Is Health Education on Anemia Increasing Iron Supplementation Consumption in Adolescent Girls?: A Systematic Review

Berliana Farah Yanisah✉[1)], Sri Widati[1)]

[1] Division of Health Promotion and Behavioral Sciences, Faculty of Public Health, Universitas Airlangga Surabaya
✉Email: berlianaffarah07@gmail.com

ABSTRACT

***Background**: Approximately 1.62 billion people worldwide suffer from anemia, and about half of all anemia can result from iron deficiency. Adolescence is also considered the golden time for interventions to control anemia. It is also the right time to create a nutritional foundation for the labor of a child in the future. Nutrition education in schools has been shown to be effective in improving young people's knowledge, attitudes, and practices regarding anemia prevention. **Objectives**: This study aims to analyze the effects of iron supplementation and nutritional education on anemia in adolescent girls and the correlation with iron supplementation consumption so that anemia can be prevented as early as possible since adolescent **Discussion**: This study showed that health education on anemia increasing adolescents' knowledge and also weekly Iron-Folic Acid Supplementation (WIFS) with health education can be effective in reducing the prevalence of anemia in adolescent girls by increasing the Hb level. **Conclusions**: These studies conclude that nutritional education increased the level of knowledge, attitude, and practice of adolescent girls and also led to an increase in Hemoglobin levels which can prevent anemia. Health education on anemia increase knowledge and practice of iron supplementation among adolescent girl. Increasing knowledge and practice in consuming iron supplementation will also increase the level of hemoglobin.*
***Keywords**: Adolescent, Anemia, Health education, Iron supplementation.*

INTRODUCTION

Approximately 1.62 billion people worldwide suffer from anemia, and about half of all anemia can result from iron deficiency(McLean *et al.*, 2009). Children, pregnant women, and women of childbearing age are severely affected. The number of non-pregnant women of childbearing potential affected by anemia increased globally from 464 million in 2000 to 578 million in 2016(WHO, 2018). Africa and Asia are the most affected, with a prevalence of over 35%, so more efforts are needed to contain the problem. In developing countries, anemia is a major public health problem not only for pregnant women and children, but also for adolescent girls(Sari, Herawati, Dhamayanti and Hilmanto, 2022). Adolescence, the transition to adulthood, is characterized by intense growth leading to the behavioral and sexual maturity of the individual. It is the second growth spurt of life when girls go through various experiences. Adolescents have an increased need for food, especially iron.

Adolescence is also considered the golden time for interventions to control anemia. It is also the right time to create a nutritional foundation for the labor of a child in the future(Kamalaja, Prashanthi and Rajeswari, 2018). The thing that makes young women vulnerable to anemia is menstruation that occurs every month. Adolescent girls who suffer from anemia are at risk of developing anemia during pregnancy. This will have a negative impact on the growth and development of the fetus in the womb-like appears to increase the risks of stunting premature delivery, low birth weight, and infant death,(Means, 2020) and has the potential to cause complications in pregnancy and childbirth, and even cause the death of mother and child(Abu-Ouf and Jan, 2015). According to the World Health Organization (WHO), the world prevalence of anemia ranges from 40-88% and the incidence of anemia in young women in developing countries is around 53.7%(Kemenkes, 2018).

One of the developing countries

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that still suffer from anemia is Indonesia. Anemia among Indonesian women of childbearing age (15-49 years) increased from 21.6% in 2018 to 22.3% in 2019(Sari, Herawati, Dhamayanti and Hilmanto, 2022). Anemia is characterized by an absence of functional hemoglobin. Anemia is estimated to affect about a quarter of the world's population and is more common in young children and women of childbearing age. Anemia has serious health consequences and is a major contributor to the global burden of disease(Kassebaum *et al.*, 2014). Anemia is a direct indicator of malnutrition and dietary iron deficiency and is a serious public health problem for adolescent girls. Adolescent girls are more susceptible to iron deficiency and anemia due to increased growth, reduced dietary iron absorption, low dietary iron bioavailability, and higher incidence of infections, parasitic infections, and menstrual bleeding. Iron deficiency anemia is more common in adolescent girls than in adolescent boys. (This is due to excess iron loss during menstruation(Juffrie, Helmyati and Hakimi, 2020). In addition, the risk of anemia in adolescent girls is increased by illiteracy, ignorance, and lack of knowledge about iron deficiency(Habeeb, 2018)(van Zutphen, Kraemer and Melse-Boonstra, 2021).

A weekly iron supplementation is a preventive approach aimed at improving and maintaining a woman's iron status before pregnancy and preventing anemia during pregnancy. Regulation of the Minister of Health of Indonesia number 88 of 2014 on standards for blood addition tablets for women of pregnant age and pregnant mothers stipulates that blood supplement tablets for women of childbearing age are given once a week and once a week. Women of childbearing age are given 1 (one) time a week and 1 (one) time a day during menstruation so that in one year women of childbearing age consume approximately 52 blood supplements.

According to the 2018 Basic Health Research by the Ministry of Health of the Republic of Indonesia, it was found that adolescent girls who consumed blood supplement tablets <52 grains amounted to 98.6%, while adolescent girls who consumed blood supplement tablets ≥ 52 grains only amounted to 1.4%. Blood supplement tablets have been routinely distributed to junior and senior high school girls. However, there are still female students who do not take the blood supplement tablets because they feel nauseous, do not like the smell of tablets, are afraid of the side effects of blood supplement tablets, and so on. This can occur because the knowledge of adolescent girls may be still lacking regarding the consumption of blood-added tablets. Because there are still adolescent girls who have less knowledge about blood-added tablets and are not compliant in consuming them(Saridewi *et al.*, 2019).

Therefore, health education is needed to increase the knowledge, attitudes, and actions of young women regarding the consumption of iron tablets in order to prevent anemia(Angadi and Mahabalaraju, 2016). Moreover, nutrition education is a long-term strategy as it builds good nutritional status(Sharma *et al.*, 2020). A community-based intervention study in India was conducted with 300 adolescent girls aged 13-17 years who were evenly divided into intervention and control groups. The anemia nutrition education program was conducted only for her 4 months in the intervention group. Results showed a significant positive effect on hemoglobin levels in the intervention group and her KAP score status(Kamalaja, Prashanthi and Rajeswari, 2018).

Similarly, a randomized controlled trial (RCT) was conducted in the Gaza Strip, Palestine, in which 89 girls aged 15-19 years were divided into control and intervention groups. In the intervention group, she participated in nutrition education lectures for 3 months. Pre-test and post-test results showed scores for good knowledge and positive attitudes, with significantly improved acceptance of preferred practices in the intervention group(Jalambo *et al.*, 2017). In Ethiopia, a cross-sectional, community-based study was conducted with 1,323 girls. Ages 10-19. Self-reported, less than half of the sample knew anything about anemia, and approximately one-third knew about the association between iron-rich dietary intake and anemia(Endris *et al.*, 2022).

This study aims to analyze the effects of iron supplementation and nutritional education on anemia in adolescent girls and the correlation with

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iron supplementation consumption so that anemia can be prevented as early as possible since adolescence.

METHODS

A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guideline to identify research on the association between health education on anemia with iron supplementation consumption. The search was conducted in PubMed, Wiley Online Library, and DOAJ with several inclusion criteria; cross-sectional study, human studies junior high school and senior high school students published in English, between 2018 to 2023, p-value and methods were described. The search terms were 'Iron Supplementation', 'Anemia', 'Health education', and 'Adolescent'. Studies with respondents who is a pregnant woman were excluded from this systematic review.

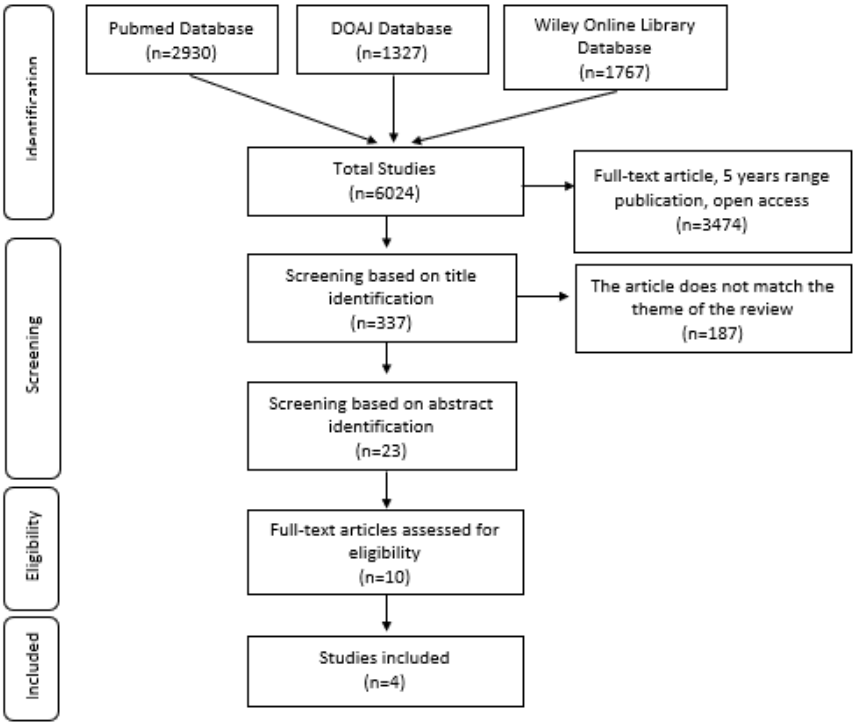

Figure 1. Flow of method.

RESULTS AND DISCUSSION

Table 1. Result of research.

No.	Study References	Study	Subject	Summary of Result
1.	Singh, *et al.*, 2020	Comparative Study	210 adolescent senior secondary schools	There was a significant decrease in the prevalence of anemia in both the intervention group and the control group after the health education intervention was carried out. And also the collaboration between Weekly Iron-Folic Acid Supplementation (WIFS) with once-a-month of health education was found to be effective in reducing the prevalence of anemia in adolescent school girls.
2.	Jalambo, *et al.*, 2018	Randomized control trial	131 iron-deficient female adolescents	Supplementation of iron tablets every week for 3 months and

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			aged 15–19 years	health education interventions are considered to be able to increase hemoglobin levels in adolescent girls. Meanwhile, adolescent girls who only received iron tablets without being given health education experienced a decrease in hemoglobin and ferritin levels.
3.	Ghadam, *et al.*, 2022	Randomized clinical trial	176 adolescent students girls aged 10–19 years in the city of Saravan were selected randomly.	Nutrition education interventions presented with a new method, namely digital games can significantly increase the knowledge, attitudes, and actions of young women in consuming iron tablets and followed by an increase in Hb and ferritin levels.
4.	Madestria, *et al.*, 2021	Quasi-experimental design	124 respondents of female student in 7th grade and 8th grade.	The intervention group that was given educational videos and changes in blood supplement tablet packaging experienced significant changes in knowledge, attitudes, and intentions to consume iron supplement tablets, Likewise with adolescent girls in the control group who only received health education interventions in the form of videos, there were also changes in knowledge, attitudes, and intentions in taking iron tablets.

The results of this study showed that health education on anemia increased adolescents' knowledge. The program for giving iron tablets has been promoted for a long time in Indonesia, but one of the obstacles to this program is the lack of knowledge(Putri, Djuari and Dwilda, 2023). There are still adolescent girls who have less knowledge about blood-added tablets and are not compliant in consuming them(Putri, Djuari and Dwilda, 2023).

In concordance with the results of this study, a recent trial in Indonesia showed that nutrition education affected improving knowledge about exclusive breastfeeding(Setyowati, Rohaya and Rahmawati, 2023). Another study about the effect of mobile health education regarding anemia among female students implies that adolescents' knowledge increased significantly in three months after the intervention(Sari, Herawati, Dhamayanti, Ma'ruf, *et al.*, 2022). Study about health education for obesity risk reduction among junior high school student state that participants in the intervention group had better knowledge regarding physical activity and diet(Rizvi, Kumar, Kulkarni, & Kamath, 2022). Thus, it can be concluded that health education is very important to increase the knowledge of adolescent girls about anemia. So, they can understand how to prevent anemia itself.

This research also shows that weekly Iron–Folic Acid Supplementation (WIFS) with health education can be effective in reducing the prevalence of anemia in adolescent school girls by increasing the Hb level(Singh, Rajoura and Honnakamble, 2020). Besides that, adolescent girls who only received iron supplementation decreased their Hb and ferritin levels. This shows that health education can increase adolescents' actions to consume iron tablets and eat nutritious foods so as to increase their hemoglobin level and prevent anemia. Therefore, to change people's living habits to be healthier we need health education. So that it does not only force someone to carry out an activity but slowly changes it by increasing knowledge, and attitude, then the final achievement is action to create healthy habits that last longer(Ghadam *et al.*, 2023). Health education has also experienced development, not only using counseling methods that might make adolescent girls bored or uninterested. An example is using digital games, videos, and modifying the packaging of blood-boosting

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tablets(Ghadam *et al.*, 2023)(Madestria *et al.*, 2021).

Another recent study about health education intervention on brucellosis state that after given health education there were statistically significant reduction in the risk behaviors practices like raw milk consumption, help animals give birth without a gown, dispose of the product after delivery in the trash(Ghugey, Setia and Deshmukh, 2022). This is also state in a research about health education on oral health of school children that there is a statistically significant positive change in dental practice score in the participant who received verbal and audio-video sessions about oral hygiene(Makhdoom, Malik and Mohammad, 2022).

Lastly, a study about education on breastfeeding mothers towards heavy metals transferred from breast milk state that the mean score of the mothers practice in the intervention group after training significantly increased ($P < 0.05$)(Marzban *et al.*, 2022).

Based on the results of the several studies above, it can be concluded that health education, especially in this discussion regarding anemia, is important to give to adolescents. So that teenagers do not just only receive iron tablets. However, they also need to be educated about anemia and how to deal with it so they understand better and are willing to take iron supplementation.

CONCLUSION

This systematic review conclude that health education on anemia increase knowledge and practice of iron supplementation among adolescent girl. With increasing knowledge and practice in consuming iron supplementation will also increase the level of hemoglobin, which can prevent anemia in adolescents. We suggest further research to be able to find the most effective educational tools to increase knowledge and practice of adolescent in iron supplementation.

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