearing age (WUS), and pregnant women. The purpose of giving blood supplementtablets (TTD) to adolescent girls is to improve the nutritional status of adolescent girls so as to break the chain of stunting, prevent anemia, and increase iron reserves in the body. The standard for giving TTD for adolescent girls is a dose of 60 mg elemental in the dosage form of *Ferro Sulfate, Ferrous Fumarate* or *Ferrous Gluconate* and Folic Acid 0.400 mg given once a week and once a day during menstruation (Kementerian Kesehatan, 2014). Based on the circular letter of the Indonesian Ministry of Health Number HK.03.03 / V / 0595 / 2016 it is explained that the provision of TTD to adolescent girls as much as one tablet per week or as much as ≥52 eggs / year (Kementerian Kesehatan RI, 2016).

However, until now, TTD consumption in adolescent girls is still low. The percentage of adolescent girls aged 12-18 years who received TTD in Indonesia was 10.3% and in 2017 it was 12.4%. Based on Basic Health Research data in 2018, the number of adolescent girls who get TTD in Indonesia is 76.2% and those who do not get TTD at all is 23.8%. Girls who consumed TTD < 52 items at 98.6% and who consumed ≥ 52 items were still very low at 1.4% and most 80.9% got TTD at school and 19.1% did not get TTD from school. Data on adolescent girls aged 12-18 years who get TTD in Bengkulu Province has only reached 5.00%, ranking 31st out of 34 provinces in Indonesia that have not met the national target of 30%. Even though the Strategy Plan of the Ministry of Health of the Republic

of Indonesia in 2015-2019 targets the coverage of TTD provision for adolescent girls to be achieved gradually starting from 10% in 2015 and 30% in 2019 (Balitbangkes Kementerian Kesehatan RI, 2018).

Based on the results of the evaluation of program implementation, the level of TTD consumption is still low due to less monitoring and evaluation, lack of awareness of adolescent girls to consume TTD and lack of support from outside parties. Although the program is clearly known to adolescents, it still experiences many obstacles, especially in terms of compliance with taking TTD (Balitbangkes Kementerian Kesehatan RI, 2018). Adherence is one of the most influential factors in the success of an iron supplementation program. Adherence to taking TTD is measured by the accuracy of the number of tablets consumed and the frequency of taking tablets. According to research (Widiastuti & Rusmini, 2019) showed that out of 90 adolescent girls, 13 people (14.4%) were lazy to consume TTD and 6.7% did not like to drink TTD and 14.4% said nausea. Conditions like this will result in low TTD consumption compliance.

One of the efforts to improve compliance with adolescent girls' TTD consumption in its implementation requires assistance from external parties such as teachers (Arintina et al., 2020). Based on research (Dubik et al., 2019) in Tamal Metropolis Ghana explained that one of the factors for the lack of TTD consumption is due to lack of supervision from school teachers. The results showed that 55% of school health workers did not always supervise adolescent girls while consuming TTD, and 63.6% of school officials reasoned because of limited time to supervise TTD consumption, and due to the unavailability of drinking water facilities in classrooms and the absence of incentives in conducting supervision activities. Efforts made so far to improve compliance with TTD consumption in adolescent girls are through the help of external parties such as teachers in schools. Research (Nuradhiani et al., 2017) shows that teachers are one of the success factors in increasing adolescent girls' compliance in consuming TTD because young women's time is spent more in school and usually students also make them as figures.

A preliminary study conducted on female students at Islamic Boarding School of Darussalam Kota Bengkulu found which from 10 female students interviewed stated that they did not get blood supplementtablets and never took TTD every week and during menstruation but only one tablet every week. Based on information from UKS officers which not all female students get TTD in their schools, but students who recommended to take TTD were suffered anemia. However, the public health center stated that TTD was given to female students in government schools at the working area of the public health center. However, not all female students get TTD according to policy governance, which is 1 tablet every week and during menstruation because the preparation of drugs is not adequate for all adolescent girls because priority is given to female students who suffered anemia and have the risk of anemia. Based on the above phenomena, researcher need to do a research how to improve TTD consumption adherence through direct supervision of TTD consumption by closest person such

teacher to increase regular TTD consumption which have will an impact to increase adolescent of HB level.

METHOD

This research is quasi-experimental research using *pre and post-test design with control group*. The group intervention was given a treatment direct supervision of TTD consumption daily during menstruation whereas control group was given an education of TTD consumption without supervision. The population in the study was all female students in grades VII-IX who had menstruated. The sample was female students at Darussalam and Pancasila Islamic Boarding School Bengkulu who had menstruated at least 2 times with normal menstrual patterns every month and did not suffer infectious diseases such malaria, helminthiasis diseases. The study was conducted for 5 months. The sample amounted to 56 female students consisting of 28 people for each group. The sample is taken by systematic random sampling using the calculation formula of the difference two means.

Data collection of respondents' characteristics was carried out directly through direct interviews and filling out questionnaires. Data on hemoglobin levels were first measured at 1-3 days before menstruation. Determination of the estimated date of menstruation obtained the record of the previous menstruation in monitoring card page. After respondents reported the incidence of menstruation on the first day, researcher immediately visited respondents and were given TTD every day during menstruation (6-7 tablets) until two months. Researcher supervised directly and monitored female student who TTD ingested every day at 19.00-21.00 PM and recorded every day in a TTD monitoring card. The HB levels are measured again at the 90th day of menstruation. HB level had measured through peripheral blood sample taken using a stick by a digital HB meter. HB measurement results are recorded in the hemoglobin monitoring card.

RESULT

The characteristics of respondents in this study are identified directly which can be seen in the following table:

Table 1. Respondents data about age, parents' education, parents' occupation, BMI, age of menarche, duration of menstruation and degree of Anemia

Variables	Group		*P Value*
	Intervention (n = 28)	Control (n = 28)	
Age			
Mean	12, 71	12, 85	0,454*
Min	12.56	12.46	
Max	13.15	12,97	
SD	0,75	0.66	

Parent Education			
Elementary/Junior High School	13 (46,4%)	9 (32,1%)	0,149*
High School / Vocational School	7 (25,0%)	12 (42,9%)	
DIII/S1	8 (26,6%)	7(25,0%)	
Parents' Occupation			
Farmer	7 (25,0%)	12 (42,9%)	0,352*
Laborer	8 (28,6%)	6 (21,4%)	
Private	5 (17.9)	7 (25,0%)	
Civil servants	8 (26,6)	3 (10.7%)	
Body Mass Index			
Underweight (< 18.5)	9 (32,1%)	7 (25,0%)	0,626*
Normal(18.5– 25.0)	12 (42,9%)	13(46,4%)	
Fat (> 25.0)	7(25,0%)	8(28,6%)	
Age of menarche			
Mean	12, 29	12, 32	0,901*
Min	11	11	
Max	14	14	
SD	0,049	1,090	
Duration of menstruation			0,552*
Mean	6, 18	6,04	
Min	5	4	
Max	7	7	
SD	0,863	0,922	
Degree of Anemia			
Weight (<8.0)	0 (0%)	0 (0%)	0,000**
Medium (8.0- 10.9)	5 (17,9%)	3 (10,7%)	
Light weight (11.0-11.9)	7 (25,0%)	1 (3,6%)	
No Anemia (≥12.0)	16 (57,1%)	24 (85,7%)	

**sig. p value α ≥ 0.05, t independent; ** Chi-Square*

The average age of respondents is similar, in the age range of 12-13 years for the intervention and control group; almost half of the mother's education level in the intervention group is elementary/junior high school (46.4%) and the control group is high school/vocational school (42.9%). The father's occupation more in the intervention group is laborer (28.6%), in the control group is farmers (42.9%), body mass index (BMI) respondents of the intervention group (42.9%) and control group (46.4%) had normal nutritional status. The mean age of menarche was 12.29 years in the intervention group, SD 1.049, and in the control group was 12.32 years, SD 1.090 with the earliest age of menarche at age 11 years and the longest age 14 years. The average length of menstruation was 6.18 days, SD 0.863 and in the control group 6.04 days SD 0.992 with the lowest menstruation of 4 days and no later than 7 days. Almost half (42.9%) of the intervention group respondents had anemia and the control group (14.3%) suffered anemia.

Table 2 Overview of Baseline Hemoglobin Levels of Female Student

Variable	Intervention Group	Control Group	*P value*
Hemoglobin (gr/dl)			
Mean	12, 20	12, 64	
Min-Max	9,80-14,10	10,10-14,60	0,158*
SD	1,23	1,10	

*Homogeneity test, SD deviation standard, sign p value $\alpha \geq 0.05$, independent-t test

Table 2 shows that in the intervention group the average menstrual HB level was normal 12,196 g/dl, and in the control group is normal 12,643. The results of the analysis showed tha there no different of HB levels between the two groups before the intervention.

Table 3. Differences in hemoglobin levels and consumption of TTD tablets

Variable	Mean	SD	Min-Max	P value
Intervention group				
Baseline	12.20	1.23	9.82-14.10	0.158
Post-Menstrual	13.39	0.98	12.36-14.60	0.828
P-value	0.000*			
Control				
Baseline	12.74	1.10	10.15-14.60	0.158
Post-Menstrual	13.14	1.13	11.90-14.70	0.828
P -value	0.000*			

SD, Standard Deviation, **p value*≤ 0.05, **Paired t test*

Table 3 shows that baseline hemoglobin levels in the intervention group was 12.20 g/dl, and in the control group was 12.74 g / dl, After the intervention, hemoglobin levels increased in the intervention group was 13.39 g / dl, and in the control group was 13.14 g / dl. Results showed an increase in average HB levels in the intervention group by 1.19 and in the control group by 0.4. The results of statistical tests showed that there was a difference in average HB levels before and after direct supervision intervention of TTD consumption (p value $0.000 \leq \alpha \leq 0.005$).

Table 4 Differences in Elevated HB Levels between Groups

Group	Mean	SD	SE	Mean Difference	P *value*
Intervention	1.19	0,839	0,159	0,79	*0,000
Control	0.40	0,700	0,132		

SD, Standard Deviation, sign *p value* $\alpha \leq 0.05$** *independent test-t*

Table 4 showed the average increase in HB levels in the intervention group of 1.19 g / dl and in the control group of 0.40 g / dl. The difference in increased HB levels between groups was 0.79 gr/dl. The results of the *independent statistical t-test* obtained p *value* results of $0.000 < \alpha \leq 0.05$ that there is

a difference in the increase in average hemoglobin levels between groups after the intervention. The direct supervision of TTD consumption during menstruation on elevated HB levels during menstruation in adolescent girls.

DISCUSSION

In this study, it was found that the characteristic of menstruation was the age of *menarche* in both groups was normal are the age of 12.3 years old or entering the age of 13 years old. The results of this study are also in line with research (Putra et al., 2020) states which most of the age of the first menstruation at the age of 11-12 years (42.4%). According to a cohort study in the United States conducted on 1257 adolescents who obtained 946 adolescents, the median age of menarche at the age of 12.25 years old. M*enarche* generally occurs in the age range of 12-16 years old. The age of menarche in each country varies, in Indonesia the age of menarche in 2012 was 13.08 years old from 2002 to 2012 experienced a decrease in the age of menarche (faster) then previous years (Leone & Brown, 2020). The respondent's menstrual period is a normal category, which is mean of 6 days with a range of 4-7 days. This study in line with (Tuntun & Rahayu, 2019) research on SMP 22 Bandar Lampung student who started that the average menstrual length was 6.6 days and the median of menstrual length was 7 days or 88.2% had menstrual length of 3-8 days. For respondent's BMI in the intervention group were only (42.9%) with normal nutritional status and 57.1% were malnourished or fat and thin and the control group (46.4%) had normal nutritional status and 53.6% were malnourished (fat and thin). This research is in line with research conducted by (Filsa et al., 2017) which shows that the BMI of adolescent girls in Sanggau Malang Girls' Dormitory is mostly 38.9% is normal, 44% is overweight, and 16.7% is underweight.

Description of Adolescence's HB Level

The results of this study showed that the average HB levels of adolescent girls in both groups before the intervention was within normal limits of >12 g/dl. However, there were still respondents who experienced mild to moderate anemia in the intervention group by 42.9% and in the control group by 14.3%. This condition can be caused by iron deficiency, menstruation, diet and infectious diseases or influenced by the education level of parents (mothers) most respondents are primary and secondary education (SMP-SMA) and the work of parents are mostly laborers and farmers which can directly affect changes in family food consumption. Anemia is influenced by factors of knowledge about nutrition, food intake, consumption of iron sources, bleeding such as menstruation, and inadequate iron absorption due to disruption of intestinal function and infectious diseases (Astuti & Kulsum, 2020).

The effect of direct supervision of the consumption of blood supplement tablets (TTD) on hemoglobin levels of adolescent girls

The results of this study showed that the average HB levels in both groups increased. In the intervention group after being given direct supervision by researchers and teachers of Islamic Boarding School there was an increase in HB from 12.20 g / dl to 13.39 g / dl and in the control group from 12.74 increased to 13.04 g / dl. This is because in this study both groups were given TTD but the difference lies in the intervention group and the second group was both given TTD but the intervention group carried out direct supervision of TTD consumption given every day during menstruation while in the control group, adolescent girls were given TTD but not supervised consumption directly so that there was still a lot of TTD that was not consumed every menstrual day.

Focus on the effectiveness of the two interventions, it was found that the increase in HB levels in the intervention group saw an increase in average HB levels of 1.19 g/dl while in the control group only 0.5 g/dl. The results of statistical tests showed that there was a significant difference in average HB levels before and after the intervention in each group. To see the effectiveness of the intervention, statistical test results showed that the group given direct consumption supervision intervention had a difference in the average increase in HB levels much greater than the control group, which was 0.79 g / dl while the control group was only 0.4 g / dl. There is an effect of direct supervision of TTD consumption during menstruation on the increase in HB levels of adolescent girls.

From the results of this study, the difference in the average increase in HB levels can be influenced by compliance with TTD consumption. In this study, it was proven that adolescent girls in the intervention group were obedient to consume TTD every day during menstruation, while in the control group it was found that adolescent girls were not obedient to taking TTD every day and there were even adolescents who did not consume TTD during menstruation and discarded TTD. The existence of routine supervision carried out by companions or teachers of Islamic Boarding School increases compliance with taking TTD as recommended which will have an impact on increasing HB. One of the efforts to increase the consumption of TTD for adolescent girls in its implementation was external assistance, including teachers. In addition to teachers, family participation can also help improve compliance with TTD consumption (Nuradhiani et al., 2017).

Parental and teacher support is a reinforcing factor in taking TTD. Research conducted by Dhikale et al. (2015), on the evaluation of giving Iron Folic Acid (IFA) tablets every week to 345 adolescents aged 6-12 years in India showed that the reason adolescents do not consume tablets is forgetting as much as 55.1% and adherence to taking IFA tablets every week is 85.4%. The success factor in the increasing consumption of IFA tablets is the guru. The role of teachers is a very important factor in motivating regular consumption of IFA tablets because every week teachers educate on the health benefits of drugs and supervise drug ingestion during lunch at school.

The results of the study on 90 adolescent in junior high school (SMP) in urban and rural areas showed that the support provided by parents in consuming TTD does not guarantee that subjects are obedient to take TTD (Widiastuti & Rusmini, 2019). This can happen because parents only remind

without making sure the subject really takes TTD so that there is no encouragement in the subject to obey taking TTD as recommended while the majority of subjects (75.4%) get good teacher support to take TTD. The results of this study are supported by Wahyuni's research (2018) on the effectiveness of TTD drinking assistance by cadres on HB levels of pregnant women at the Palangka Raya City Health Center. The results showed that the group given assistance increased hemoglobin levels by 31 people (100%) and the difference in hemoglobin levels increased from 0.2-2.6 gr%, while in the group that was not assisted by 15 people (48.4%) hemoglobin levels decreased (Wahyuni, 2018).

In this study, it was seen that the group given supervision had high adherence in TTD consumption and had a very significant increase in HB levels. This is because the administration of TTD as recommended with the dose for adolescent girls is a dose of 60 mg elemental (in the dosage form of Ferro Sulfate, Ferrous Fumarate or Ferrous Gluconate and Folic Acid 0.400 mg given once a week and once a day during menstruation can increase adolescent HB levels (Kementerian Kesehatan, 2014). This is supported by research (Gupta et al., 2021) on the effectiveness of daily monitoring of Iron Folic Acid (IFA) administration on increasing HB levels in adolescent girls aged 12-19 years in India shows that giving IFA tablets alone can increase HB levels from 10.6 g before intervention to 12.1 g or there is a difference in increase by 1.5 gr.

CONCLUSSION

The average hemoglobin level (baseline) of female adolescents in the intervention group was 13.39 and that of the control group was 13.14. The intervention to monitor iron supplement consumption was directly effective in increasing HB levels by 1.19 gr in the intervention and control groups by 0.4 with a difference of 0.79. It is recommended that teachers or assistants supervise young women in consuming blood supplements regularly every day during menstruation and record iron tablets consumption monitoring cards in order to increase compliance and increase HB levels in young women to prevent anemia.

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