DOKUMEN

FULL ARTIKEL
KORESPONDENSI
ETHICAL CLEARANCE
TURNITIN

KEMAS 18 (3) (2023) 375-382

Jurnal Kesehatan Masyarakat

http://journal.unnes.ac.id/nju/index.php/kemas

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

Niken Meilani✉, Nanik Setiyawati
Poltekkes Kemenkes Yogyakarta, Department of Midwifery, Yogyakarta, Indonesia

Article Info

Article History:
Submitted September 2022
Accepted November 2022
Published January 2023

Keywords:
Anemia, peer,
teachers, adolescents

DOI
https://doi.org/10.15294/
kemas.v18i3.38594

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

✉ Correspondence Address:
Poltekkes Kemenkes Yogyakarta, Department of Midwifery, Yogyakarta, Indonesia
Email : -

pISSN 1858-1196
eISSN 2355-3596

(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.

References

Derso, T., Abera, Z., & Tariku, A., 2017. Magnitude and Associated Factors of Anemia Among Pregnant Women in Dera District: A Cross-sectional Study in Northwest Ethiopia. *BMC Research Notes*, 10(1), pp.1–8.

Finkelstein, J.L., Herman, H.S., Guetterman, H.M., Pena-Rosas, J.P., & Mehta, S., 2018. Daily Iron Supplementation for Prevention or Treatment of Iron Deficiency Anaemia in Infants, Children, and Adolescents. *Cochrane Database of Systematic Reviews*, 2018(12).

Green, L., *2000 Health Promotion Planning An Educational and Environmental Approach*. Toronto- London: Mayfield Publishing Company.

Hassard, S., Ronald, A., & Angella, K., 2017. Patient Attitudes Towards Community-based Tuberculosis DOT and Adherence to Treatment in an Urban Setting; Kampala, Uganda'. *Pan African Medical Journal*, 27, pp.1–6.

Hatami, M., Kazemi, A., & Mehrabi, T., 2015. Effect of Peer Education in School on Sexual Health Knowledge and Attitude in Girl Adolescents. *Journal of Education and Health Promotion*, 4, pp.78.

Helliyana, H., Aritonang, E.Y., & Sanusi, S.R., 2019. The Associations between Maternal Education, Chronic Energy Deficit, and Anemia in Pregnant Women: An Evidence from Lhokseumawe, Indonesia', *Journal of Maternal and Child Health*, 4(5), pp.302–306.

Hull, T.H., Hasmi, E., & Widyantoro, N., 2004. "Peer" Educator Initiatives for Adolescent Reproductive Health Projects in Indonesia. *Reproductive Health Matters*, 12(23), pp.29–39.

Huriah, T., & Nisma, H., 2008. The Influence of Reproductive Health Education by Peer Groups on Knowledge of Reproductive Health in SMP Negeri 2 Kasihan Bantul Yogyakarta. *Mutiara Medika*, 8(2), pp.89–96.

Hurlock, E.B., 2009. *Developmental Psychology An Approach throughout the Life Span*. Jakarta: Erlangga.

Jalambo, M., Karim, N., Naser, I., & Sharif, R., 2018. Effects of Iron Supplementation and Nutrition Education on Hemoglobin, Ferritin and Oxidative Stress in Iron-deficient Female Adolescents in Palestine: Randomized Control Trial. *Eastern Mediterranean Health Journal*, 24(6), pp.560–568.

Ministry of Health., 2016. *Guidelines for the Prevention and Management of Anemia in Adolescent Girls and Women of Childbearing Age.* Jakarta: Directorate General of Public Health, Ministry of Health.

Ministry of Health of the Republic of Indonesia., 2016. Guidelines for the Prevention and Management of Anemia in Adolescent Girls and WUS. *Directorate of Community Nutrition*, pp.97.

Kusmiyati, Y., Meilani, N., & Ismail, S., 2013. Hemoglobin Levels and Children's Intellectual Intelligence Hemoglobin Level and Intelligence Quotient of Children. *National Journal of Public Health*, 8(3), pp. 115–118.

Lestari, H., 2012. Sexual and Reproductive Health Universal Access to Sexual and Reproductive Health Services: Profile of Indonesia. *Women's Health Foundation*.

Nikfallah, F., Taslimi, S., Shaahmadi, F., & Jalilian, D., 2017. Acceptance Rate of Iron-aid Program and its Effective Factors among Girl Students. *International Journal of Nursing Papers*, 2(1), pp.1–5.

Patil, S.N., Wasnik, V., & Wadke, R., 2009. Health Problems Amongst Adolescent Girls in Rural Areas of Ratnagiri District of Maharashtra India. *Journal of Clinical and Diagnostic Research*, 3(5), pp.1784–1790.

Reid, S.E., Reid, C.A., & Vermund, S.H., 2004. Antiretroviral Therapy in Sub-Saharan Africa: Adherence Lessons from Tuberculosis and Leprosy. *Mutiara Medika*, 8(2), pp.89–96.

Jalambo, M., Karim, N., Naser, I., & Sharif, R., 2018. Effects of Iron Supplementation and Nutrition Education on Haemoglobin, Ferritin and Oxidative Stress in Iron-deficient Female Adolescents in Palestine: Randomized Control Trial. *Eastern Mediterranean Health Journal*, 24(6), pp.560–568.

Kemenkes., 2016 *Pedoman Pencegahan dan Penanggulangan Anemia pada Remaja Putri dan Wanita Usia Subur.* Jakarta: Direktorat Jenderal Kesehatan Masyarakat Kemenkes.

Kementerian Kesehatan Republik Indonesia., 2018. Laporan Nasional Riset Kesehatan Dasar 2018, *Kementerian Kesehatan RI.*

Kementerian Kesehatan RI., 2016. Pedoman Pencegahan dan Penanggulannggan Anemia pada Remaja Putri dan WUS. *Direktorat Gizi Masyarakat*, pp. 97.

Kusmiyati, Y., Meilani, N., & Ismail, S., 2013. Kadar Hemoglobin dan Kecerdasan Intelektual Anak Hemoglobin Level and Intelligence Quotient of Children. *Jurnal Kesehatan Masyarakat Nasional*, 8(3), pp.115–118.

Mansour, D., Hofmann, A., & Gemzell-Danielsson, K., 2021. A Review of Clinical Guidelines on the Management of Iron Deficiency and Iron-Deficiency Anemia in Women with Heavy Menstrual Bleeding. *Advances in Therapy,* 38(1), pp.201–225.

Mishra, A., Marwah, S., Divedi, P., Dewan, R., & Ahluwalia, H., 2021. A Cross-Sectional Study of Barriers in Prevention of Anemia in Pregnancy. *Cureus,* 13(1), pp.1–10.

Nikfallah, F., Taslimi, S., Shaahmadi, F., & Jalilian, D., 2017. Acceptance Rate of Iron-aid Program and its Effective Factors among Girl Students. *International Journal of Nursing Papers*, 2(1), pp.1–5.

Nurjanah, F.W., Hadisaputro, S., & Fatmasari, D., 2020. Long Bean Leaf Extract for Improving Haematological Status of Female Adolescent with Anemia that Gets Fe Supplementation. *Jurnal Kesehatan Masyarakat,* 16(1), pp.81–87.

Oktriyanto., Rahardja, M.B., Amrullah, H., Pujihasvuty, R., & P, N.M.M., 2022. Determinants of Low Birth Weight in Indonesia. *Jurnal Kesehatan Masyarakat,* 17(4), pp.583–593.

Omotayo, M.O., Abioye, A., Kuyebi, M., Eke, A.C., 2021. Prenatal Anemia and Postpartum Hemorrhage Risk: A Systematic Review and Meta-analysis. *Journal of Obstetrics and Gynaecology Research,* 47(8), pp.2565–2576.

Patil, S.N., Wasnik, V., & Wadke, R., 2009. Health Problems Amongst Adolescent Girls in Rural Areas of Ratnagiri District of Maharashtra India. *Journal of Clinical and Diagnostic Research*, 3(5), pp.1784–1790.

Pit-Ten, C.I.M., Mariya, M., Mireille, K., Sabine, K-S., 2018. Promoting Inclusive Education: The Role of Teachers' Competence and Attitudes. *Insights into Learning Disabilities,* 15(1), pp.49–63.

Reid, S.E., Reid, C.A., & Vermund, S.H., 2004. Antiretroviral Therapy in Sub-Saharan Africa: Adherence Lessons from Tuberculosis and Leprosy. *International Journal of STD and AIDS,* 15(11), pp.713–716.

Seaharattanapatum, B., Sinsuksai, N., Phumonsakul, S., Chansatitporn, N., 2020. Effectiveness of Balanced Diet-Iron Supplement Program among Pregnant Women with Anemia: A Quasi-Experimental Study. *Pacific Rim International Journal of Nursing Research,* (4), pp. 4–9.

Soekarjo, D.D., Sd, S.P., Kusin, J.A., Schreurs, W.H.P.,

Schultink, W., Muhilal., & Bloem, M.W., 2004. Effectiveness of Weekly Vitamin A (10 000 IU) and Iron (60 mg) Supplementation for Adolescent Boys and Girls Through Schools in Rural and Urban East Java, Indonesia. *European Journal of Clinical Nutrition*, 58(6), pp.927–937.

Sriasih, N., 2013. The Influence of Adolescent Sexuality Education by Peer Educators on Adolescent Knowledge and Attitudes About the Dangers of Free Sex. *Jurnal Skala Husada*, 10(1), pp.13–19.

V., S.M., & Jacob, S.A., 2017. Adherence to Weekly Iron and Folic Acid Supplementation Among the School Students of Thrissur Corporation–a Cross Sectional Study. *International Journal Of Community Medicine And Public Health*, 4(5), pp.1689.

Wahyurin, I.S., & Rahmah, H.A., 2021. Amount of Menstrual Blood and Nutrient Intake with Hemoglobin Level. *Jurnal Kesehatan Masyarakat*, 17(1), pp.31–36.

WHO., 2019. WHO Recommendations on Adolescent Sexual and Reproductive Health and Rights. *World Health Organization.*

Zhang, H., Ehiri, J., Yang, H., Tang, S., & Li, Y., 2016. Impact of Community-Based DOT on Tuberculosis Treatment Outcomes: A Systematic Review and Meta-Analysis. *PLoS One*, 11(2), pp.1–19.

KELENGKAPAN BERKAS

BUKTI KORESPONDENSI
ETHICAL CLEARANCE
TURNITIN

Judul artikel

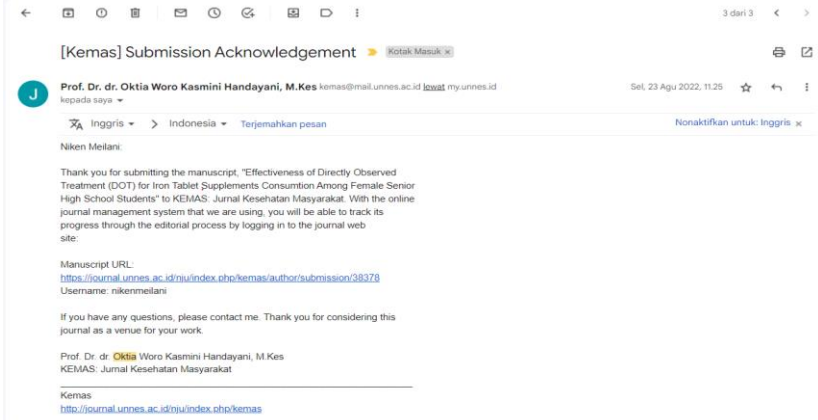
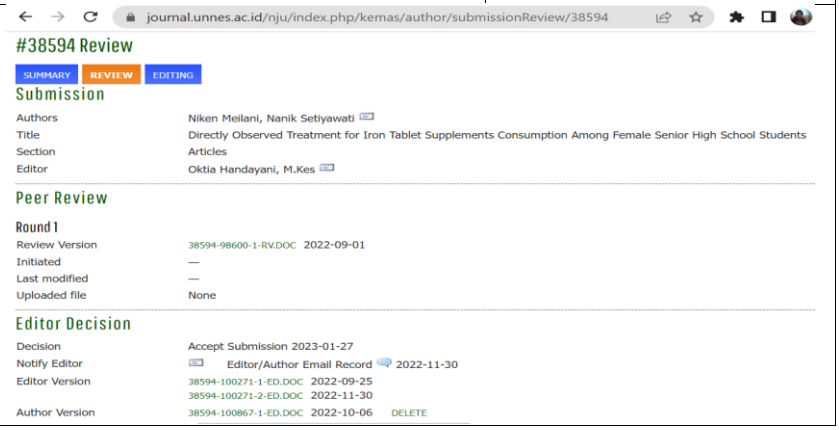
The Effectiveness of peer educator and guidance counselling teachers to knowledge of reproductive health

BUKTI KORESPONDENSI

BUKTI KORESPONDENSI

ARTIKEL JURNAL NASIONAL PERINGKAT 2/
MULAI OKT 2022 TERINDEKS SCOPUS

Judul artikel : Directly Observed Treatment for Iron Tablet Supplements Consumtion among Female Senior High School Students
Jurnal : Jurnal Kesehatan Masyarakat (Kemas)
Penulis : Niken Meilani (Penulis 1 dan korespondensi)

No	Perihal	Tanggal
1	Submit melalui OJS	23 Agustus 2022
		
2	Proses Review dan pengembalian revisi	1 September 2022 s.d. 30 November 2022
		

MASUKAN DARI REVIEWER:

Effectiveness of Directly Observed Treatment (DOT) for Iron Tablet Supplements Consumtion Among Female Senior High School Students

Niken Meilani[1], Nanik Setiyawati[1]
[1]Poltekkes Kemenkes Yogyakarta, Department of Midwifery, Yogyakarta, Indonesia

Article Info

Article history:
Received month dd, yyyy
Revised month dd, yyyy
Accepted month dd, yyyy

Keywords:
Anemia
Peer
Teachers
Adolescents

ABSTRACT

Adolescence is the most vulnerable periods of life towards reproductive health problems. Anemia one of the adolescent reproductive problems. Incidence of anemia are still high in Indonesia. Supplementation of Iron tablet per a week as one of the policy to decrease the anemia incident. This study aims to determine the effectiveness of the implementation Directly Observed Treatment (DOT) as same as TB medication for Iron Tablet Supplements Consumtion by peer and guidance counseling teacher for 12 tablets of iron tablets to high school students for 12 weeks in an effort to increase hemoglobin levels among female adolescents. This study is a quantitative study with a quasi-experimental design, non-equivalent control group design, with the experiment group is peer as DOT or accompanying person and control group is guidance counseling teacher. This research was conducted from July to July. October 2019 in Sleman and Bantul. The number of samples for the two research groups was 70 respondents. Data analysis using univariate and bivariate using t test. The results of this study showed that the incidence of anemia in the two study groups was still high as 51.4% before giving the iron tablets to 34.3% after the tablets were given. The implementation DOT in the consumption of iron tablets in the teacher group showed that non-adherence to drinking iron tablet only 2.9% and by peers up to 31.4%. Observed by teacher showed that an effect on the difference in Hemoglobin levels before and after treatment with p=0.037 and peer as observed with p=0.247.

Corresponding Author:
Niken Meilani
Poltekkes Kemenkes Yogyakarta, Department of Midwifery, Yogyakarta, Indonesia
Jl. Mangkuyudan MJ III/ 304, Yogyakarta
Email: nikenbundaqueena@gmail.com

Commented [A1]: Naskah dikirim dalam bentuk word biasa tidak perlu dalam dua lajur

Commented [A2R1]: Jumlah kata maksimam 4000 kata , jika melebihi maka biaya proofread akan dibebankan kepada penulis

Commented [A3]: Maksimal kata pada abstrak 200

Introduction

Adolescents 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 periods of life towards reproductive health problems. Anemia one of the adolescents reproductive problems. The incidence of anemia is still high. Based on Riskesdas 2018 showed that prevalence of anemia among females adolescents more than 15 years old is about 48.9%.

Female adolescents as the vulnerable groups towards nutritional deficiencies, including anemia or iron deficiency. Anemia among female can cause by heavy blooding during menstruation. Female Adolescent who had anemia are at risk of developing anemia during pregnancy. This is a negative impact on the growth and development of the fetus during pregnancy and potential to cause complications in pregnancy and labor, and even cause the 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 main causes of maternal death are pre-eclampsia and eclampsia (32.4%) and postpartum hemorrhage (20.3%). Therefore, it is necessary for a 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 in 1989, stated that efforts to solve adolescent health problems were needed as a transition period from adolescence to adulthood. This period is quite crucial considering that adolescence is a process of physical, psychological and behavioral changes that greatly 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, anemia prevention among adolescents are focused on promotion and prevention activities, such as increasing the consumption of iron-rich foods, supplementing iron supplement tablets and increasing fortification of foodstuffs with iron and folic acid. Professional and the private sector are expected to contribute to supporting this comprehensive activities. The successfull of prevention and control of anemia among remale adolescent requires SMART (Specific, Measurable, Attainable, Relevant, Timely) management support. Behavior change intervention starts from providing the 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 adolescent. For example, a study in Iran reported that there were still 24.6% of adolescents didn't consume the iron tablet. Some of the reasons given were 41% said they forgot, 28.2% gave reasons related to the side effects they felt and several other reasons (Nikfallah et al., 2017).

Previous study in India also reported that female adolescent that the adherence to consume iron tablets was still low. For 6 months, it was found the adherence to consume iron tablet many as 36.3% of female adosencent (V. and Jacob, 2017).

The low adherence to consume of iron tablet requires to built a 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 will likely be a component of any comprehensive HIV programme. Family, friend can play the role of 'buddy', 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 burden, because it is cost-effective and acceptable (Zhang et al., 2016).

Based on the previous diasease such as Tuberculosis and HIV treatment and proof that directly observed treatment (DOT） which is considered effective. (Hassard, Ronald and Angella, 2017). Previous studies was 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 tablet in schools, the involvement of companions is from friends and teachers (Ministry of Health RI, 2016).

The role of friends / peer is considered important based on the results of previous research. The results of these studies include conveying that The majority of females adolescent (57%) said that they communicated menstruation to their friends compared to their mothers or fathers. The role of peer/ friends is very important in providing information to adolescents and also as a accompanying person for remembering the iron tablet consumtion. 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. Research at SMA N 2 Denpasar shows that sexuality education by peers has a significant effect on adolescent knowledge and attitudes about the dangers of free sex. Similar research has also been carried out by Hatami that peer education can increase the average score before and after the intervention for adolescent knowledge and attitudes about reproductive health.(Sriasih and et al, 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 important in this program. However, to be more effective, there is still a need for continuity of service in the family and community (Hull, Hasmi and Widyantoro, 2004).

The aims of this study is to know the effectiveness of implementation of DOT for iron tablet supplementation among senior high female students by peer educators and guidance counseling teacher on adherence to consume iron tablets to increasing 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 tablet in increasing the hemoglobin levels among female adolescents. This research used behavioral science according to the Procede Precede theory approached (Green, 2000).

In this study, what was investigated was the DOT for iron tablets on increasing the Hemoglobin levels of high school students after given iron tablets with the brand Fermia consist of: Fumarate 60 mg, Folic acid 0.25 mg, Vitamin B6 37.5 mg. DOT implementing by peer and teacher.

Peers and teachers were given 12 tablets and a control card for each respondent. Both of these buddy/ accompanying person have been trained using the same module. This research was conducted at SMA 1 Gamping Sleman and SMA 1 Kasihan Bantul from July to October 2019. Ethical clearance this study from ethical commitee 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, so the samples of this study is 70 respondents. The inclusion criteria in this study were students who were willing to be respondents and were willing 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 levels measure with a digital hemoglobin measuring device both in the pre and post tests.

The treatment was carried out for 12 weeks.The analysis used is univariate andbivariate. The variables in this study include the income of parents divided by $<$ Index and $\geq$ Index, Body Mass Index (Thin, Normal and Fat) and adherence to consume iron tablets 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 as the role of peer educator and SMA 1 Kasihan Bantul as the the rule of experiment group. These are two schools did not yet have a program for iron tablets from the government at the time of the research. In this study, peer and teacher give 1 tablet to females students every week. In practice, the teacher provides assistance by asking students to drink iron tablets in front of the teacher and then the teacher fill 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 side effects.

This study was followed by 70 respondents who had signed the consent and also their parents/guardians. This research was conducted for 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.

Variable	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

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 of the 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

Variable	Peers		BK 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

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 greater at 51.4%. After 12 weeks of 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%.

Commented [A4]: Dibawah setiap table sebutkan sumbernYa

Compliance with takingiron tablets was seen from the number of iron tablets consumed based on the respondents' answers recorded in the control book. The results of compliance showed that some of the companions who drank iron tablet were obedient to drinking 12 items given one item per week by 68.6% and those who were accompanied by teachers were 97.1%. Compliance was lower in 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

Group		mean	95% CI		t	p
Peers	HB_pre	12.6886	-.16553	.62267	1.179	.247
	HB_post	12.4600				
BK teacher	HB_pre	12.0343	-.84581	-.02847	-2.174	.037
	HB_post	12.4714				

In table 3, showed that in peer group there was no difference in hemoglobin levels before and after the study with p value = 0.247. Meanwhile, in the teacher group, it was known that 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	Lavene's test	t	p
Research Group					
Peers	35	-0.23	0.459	-2.383	0.020
Teacher	35	0.44			

In table 4 showed 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.

Adolescence is a period of transition from childhood to adulthood, at that time there is rapid growth including reproductive function so that it affects changes in development, both physical, mental, and social roles (Hurlock EB, 2009). Anemia are mostly experienced by young women who are a population group prone to nutritional deficiencies, especially iron deficiency. The results of this study also showed that the anemia rate was still quite 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, it was found that the iron tablet consumtion 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 (Ministry of Health, 2016).

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

This study showed that the adherence to consume iron tablets is better in the guidance consellor group compared to the peer group. The proportion of non-compliance of drinking iron tablet in the peer group was 31.4%. This result showed that the teacher's role is more that pursuing but also control and

accompanying the students at the time they consume the iron tablet. And as a friends, peer feel more comfort, closed and not to give a compulsion to consume the iron tablet. Peer only share the iron tablet and ask the friends to drink as soon as possible or at night if they have any doubt or side effect. The peer only record in their notebooks inf their friends deny to consume iron tablet in front of them. This case refers to the Infodatin (2016) showed that most of the young women (57%) said they communicated menstruation to their friends compared to their mother or father. The role of peer is more on communication because of peer relations so that in terms of compliance it becomes less than optimal. Peers cannot replace teachers in their role in providing knowledge about reproductive health also in this role as DOT for iron tablet consumtion The previous study showed that optimization of reproductive health knowledge including iron tablet consumtion cannot be done alone but must be comprehensive (Hull, Hasmi and Widyantoro, 2004; Soekarjo et al., 2004),

Conclusion

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

References

Green, L. (2000) Health Promotion Planning An Educational and Environmental Approach. Toronto - London: Mayfield Publishing Company.

Hassard, S., Ronald, A. and Angella, K. (2017) 'Patient attitudes towards community-based tuberculosis DOT and adherence to treatment in an urban setting; Kampala, Uganda', Pan African Medical Journal, 27, pp. 1–6. doi: 10.11604/pamj.2017.27.1.11119.

Hatami, M., Kazemi, A. and Mehrabi, T. (2015) 'Effect of peer education in school on sexual health knowledge and attitude in girl adolescents.', Journal of education and health promotion, 4, p. 78. doi: 10.4103/2277-9531.171791.

Hull, TH, Hasmi, E. and Widyantoro, N. (2004) '"Peer" educator initiatives for adolescent reproductive health projects in Indonesia', Reproductive Health Matters, 12(23), pp. 29–39. doi:10.1016/S0968-8080(04)23120-2.

Huriah, T; Nisma, H. (2008) 'The Influence of Reproductive Health Education by Peer Groups on Knowledge of Reproductive Health in SMP Negeri 2 Kasihan Bantul Yogyakarta', Mutiara Medika, 8(2), pp. 89–96.

Hurlock EB (2009) Developmental Psychology An Approach throughout the Life Span. Jakarta: Erlangga.

Jalambo, M. et al. (2018) 'Effects of iron supplementation and nutrition education on hemoglobin, ferritin and oxidative stress in iron-deficient female adolescents in Palestine: Randomized control trial', Eastern Mediterranean Health Journal, 24(6), pp. 560–568. doi:10.26719/2018.24.6.560.

Ministry of Health (2016) Guidelines for the Prevention and Management of Anemia in adolescent girls and women of childbearing age. Jakarta: Directorate General of Public Health, Ministry of Health.

Ministry of Health of the Republic of Indonesia (2016) 'Guidelines for the prevention and management of

Commented [A5]: Use reference management,
Check again:
- Minimum bibliography 20.
- At least 80% of the bibliography is INTERNATIONAL JOURNAL ARTICLES
- Make sure the article bibliography exists: author's name, year, article title, journal name, no/volume
- add citations from UNNES KEMAS journals

anemia in adolescent girls and WUS', Directorate of Community Nutrition, p. 97.

Kusmiyati, Y., Meilani, N. and Ismail, S. (2013) 'Hemoglobin Levels and Children's Intellectual Intelligence Hemoglobin Level and Intelligence Quotient of Children', National Journal of Public Health, 8(3), pp. 115–118.

Lestari, H. (no date) Sexual and Reproductive Health Universal Access to Sexual and Reproductive Health Services: Profile of Indonesia. Women's Health Foundation.

Nikfallah, F. et al. (2017) 'Acceptance Rate of Iron-aid Program and its Effective Factors among Girl Students', International Journal of Nursing Papers, 2(1), pp. 1–5. Available at: www.scigatejournals.comhttp://scigatejournals.com/publications/index.php/ijnp.

Patil, SN, Wasnik, V. and Wadke, R. (2009) 'Health problems amongst adolescent girls in rural areas of Ratnagiri District of Maharashtra India', Journal of Clinical and Diagnostic Research, 3(5), pp. 1784–1790.

Reid, SE, Reid, CA and Vermund, SH (2004) 'Antiretroviral therapy in sub-Saharan Africa: Adherence lessons from tuberculosis and leprosy', International Journal of STD and AIDS, 15(11), pp. 713–716. doi: 10.1258/0956462042395195.

Soekarjo, DD et al. (2004) 'Effectiveness of weekly vitamin A (10 000 IU) and iron (60 mg) supplementation for adolescent boys and girls through schools in rural and urban East Java, Indonesia', European Journal of Clinical Nutrition, 58(6), pp . 927–937. doi: 10.1038/sj.ejcn.1601914.

Sriasih, N. and et al (2013) 'The Influence of Adolescent Sexuality Education by Peer Educators on Adolescent Knowledge and Attitudes About the Dangers of Free Sex Ngk Sriasih 1 , NW Ariyani 2 , Juliana Mauliku 3 , AA Wife Dalem Cinthya Riris 4', Husada Scale Journal, 10(1), pp. 13–19.

V., SM and Jacob, SA (2017) 'Adherence to weekly iron and folic acid supplementation among the school students of Thrissur corporation – a cross sectional study', International Journal Of Community Medicine And Public Health, 4(5), p. 1689. doi:10.18203/2394-6040.ijcmph20171785.

WHO (2019) WHO Recommendations on Adolescent Sexual and Reproductive Health and Rights. World Health Organization.

Zhang, H. et al. (2016) 'Impact of community-based DOT on tuberculosis treatment outcomes: A systematic review and meta-analysis', PLoS ONE, 11(2), pp. 1–19. doi: 10.1371/journal.pone.0147744.

HASIL REVISI DARI PENULIS

Effectiveness of Directly Observed Treatment (DOT) for Iron Tablet Supplements Consumption Among Female Senior High School Students

Niken Meilani[1], Nanik Setiyawati[1]
[1]Poltekkes Kemenkes Yogyakarta, Department of Midwifery, Yogyakarta, Indonesia

Commented [A6]: Naskah dikirim dalam bentuk word biasa tidak perlu dalam dua lajur

Commented [A7R6]: Jumlah kata maksimam 4000 kata , jika melebihi maka biaya proofread akan dibebankan kepada penulis

Sudah direvisi: daftar kata selain daftar pustaka sudah kurang dari 4000

Commented [A8]: Maksimal kata pada abstrak 200
Sudah direvisi: tepat 200

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 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 is peers as DOT and the control group is 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 as 51.4% before giving the iron tablets to 34.3% after the tablets were given. The implementation DOT in the consumption of iron tablets in the teacher group showed that non-adherence to drinking iron tablet only 2.9% and by peers up to 31.4%. Observed by teacher showed that an effect on the difference in Hemoglobin levels before and after treatment with p=0.037 and peer as observed with p=0.247.

Keywords: Anemia, peer, teachers, adolescents

Introduction

Adolescents 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 periods of life towards reproductive health problems such as anemia. The incidence of anemia is still high. Based on Riskesdas 2018 showed that prevalence of anemia among females adolescents more than 15 years old is about 48.9% (Indonesian Ministry of Health, 2018).

Female adolescents is the vulnerable groups towards nutritional deficiencies, including anemia. Anemia among female can cause by heavy blooding during menstruation. Female adolescent who had anemia are at risk of developing anemia during pregnancy. This is a negative impact on the growth and development of the fetus during pregnancy and potential to cause complications in pregnancy and labor, and even cause the 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 main causes of maternal death are pre-eclampsia and eclampsia (32.4%) and postpartum hemorrhage (20.3%). A previous study suggest 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 related to low birth weight (Oktriyanto *et al.*, 2022). Therefore, it is necessary for a 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 in 1989, stated that efforts to solve adolescent health problems were needed. This period is quite crucial considering that adolescence is a process of physical, psychological and behavioral changes that greatly 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, anemia prevention among adolescents are focused on promotion and prevention activities, such as increasing the consumption of iron-rich foods, supplementing

iron supplement tablets and increasing fortification of foodstuffs with iron and folic acid. Professional and the private sector are expected to contribute to supporting this comprehensive activities. The successful of prevention and control of anemia among female adolescent requires SMART (Specific, Measurable, Attainable, Relevant, Timely) management support. Behavior change intervention starts from providing the 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 adolescent. For example, a study in Iran reported that there were still 24.6% of adolescents didn't consume the iron tablet. Some of the reasons given were 41% said they forgot, 28.2% gave reasons related to the side effects they felt and several other reasons (Nikfallah et al., 2017).

Previous study in India also reported that female adolescent that the adherence to consume iron tablets was still low. For 6 months, it was found the adherence to consume iron tablet many as 36.3% of female adolescents (V. and Jacob, 2017). The low adherence to consume of iron tablet requires to build a 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 will likely be a component of any comprehensive HIV program. Family, friend can play the role of 'buddy', 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 burden, because it is cost-effective and acceptable (Zhang et al., 2016). The previous disease such as Tuberculosis and HIV treatment and proof that DOT was considered effective (Hassard, Ronald and Angella, 2017). Previous studies was 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 tablet in schools, the involvement of companions is from friends and teachers (Ministry of Health RI, 2016).

The role of friends/ peer is considered important based on the results of previous research. The role of peer/ friends is very important in providing information to adolescents and also as a 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 and et al, 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 important in this program (Hull, Hasmi and Widyantoro, 2004).

The aims of this study is to know the effectiveness of implementation of DOT for iron tablet supplementation among senior high female students by peer educators and guidance counseling teacher on adherence to consume iron tablets 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 tablet in increasing the hemoglobin levels among female adolescents. This research used behavioral science according to the Procede Precede theory approached (Green, 2000).

In this study, what was investigated was the DOT for iron tablets on increasing the Hemoglobin levels of high school students after given iron tablets with the brand Fermia consist of: Fumarate 60 mg, Folic acid 0.25 mg, Vitamin B6 37.5 mg. DOT implementing by peer and teacher.

Peers and teachers were given 12 tablets and a control card for each respondent. Both of these buddy/ accompanying person have been trained using the same module. This research was conducted at SMA 1 Gamping Sleman and SMA 1 Kasihan Bantul from July to October 2019. Ethical clearance this study from ethical commitee 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, so the samples of this study was 70 respondents. The inclusion criteria in this study were students who were willing to be respondents and were willing 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 levels measure with a digital hemoglobin measuring device both in the pre and post-tests.

The treatment was carried out for 12 weeks.The analysis used is univariate andbivariate. 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 consume iron tablets 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 as the role of peer educator and SMA 1 Kasihan Bantul as the the rule of experiment group. These are two schools did not yet have a program for iron tablets from the government at the time of the research. In this study, peer and teacher give 1 tablet to female students every week. In practice, the teacher provides assistance by asking students to drink iron tablets in front of the teacher and then the teacher fill 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 side effects.

This study was followed by 70 respondents who had signed the consent and also their parents/guardians. This research was conducted for 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.

Variable	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

Commented [A9]: Dibawah setiap table sebutkan sumbernYa
Sudah ditambahkan

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 of the 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

Variable	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 greater at 51.4%. After 12 weeks of 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 of compliance showed that some of the companions who drank iron tablet were obedient to drinking 12 items given one item per week by 68.6% and those who were accompanied by teachers were 97.1%. Compliance was lower in 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

Group		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

In table 3, showed that in peer group there was no difference in hemoglobin levels before and after the study with p value = 0.247. Meanwhile, in the teacher group, it was known that 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

In table 4 showed 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 of this study also showed that the anemia rate was still quite 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, it was found that the 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 that 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 to 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). High intake of vitamin C has an effect on the absorption of iron intake in the body. Another studies stated t**here was 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 the adherence to consume iron tablets is better in the guidance counselling teachers group compared to the peers group. The proportion of non-compliance of drinking iron tablet in the peer group was 31.4%. This result showed that the teacher's role is more that pursuing but also control and accompanying the students at the time they consume the iron tablet. And as a friends, peer feel more comfort, closed and not to give a compulsion to consume the iron tablet. Peer only share the iron tablet and ask the friends to drink as soon as possible or at night if they have any doubt or side effect. The peer only record in their notebooks even their friends deny to consume iron tablet in front of them. Peers cannot replace teachers in their role in providing knowledge about reproductive health also in this role as DOT for iron tablet consumption. Teachers had a major role in the world of education, this 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 consume iron tablets for 12 weeks towards hemoglobin levels before and after treatment. The role of the guidance and counsellor teacher cannot be replaced by the presence of a peer, so

that these two roles can be carried out together to be more optimal. Consumption of iron tablets is very important 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 important including teachers and synergizing with peers, also as well as the role of parents in reducing the incidence of anemia.

References

Derso, T., Abera, Z. and Tariku, A. (2017) 'Magnitude and associated factors of anemia among pregnant women in Dera District: A cross-sectional study in northwest Ethiopia', *BMC Research Notes*. BioMed Central, 10(1), pp. 1–8. doi: 10.1186/s13104-017-2690-x.

Finkelstein, J. L. *et al.* (2018) 'Daily iron supplementation for prevention or treatment of iron deficiency anaemia in infants, children, and adolescents', *Cochrane Database of Systematic Reviews*, 2018(12). doi: 10.1002/14651858.CD013227.

Green, L. (2000) *Health Promotion Planning An Educational and Environmental Approach*. Toronto - London: Mayfield Publishing Company.

Hassard, S., Ronald, A. and Angella, K. (2017) 'Patient attitudes towards community-based tuberculosis DOT and adherence to treatment in an urban setting; Kampala, Uganda', *Pan African Medical Journal*, 27, pp. 1–6. doi: 10.11604/pamj.2017.27.1.11119.

Hatami, M., Kazemi, A. and Mehrabi, T. (2015) 'Effect of peer education in school on sexual health knowledge and attitude in girl adolescents.', *Journal of education and health promotion*, 4, p. 78. doi: 10.4103/2277-9531.171791.

Helliyana, H., Aritonang, E. Y. and Sanusi, S. R. (2019) 'The Associations between Maternal Education, Chronic Energy Deficit, and Anemia in Pregnant Women: An Evidence from Lhokseumawe, Indonesia', *Journal of Maternal and Child Health*, 4(5), pp. 302–306. doi: 10.26911/thejmch.2019.04.05.02.

Hull, T. H., Hasmi, E. and Widyantoro, N. (2004) '"Peer" educator initiatives for adolescent reproductive health projects in Indonesia', *Reproductive Health Matters*, 12(23), pp. 29–39. doi: 10.1016/S0968-8080(04)23120-2.

Huriah, T; Nisma, H. (2008) 'The Influence of Reproductive Health Education by Peer Groups on Knowledge of Reproductive Health in SMP Negeri 2 Kasihan Bantul Yogyakarta', Mutiara Medika, 8(2), pp. 89–96.

Hurlock EB (2009) Developmental Psychology An Approach throughout the Life Span. Jakarta: Erlangga.

Jalambo, M. et al. (2018) 'Effects of iron supplementation and nutrition education on hemoglobin, ferritin and oxidative stress in iron-deficient female adolescents in Palestine: Randomized control trial', Eastern Mediterranean Health Journal, 24(6), pp. 560–568. doi:10.26719/2018.24.6.560.

Ministry of Health (2016) Guidelines for the Prevention and Management of Anemia in adolescent girls and women of childbearing age. Jakarta: Directorate General of Public Health, Ministry of Health.

Ministry of Health of the Republic of Indonesia (2016) 'Guidelines for the prevention and management of anemia in adolescent girls and WUS', Directorate of Community Nutrition, p. 97.

Kusmiyati, Y., Meilani, N. and Ismail, S. (2013) 'Hemoglobin Levels and Children's Intellectual Intelligence Hemoglobin Level and Intelligence Quotient of Children', National Journal of Public Health, 8(3), pp. 115–118.

Commented [A10]: Use reference management,
Check again:
- Minimum bibliography 20.
- At least 80% of the bibliography is INTERNATIONAL JOURNAL ARTICLES
- Make sure the article bibliography exists: author's name, year, article title, journal name, no/volume
- add citations from UNNES KEMAS journals

Sudah direvisi dan ditambahkan

Lestari, H. (no date) Sexual and Reproductive Health Universal Access to Sexual and Reproductive Health Services: Profile of Indonesia. Women's Health Foundation.

Nikfallah, F. et al. (2017) 'Acceptance Rate of Iron-aid Program and its Effective Factors among Girl Students', International Journal of Nursing Papers, 2(1), pp. 1–5. Available at: www.scigatejournals.comhttp://scigatejournals.com/publications/index.php/ijnp.

Patil, SN, Wasnik, V. and Wadke, R. (2009) 'Health problems amongst adolescent girls in rural areas of Ratnagiri District of Maharashtra India', Journal of Clinical and Diagnostic Research, 3(5), pp. 1784–1790.

Reid, SE, Reid, CA and Vermund, SH (2004) 'Antiretroviral therapy in sub-Saharan Africa: Adherence lessons from tuberculosis and leprosy', *Mutiara Medika*, 8(2), pp. 89–96.

Jalambo, M. *et al.* (2018) 'Effects of iron supplementation and nutrition education on haemoglobin, ferritin and oxidative stress in iron-deficient female adolescents in Palestine: Randomized control trial', *Eastern Mediterranean Health Journal*, 24(6), pp. 560–568. doi: 10.26719/2018.24.6.560.

Kemenkes (2016) *Pedoman Pencegahan dan Penanggulangan Anemia pada remaja putri dan Wanita Usia Subur*. Jakarta: Direktorat Jenderal Kesehatan Masyarakat Kemenkes.

Kementerian Kesehatan Republik Indonesia (2018) *Laporan Nasional Riset Kesehatan Dasar 2018*, *Kementerian Kesehatan RI*.

Kementerian Kesehatan RI (2016) 'Pedoman pencegahan dan penanggulanngan anemia pada remaja putri dan WUS', *Direktorat Gizi Masyarakat*, p. 97.

Kusmiyati, Y., Meilani, N. and Ismail, S. (2013) 'Kadar Hemoglobin dan Kecerdasan Intelektual Anak Hemoglobin Level and Intelligence Quotient of Children', *Jurnal Kesehatan Masyarakat Nasional*, 8(3), pp. 115–118.

Mansour, D., Hofmann, A. and Gemzell-Danielsson, K. (2021) 'A Review of Clinical Guidelines on the Management of Iron Deficiency and Iron-Deficiency Anemia in Women with Heavy Menstrual Bleeding', *Advances in Therapy*, 38(1), pp. 201–225. doi: 10.1007/s12325-020-01564-y.

Mishra, A. *et al.* (2021) 'A Cross-Sectional Study of Barriers in Prevention of Anemia in Pregnancy', *Cureus*, 13(1), pp. 1–10. doi: 10.7759/cureus.12802.

Nikfallah, F. *et al.* (2017) 'Acceptance Rate of Iron-aid Program and its Effective Factors among Girl Students', *International Journal of Nursing Papers*, 2(1), pp. 1–5.

Nurjanah, F. W., Hadisaputro, S. and Fatmasari, D. (2020) 'Long Bean Leaf Extract for Improving Haematological Status of Female Adolescent with Anemia that Gets Fe Supplementation', *Jurnal Kesehatan Masyarakat*, 16(1), pp. 81–87. doi: 10.15294/kemas.v16i1.23203.

Oktriyanto *et al.* (2022) 'Determinants of Low Birth Weight in Indonesia', *Jurnal Kesehatan Masyarakat*, 17(4), pp. 583–593. doi: https://doi.org/10.15294/ kemas.v17i4.33365.

Omotayo, M. O. *et al.* (2021) 'Prenatal anemia and postpartum hemorrhage risk: A systematic review and meta-analysis', *Journal of Obstetrics and Gynaecology Research*, 47(8), pp. 2565–2576. doi: 10.1111/jog.14834.

Patil, S. N., Wasnik, V. and Wadke, R. (2009) 'Health problems amongst adolescent girls in rural areas of Ratnagiri District of Maharashtra India', *Journal of Clinical and Diagnostic Research*, 3(5), pp. 1784–1790.

Pit-Ten Cate, I. M. *et al.* (2018) 'Promoting Inclusive Education: The Role of Teachers' Competence and

Attitudes', *Insights into Learning Disabilities*, 15(1), pp. 49–63. Available at: www.ldworldwide.org.

Reid, S. E., Reid, C. A. and Vermund, S. H. (2004) 'Antiretroviral therapy in sub-Saharan Africa: Adherence lessons from tuberculosis and leprosy', *International Journal of STD and AIDS*, 15(11), pp. 713–716. doi: 10.1258/0956462042395195.

Seaharattanapatum, B. *et al.* (2020) 'Effectiveness of Balanced Diet-Iron Supplement Program among Pregnant Women with Anemia : A Quasi-Experimental Study', (4), pp. 4–9.

Soekarjo, D. D. *et al.* (2004) 'Effectiveness of weekly vitamin A (10 000 IU) and iron (60 mg) supplementation for adolescent boys and girls through schools in rural and urban East Java, Indonesia', *European Journal of Clinical Nutrition*, 58(6), pp. 927–937. doi: 10.1038/sj.ejcn.1601914.

Sriasih, N. and Dkk (2013) 'The Influence of Adolescent Sexuality Education by Peer Educators on Adolescent Knowledge and Attitudes About the Dangers of Free Sex', *Jurnal Skala Husada*, 10(1), pp. 13–19.

V., S. M. and Jacob, S. A. (2017) 'Adherence to weekly iron and folic acid supplementation among the school students of Thrissur corporation – a cross sectional study', *International Journal Of Community Medicine And Public Health*, 4(5), p. 1689. doi: 10.18203/2394-6040.ijcmph20171785.

Wahyurin, I. S. and Rahmah, H. A. (2021) 'Amount of Menstrual Blood and Nutrient Intake with Hemoglobin Level', *Jurnal Kesehatan Masyarakat*, 17(1), pp. 31–36. doi: https://doi.org/10.15294/kemas.v17i1.24540.

WHO (2019) *WHO Recommendations on Adolescent Sexual and Reproductive Health and Rights*. World Health Organization.

Zhang, H. *et al.* (2016) 'Impact of community-based DOT on tuberculosis treatment outcomes: A systematic review and meta-analysis', *PLoS ONE*, 11(2), pp. 1–19. doi: 10.1371/journal.pone.0147744.

ETHICAL CLEARANCE

KOMISI ETIK PENELITIAN KESEHATAN
POLITEKNIK KESEHATAN KEMENKES YOGYAKARTA
Jl. Tatabumi No. 3, Banyuraden, Gamping, Sleman, D.I. Yogyakarta Telp./Fax. (0274) 617601
email : kepk@poltekkesjogja.ac.id

KETERANGAN LAYAK ETIK

DESCRIPTION OF ETHICAL EXEMPTION

No. e-KEPK/POLKESYO/0101/V/2019

Protokol penelitian yang diusulkan oleh :
The research protocol proposed by

Peneliti Utama : Niken Meilani
Principal in Investigator

Nama Institusi : Poltekkes Kemenkes Yogyakarta
Name of the Institution

Dengan judul:
Title

" EFEKTIVITAS *PEER EDUCATOR* DALAM MENINGKATKAN PENGETAHUAN TENTANG KESEHATAN REPRODUKSI DAN PENURUNAN KEJADIAN ANEMIA PADA SISWI SMA DI YOGYAKARTA "

"THE EFFECTIVENESS OF PEER EDUCATORS IN IMPROVING KNOWLEDGE OF REPRODUCTIVE HEALTH AND DECREASING ANEMIA EVENTS IN SISWI HIGH SCHOOL IN YOGYAKARTA"

Dinyatakan layak etik sesuai 7 (tujuh) Standar WHO 2011, yaitu 1) Nilai Sosial, 2) Nilai Ilmiah, 3) Pemerataan Beban dan Manfaat, 4) Risiko, 5) Bujukan/Eksploitasi, 6) Kerahasiaan dan Privacy, dan 7) Persetujuan Setelah Penjelasan, yang merujuk pada Pedoman CIOMS 2016. Hal ini seperti yang ditunjukkan oleh terpenuhinya indikator setiap standar.

Declared to be ethically appropriate in accordance to 7 (seven) WHO 2011 Standards, 1) Social Values, 2) Scientific Values, 3) *Equitable Assessment and Benefits, 4) Risks, 5) Persuasion/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Concent, referring to the 2016 CIOMS Guidelines. This is as indicated by the fulfillment of the indicators of each standard.*

Pernyataan Laik Etik ini berlaku selama kurun waktu tanggal 28 Mei 2019 sampai dengan tanggal 28 Mei 2020.

This declaration of ethics applies during the period May 28, 2019 until May 28, 2020.

May 28, 2019
Professor and Chairperson,

Ketua KEPK,

KOMISI ETIK PENELITIAN KESEHATAN

DR. Tri Siswati, SKM, M.Kes.

TURNITIN

Kemas Jan 2023

by Niken Meilani

Submission date: 26-Apr-2023 03:36PM (UTC+0700)
Submission ID: 2075962049
File name: 1._Januari_Artikel_Kemas_Niken_Meilani.pdf (285.17K)
Word count: 4407
Character count: 23617

KEMAS 18 (3) (2023) 375-382

Jurnal Kesehatan Masyarakat

http://journal.unnes.ac.id/nju/index.php/kemas

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

Niken Meilani✉, Nanik Setiyawati

Poltekkes Kemenkes Yogyakarta, Department of Midwifery, Yogyakarta, Indonesia

Article Info

Article History:
Submitted September 2022
Accepted November 2022
Published January 2023

Keywords:
Anemia, peer, teachers, adolescents

DOI
https://doi.org/10.15294/kemas.v18i3.38594

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

✉Correspondence Address:
Poltekkes Kemenkes Yogyakarta, Department of Midwifery, Yogyakarta, Indonesia
Email : -

pISSN 1858-1196
eISSN 2355-3596

(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; Hidayah, 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 Ferric 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.

References

Derso, T., Abera, Z., & Tariku, A., 2017. Magnitude and Associated Factors of Anemia Among Pregnant Women in Dera District: A Cross-sectional Study in Northwest Ethiopia. *BMC Research Notes*, 10(1), pp.1–8.

Finkelstein, J.L., Herman, H.S., Guetterman, H.M., Pena-Rosas, J.P., & Mehta, S., 2018. Daily Iron Supplementation for Prevention or Treatment of Iron Deficiency Anaemia in Infants, Children, and Adolescents. *Cochrane Database of Systematic Reviews*, 2018(12).

Green, L., *2000 Health Promotion Planning An Educational and Environmental Approach*. Toronto- London: Mayfield Publishing Company.

Hassard, S., Ronald, A., & Angella, K., 2017. Patient Attitudes Towards Community-based Tuberculosis DOT and Adherence to Treatment in an Urban Setting; Kampala, Uganda'. *Pan African Medical Journal*, 27, pp.1–6.

Hatami, M., Kazemi, A., & Mehrabi, T., 2015. Effect of Peer Education in School on Sexual Health Knowledge and Attitude in Girl Adolescents. *Journal of Education and Health Promotion*, 4, pp.78.

Helliyana, H., Aritonang, E.Y., & Sanusi, S.R., 2019. The Associations between Maternal Education, Chronic Energy Deficit, and Anemia in Pregnant Women: An Evidence from Lhokseumawe, Indonesia', *Journal of Maternal and Child Health*, 4(5), pp.302–306.

Hull, T.H., Hasmi, E., & Widyantoro, N., 2004. "Peer" Educator Initiatives for Adolescent Reproductive Health Projects in Indonesia. *Reproductive Health Matters*, 12(23), pp.29–39.

Huriah, T., & Nisma, H., 2008. The Influence of Reproductive Health Education by Peer Groups on Knowledge of Reproductive Health in SMP Negeri 2 Kasihan Bantul Yogyakarta. *Mutiara Medika*, 8(2), pp.89–96.

Hurlock, E.B., 2009. *Developmental Psychology An Approach throughout the Life Span*. Jakarta: Erlangga.

Jalambo, M., Karim, N., Naser, I., & Sharif, R., 2018. Effects of Iron Supplementation and Nutrition Education on Hemoglobin, Ferritin and Oxidative Stress in Iron-deficient Female Adolescents in Palestine: Randomized Control Trial. *Eastern Mediterranean Health Journal*, 24(6), pp.560–568.

Ministry of Health., 2016. *Guidelines for the Prevention and Management of Anemia in Adolescent Girls and Women of Childbearing Age.* Jakarta: Directorate General of Public Health, Ministry of Health.

Ministry of Health of the Republic of Indonesia., 2016. Guidelines for the Prevention and Management of Anemia in Adolescent Girls and WUS. *Directorate of Community Nutrition*, pp.97.

Kusmiyati, Y., Meilani, N., & Ismail, S., 2013. Hemoglobin Levels and Children's Intellectual Intelligence Hemoglobin Level and Intelligence Quotient of Children. *National Journal of Public Health*, 8(3), pp. 115–118.

Lestari, H., 2012. Sexual and Reproductive Health Universal Access to Sexual and Reproductive Health Services: Profile of Indonesia. *Women's Health Foundation*.

Nikfallah, F., Taslimi, S., Shaahmadi, F., & Jalilian, D., 2017. Acceptance Rate of Iron-aid Program and its Effective Factors among Girl Students. *International Journal of Nursing Papers*, 2(1), pp.1–5.

Patil, S.N., Wasnik, V., & Wadke, R., 2009. Health Problems Amongst Adolescent Girls in Rural Areas of Ratnagiri District of Maharashtra India. *Journal of Clinical and Diagnostic Research*, 3(5), pp.1784–1790.

Reid, S.E., Reid, C.A., & Vermund, S.H., 2004. Antiretroviral Therapy in Sub-Saharan Africa: Adherence Lessons from Tuberculosis and Leprosy. *Mutiara Medika*, 8(2), pp.89–96.

Jalambo, M., Karim, N., Naser, I., & Sharif, R., 2018. Effects of Iron Supplementation and Nutrition Education on Haemoglobin, Ferritin and Oxidative Stress in Iron-deficient Female Adolescents in Palestine: Randomized Control Trial. *Eastern Mediterranean Health Journal*, 24(6), pp.560–568.

Kemenkes., 2016 *Pedoman Pencegahan dan Penanggulangan Anemia pada Remaja Putri dan Wanita Usia Subur.* Jakarta: Direktorat Jenderal Kesehatan Masyarakat Kemenkes.

Kementerian Kesehatan Republik Indonesia., 2018. Laporan Nasional Riset Kesehatan Dasar 2018, *Kementerian Kesehatan RI.*

Kementerian Kesehatan RI., 2016. Pedoman Pencegahan dan Penanggulanngan Anemia pada Remaja Putri dan WUS. *Direktorat Gizi Masyarakat*, pp. 97.

Kusmiyati, Y., Meilani, N., & Ismail, S., 2013. Kadar Hemoglobin dan Kecerdasan Intelektual Anak Hemoglobin Level and Intelligence Quotient of Children. *Jurnal Kesehatan Masyarakat Nasional*, 8(3), pp.115–118.

Mansour, D., Hofmann, A., & Gemzell-Danielsson, K., 2021. A Review of Clinical Guidelines on the Management of Iron Deficiency and Iron-Deficiency Anemia in Women with Heavy Menstrual Bleeding. *Advances in Therapy,* 38(1), pp.201–225.

Mishra, A., Marwah, S., Divedi, P., Dewan, R., & Ahluwalia, H., 2021. A Cross-Sectional Study of Barriers in Prevention of Anemia in Pregnancy. *Cureus,* 13(1), pp.1–10.

Nikfallah, F., Taslimi, S., Shaahmadi, F., & Jalilian, D., 2017. Acceptance Rate of Iron-aid Program and its Effective Factors among Girl Students. *International Journal of Nursing Papers*, 2(1), pp.1–5.

Nurjanah, F.W., Hadisaputro, S., & Fatmasari, D., 2020. Long Bean Leaf Extract for Improving Haematological Status of Female Adolescent with Anemia that Gets Fe Supplementation. *Jurnal Kesehatan Masyarakat,* 16(1), pp.81–87.

Oktriyanto., Rahardja, M.B., Amrullah, H., Pujihasvuty, R., & P, N.M.M., 2022. Determinants of Low Birth Weight in Indonesia. *Jurnal Kesehatan Masyarakat,* 17(4), pp.583–593.

Omotayo, M.O., Abioye, A., Kuyebi, M., Eke, A.C., 2021. Prenatal Anemia and Postpartum Hemorrhage Risk: A Systematic Review and Meta-analysis. *Journal of Obstetrics and Gynaecology Research,* 47(8), pp.2565–2576.

Patil, S.N., Wasnik, V., & Wadke, R., 2009. Health Problems Amongst Adolescent Girls in Rural Areas of Ratnagiri District of Maharashtra India. *Journal of Clinical and Diagnostic Research*, 3(5), pp.1784–1790.

Pit-Ten, C.I.M., Mariya, M., Mireille, K., Sabine, K-S., 2018. Promoting Inclusive Education: The Role of Teachers' Competence and Attitudes. *Insights into Learning Disabilities,* 15(1), pp.49–63.

Reid, S.E., Reid, C.A., & Vermund, S.H., 2004. Antiretroviral Therapy in Sub-Saharan Africa: Adherence Lessons from Tuberculosis and Leprosy. *International Journal of STD and AIDS,* 15(11), pp.713–716.

Seaharattanapatum, B., Sinsuksai, N., Phumonsakul, S., Chansatitporn, N., 2020. Effectiveness of Balanced Diet-Iron Supplement Program among Pregnant Women with Anemia: A Quasi-Experimental Study. *Pacific Rim International Journal of Nursing Research,* (4), pp. 4–9.

Soekarjo, D.D., Sd, S.P., Kusin, J.A., Schreurs, W.H.P.,

Schultink, W., Muhilal., & Bloem, M.W., 2004. Effectiveness of Weekly Vitamin A (10 000 IU) and Iron (60 mg) Supplementation for Adolescent Boys and Girls Through Schools in Rural and Urban East Java, Indonesia. *European Journal of Clinical Nutrition*, 58(6), pp.927–937.

Sriasih, N., 2013. The Influence of Adolescent Sexuality Education by Peer Educators on Adolescent Knowledge and Attitudes About the Dangers of Free Sex. *Jurnal Skala Husada*, 10(1), pp.13–19.

V., S.M., & Jacob, S.A., 2017. Adherence to Weekly Iron and Folic Acid Supplementation Among the School Students of Thrissur Corporation–a Cross Sectional Study. *International Journal Of Community Medicine And Public Health*, 4(5), pp.1689.

Wahyurin, I.S., & Rahmah, H.A., 2021. Amount of Menstrual Blood and Nutrient Intake with Hemoglobin Level. *Jurnal Kesehatan Masyarakat*, 17(1), pp.31–36.

WHO., 2019. WHO Recommendations on Adolescent Sexual and Reproductive Health and Rights. *World Health Organization.*

Zhang, H., Ehiri, J., Yang, H., Tang, S., & Li, Y., 2016. Impact of Community-Based DOT on Tuberculosis Treatment Outcomes: A Systematic Review and Meta-Analysis. *PLoS One*, 11(2), pp.1–19.

Kemas Jan 2023

ORIGINALITY REPORT

24%	19%	22%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	edulearn.intelektual.org Internet Source	8%
2	media.neliti.com Internet Source	2%
3	garuda.kemdikbud.go.id Internet Source	2%
4	Reid, S E, C A Reid, and S H Vermund. "Antiretroviral therapy in sub-Saharan Africa: adherence lessons from tuberculosis and leprosy", International Journal of STD & AIDS, 2004. Publication	1%
5	ejurnalmalahayati.ac.id Internet Source	1%
6	www.ncbi.nlm.nih.gov Internet Source	1%
7	balimedicaljournal.org Internet Source	1%

8	Apri Sulistianingsih, Baiq Iin Rumintang, St Halimatusyaadiah, Lina Sundayani. "Independent Anemia Care Monitoring Card Improves Iron Tablets Compliance and Hemoglobin", Jurnal Aisyah : Jurnal Ilmu Kesehatan, 2022 Publication	1 %
9	Susilowati Susilowati, Radina Istiqomah, Gunawan Irianto, Ruhyandi Ruhyandi. "Comparison of the Effectiveness of Moringa Oleifera Leaf Powder Versus Extract on Hemoglobin Levels in Adolescent Girls: A Systematic Literature Review", KnE Medicine, 2022 Publication	1 %
10	Niken Meilani, Nanik Setiyawati. "The effectiveness of peer educators and guidance counselling teachers to the knowledge of reproductive health", Journal of Education and Learning (EduLearn), 2022 Publication	1 %
11	repository.stikim.ac.id Internet Source	1 %
12	www.stikes-bth.ac.id Internet Source	1 %
13	Michiyo Okada, Yoshihiro Nakadoi, Ai Fujikawa. "Relationship between self-rated	1 %

health and depression risk among children: Promoting school–medical care cooperation for child suicide prevention", Research Square Platform LLC, 2021
Publication

14	firstranker.com Internet Source	<1%
15	Meti Megawati, Asep Kuswandi. "KONSUMSI ZAT BESI TERHADAP KADAR HEMOGLOBIN REMAJA PUTRI", Media Informasi, 2018 Publication	<1%
16	Supriyatun Supriyatun. "Analysis The Causes Of Anemia In Pregnant Women", Jurnal Kebidanan Malahayati, 2022 Publication	<1%
17	www.cambridge.org Internet Source	<1%
18	www.tafpublications.com Internet Source	<1%
19	"VITAMIN C INTAKE AND MORTALITY", Nutrition Reviews, 2009 Publication	<1%
20	Juliana U Ojukwu, Joseph U Okebe, Dafna Yahav, Mical Paul. "Cochrane review: Oral iron supplementation for preventing or treating anaemia among children in malaria-endemic	<1%

areas", Evidence-Based Child Health: A Cochrane Review Journal, 2010
Publication

21	Michael Papadopoulos, Deepa Patel, Roxanna Korologou-Linden, Eunice Goto, Krishna Soondrum, John M. E. Fell, Jenny Epstein. "Safety and efficacy of parenteral iron in children with inflammatory bowel disease", British Journal of Clinical Pharmacology, 2018 Publication	<1 %
22	e-journal.poltekkesjogja.ac.id Internet Source	<1 %
23	repository.alraziuni.edu.ye Internet Source	<1 %
24	repository.poltekkesbengkulu.ac.id Internet Source	<1 %
25	www.lagipromo.com Internet Source	<1 %
26	Yulien Adam, Nurlita Naser, Anita Lontaan, Martha D Korompis et al. "Effectiveness Of Chicken Eggs (Pullum) Consumption On Hemoglobin Levels In Adolescent Women", Jurnal Kebidanan Malahayati, 2022 Publication	<1 %

Exclude quotes	On	Exclude matches	< 5 words
Exclude bibliography	On		