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Original Article

The Effect of Giving Iron Tablets With Lemon and Honey on Hemoglobin Levels in Adolescent Girls

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ABSTRACT
Background: Adolescent girls lose iron during menstruation, coupled with their increased consumption of plant-based foods, resulting in insufficient iron intake to meet their daily iron needs. This leads to anemia in adolescent girls. Therefore, iron supplementation is necessary to address anemia in adolescents. The purpose of this study was to determine the effect of administering Iron tablets with lemon and honey on hemoglobin levels in adolescent girls.
Method: The research design uses a pre-experimental approachone-group pretest-posttest design. A sample of 23 respondents with the techniquetotal sampling. The instrument used was an Hb level tester, a Standard Operating Procedure (SOP), and an observation sheet. Data analysis used the test Wilcoxon.
Results: The results of the study were obtained from 23 respondents before giving Iron tablets with lemon and honey, most of whom experienced moderate anemia, namely 14 respondents (60.8%). After giving Iron tablets with lemon and honey, some respondents did not experience anemia, namely 19 respondents (82.61%). The results of the statistical Wilcoxon test, $p=0.001 < \alpha=0.05$, show that there is an effect of consuming Iron tablets with lemon and honey on hemoglobin levels in adolescent girls.
Conclusion: Consuming iron tablets with lemon and honey is very beneficial in increasing hemoglobin levels in adolescent girls. It is hoped that the provision of iron tablets to adolescent girls can be expanded to reduce the incidence of anemia in them

INTRODUCTION

Adolescence is a time of rapid growth, so nutritional needs also increase (Putrianti, 2020). During adolescence, physical changes and reproductive maturity occur. One of the changes experienced by adolescent girls is menstruation. During menstruation, adolescent girls lose iron (Fe), and adolescent girls' behavior of consuming more plant-based foods results in iron intake not meeting daily iron requirements (Budiarti, A., Anik, S., & Wirani, 2021). This is one of the factors causing anemia in adolescent girls. Anemia is a major health problem in society and is common throughout the world, especially in developing countries. Anemia is more common in adolescent girls than in boys (Ahmed, F., Khan, M. R., & Jackson, 2017).

The prevalence of anemia in developing countries has reached 53.7%. The health and nutritional status of the 10-24 age group in Indonesia remains concerning. The prevalence of anemia in Indonesia among adolescents is 32%, meaning 3-4 out of 10 Indonesian adolescents suffer from anemia (Kemenkes RI, 2018). The East Java Provincial Health Office in 2018 revealed that the prevalence of adolescent girls suffering from anemia was 50-60% (Asrina, S. M., Setyarini, A. I., & Novitasari, 2021). Research conducted at the Manba'ul Hikam Islamic Boarding School in Sidoarjo found that 65.4% of respondents had anemia (Puspita, 2020). Based on a preliminary survey conducted in Ketegan Village in April 2023, through interviews, it was found that out of 20 adolescent girls, 13 experienced signs of anemia, resulting in frequent weakness and fatigue, difficulty concentrating, and frequent dizziness.

Iron deficiency anemia is the most common anemia in adolescents, due to the high demand for growth (Munir, 2022). Iron deficiency anemia can be influenced by several factors, namely, insufficient consumption of animal foods as a source of easily absorbed iron (heme iron), while plant foods (non-heme iron) are a high source of iron but are difficult to absorb, so large portions are needed to meet daily iron needs (Us, H., & Safitri, 2023). It can also be caused by a lack of nutrients that play a role in iron absorption, such as protein and vitamin C (Indriyani, R., Aulia, A., Andrian, M. W., & Suprayitno, 2020). The incidence of anemia experienced by adolescent girls is also influenced by external factors such as low family economic level (income), parental education (Ibrahim, S. W. A., Santjaka, A., Isnawati, M., Santjaka, 2023).

Anemia in adolescent girls can have both short-term and long-term consequences. The short-term impacts experienced by adolescent girls with anemia include decreased immunity and reduced productivity. Long-term consequences include risks during pregnancy, negatively impacting the growth and development of the fetus, and complications during pregnancy and childbirth. Anemia is even a leading cause of maternal and infant mortality (Kemenkes RI, 2021). Therefore, efforts are needed to treat anemia in adolescents. One way is if dietary iron intake is insufficient, additional iron supplementation is necessary. Regular iron supplementation over a period of time aims to rapidly increase hemoglobin levels and should be continued to increase iron stores in the body. Iron supplementation in adolescent girls and women of childbearing age (WUS) is one of the Indonesian government's efforts to meet iron intake. Providing iron supplements at the correct dosage can prevent anemia and increase iron reserves in the body (Kemenkes RI, 2018). This study experimentally tested the effect of administering Iron tablets combined with vitamin C and honey on hemoglobin levels in adolescents.

The absorption of iron in the body is greatly influenced by the availability of vitamin C in the body (Skolmowska, D., & Glabska, 2022). We can obtain vitamin C from the foods we consume, including oranges. Oranges are rich in vitamin C, which helps the body absorb iron. In addition to vitamin C, oranges also contain folic acid, which helps the body produce new red blood cells. Lemons are a good source of vitamins C, B6, potassium, and flavonoids (Putrianti, 2020). Vitamin C plays a role in helping reduce ferric iron (Fe3+) to ferrous iron (Fe2+) in the small intestine so that iron is easily absorbed and the reduction process will be greater if the pH in the stomach is more acidic. Gastric acidity increases due to the availability of sufficient vitamin C in the body so that iron absorption increases by up to 30% (Deng J, Ramelli L, Li PY, Crowther MA, 2024). In addition to vitamin C, honey is a source of iron. Iron is very necessary for the body to form hemoglobin. The body's iron requirement reaches 65% for the formation of hemoglobin. In addition to iron, honey also contains vitamin B6, which also functions to form hemoglobin in the body (Asrida, A., Astuti, A., Leli, L., & Saad, R, 2022). The aim of this study was to analyze the effect of administering Iron tablets with lemon and honey on hemoglobin levels in female adolescents suffering from anemia in Ketegan Village, Sidoarjo Regency.

RESEARCH METHODS

The type of research used in this study is a pre-experimental design type one-group pre-test post-test. The study was conducted in Ketegan sub-district, Taman District, Sidoarjo Regency in September 2023 – January 2024. The population in the study was all adolescent girls aged 12 – 18

years and active participants of adolescent posyandu who experienced anemia, with a population of 23 adolescent girls. The sample in this study was 23 adolescent girls who experienced anemia with a total sampling technique. The measuring instrument in this study used an observation sheet and checking hemoglobin levels using a GCHB tool. The initial data collection researchers conducted research permits, conducted informed consent, conducted a pre-test by observing hemoglobin levels after menstruation using a GCHb tool in the first cycle then conducted an intervention by giving Iron tablets with lemon and honey once a day during menstruation and once a week after menstruation namely the 7th day, the 14th day, the 21st day after that a post-test was conducted by observing hemoglobin levels again after menstruation in the next cycle to measure whether there was an increase in hemoglobin levels after being treated. Data analysis used the Wilcoxon Signed Rank Test. This research has passed the ethical test at the Health Research Ethics Committee of Nahdlatul Ulama University Surabaya with letter number 0027/EC/KEPK/UNUSA/2024.

RESULTS

The findings are presented in the following tables.

Table 1. Characteristics of Respondents

General Data	n	%
Age		
12-15 years	15	65.22
16-18 years	8	34.78
Age of First Menstruation		
11-13 years	23	30.0
14-16 years	53	100.0

Based on the table above, it can be seen that of the 23 respondents, almost all (65.22%) were aged 12 – 15 years, and that of the 23 respondents (100%), all of them had their first menstruation at the age of 11-13 years.

Table 2. Anemia Level Before Being Given Iron Tablets With Lemon and Honey

Anemia Level	n	%
Severe anemia	9	39.13
Moderate anemia	14	60.87
Mild anemia	0	0
No anemia	0	0

Based on the table above, it can be seen that of the 23 respondents, almost all (60.87%) experienced moderate anemia.

Table 3. Anemia Level After Being Given Iron Tablets With Lemon and Honey

Anemia Level	n	%
Severe anemia	4	17.39
Moderate anemia	0	0
Mild anemia	0	0
No anemia	19	82.61

Based on the table above, it can be seen that of the 23 respondents, almost all (82.61%) did not experience anemia.

Table 4. Effect of Iron tablets with lemon and honey on anemia levels in adolescents with anemia

Anemia Level	Pre-test (%)	Post-test (%)
Severe anemia	39.13	17.39
Moderate anemia	60.87	0
Mild anemia	0	0
No anemia	0	82.61
Shapiro–Wilk	P=0.039<0.05	
Test Wilcoxon	P=0.001<0.05	

Based on the normality test table Shapiro-Wilk. The above data shows that the pre-test data obtained a significant value of 0.039 < 0.05, indicating that the data was not normally distributed. Meanwhile, the post-test data obtained a significant value of 0.298 > 0.05, indicating that the data was normally distributed.

Based on the test table, the above shows that obtaining a significant value of 0.001 < 0.05 indicates that the pre-test and post-test data have a significant relationship. Based on the Wilcoxon test decision rule, if the significance value is < 0.05, which means that there is an effect of consuming Iron tablets with lemon and honey on the hemoglobin levels of female adolescents who experience anemia in Ketegan Village, Sidoarjo Regency

DISCUSSION

Anemia Level Before Giving Iron Tablets with Lemon and Honey to Adolescent Girls with Anemia

The results of the study showed that of the 23 respondents, almost half of the respondents experienced mild anemia, namely 9 respondents (39.13%), while those who experienced moderate anemia were 14 respondents (60.87%). Based on the results above, it can be concluded that almost all respondents experienced moderate anemia. Researchers assume that adolescent girls who have menstruated will experience monthly bleeding, which is one of the factors triggering anemia in adolescents. This aligns with the theory put forward by Nurbadriyah that blood loss due to bleeding is a cause of iron deficiency anemia. A 1 ml blood loss results in a loss of 0.5 mg of iron, so a blood loss of 3-4 ml/day (1.5-2 mg of iron) can result in a negative iron balance (Nurbadriyah, 2021).

Besides bleeding, anemia can also be caused by a lack of nutritious food intake. Researchers often observe that today's teenagers prefer fast food and follow strict diets without the guidance of health professionals who understand nutrition.

Insufficient consumption of animal-based foods is a source of easily absorbed iron (heme iron), while plant-based foods (non-heme iron) are high in iron but are difficult to absorb, requiring large portions to meet daily iron requirements. It can also be caused by a lack of nutrients that play a role in iron absorption, such as protein and vitamin C (Mahyaningtyas, F. P., Santoso, S., & Wiboworini, 2016).

Anemia Levels After Administering Iron Tablets with Lemon and Honey to Adolescent Girls with Anemia

The results of the study showed that of the 23 respondents, a small number of respondents experienced mild anemia, namely 4 respondents (17.39%), while almost all of the respondents did not experience anemia, 19 respondents (82.61%) did not experience anemia.

Administering iron tablets to adolescents with anemia significantly impacts hemoglobin levels. Regular administration of iron tablets can help manage anemia. Iron tablets can meet the body's iron needs. If iron requirements are not met, anemia will not be avoided (Savitri, M. K., Tupitu, N. D., Iswah, S. A., & Safitri, 2021). This is supported by the Ministry of Health's statement that routine iron supplementation over a period of time aims to rapidly increase hemoglobin levels and needs to be continued to increase iron stores in the body. Iron supplementation (IBF) for adolescent girls and women of childbearing age is one of the Indonesian government's efforts

to meet iron intake. Administering iron supplements at the correct dosage can prevent anemia and increase iron reserves in the body (Kemenkes RI, 2021).

The Effect of Iron Tablets with Lemon and Honey on Hemoglobin Levels in Adolescent Girls with Anemia.

Based on the decision rule of the Wilcoxon test If the significance value is <0.05, then H1 is accepted, which means that there is an effect of consuming Iron tablets with lemon and honey on the hemoglobin levels of adolescents with anemia in Ketegan Village, Sidoarjo Regency.

Researchers hypothesize that administering iron tablets with lemon and honey throughout the menstrual cycle, once daily during menstruation and once weekly afterward, significantly impacts hemoglobin levels. Administering iron tablets with lemon and honey significantly impacts hemoglobin levels, as lemon, which contains a high amount of vitamin C, aids iron absorption in the body, and honey aids the body in the production of new red blood cells.

Taking iron supplements can increase hemoglobin levels in the body, thereby preventing anemia (Ayupir, 2021). Iron supplements are used to quickly improve a person's iron status. According to WHO recommendations, iron tablets contain 60 mg of elemental iron and 400 µg of folic acid. The Indonesian Pediatrician Association recommends iron supplementation for adolescents aged 12-18 years for three consecutive months each year, with a dose of 60 mg of elemental iron plus 400 µg of folic acid twice weekly.

In addition to iron supplementation through iron supplements, vitamin C consumption is also very effective in increasing hemoglobin levels. The high levels of vitamin C in lemons can aid iron absorption, thereby increasing Hb levels in the blood. This means that lemons are rich in vitamin C, which can be used as an alternative to help increase Hb levels. Research conducted by (Putrianti, 2020) found that consuming 30 ml of lemon juice diluted in 200 cc of water for three weeks can increase Hb levels by 0.82 g/dl.

Honey is a food that contains iron (Fe), vitamin C, vitamin B complex and folic acid which can help the formation of blood cells (Ajibola, 2012). This is supported by research conducted by (Indriyani, R., Aulia, A., Andrian, M. W., & Suprayitno, 2020), which states that consuming honey can increase hemoglobin levels in pregnant women with anemia. A study of 18 adolescent girls showed that administering Iron tablets and 1 tablespoon daily was more effective in increasing hemoglobin levels in adolescent girls (Damayanti, D. F., Astuti, W., Wati, E., & Marsita, 2021).

CONCLUSIONS AND RECOMMENDATION

Taking iron tablets with lemon and honey can help increase hemoglobin levels in anemic adolescent girls. Therefore, it is recommended that these girls start taking iron tablets regularly. Furthermore, they can take iron tablets with lemon and honey to aid iron absorption. Honey can also increase iron levels and reduce nausea when taking iron tablets.

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