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## The Effect of Giving *Portulaca Oleraceae* Extract on Hemoglobin Levels in Adolescent Females

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### ABSTRACT

**Background:** Adolescent girls entering puberty are at risk of developing anemia, a condition characterized by a reduction in the number of red blood cells or hemoglobin concentration below normal levels. The prevalence of anemia among adolescent girls is approximately 32%, indicating that about 3 to 4 out of every 10 adolescents are affected. One plant that contains various nutrients and has potential health benefits to support government efforts in reducing anemia prevalence is purslane (*Portulaca oleracea*).

**Objective:** This study aimed to evaluate the effectiveness of purslane (*Portulaca oleracea*) extract at a dose of 500 mg combined with iron supplementation (Fe) 60 mg for 14 days on hemoglobin levels in adolescent girls.

**Methods:** This study employed a quasi-experimental design with a pretest–posttest control group design. The sample consisted of 40 adolescent respondents who met the inclusion criteria of having symptoms of anemia. They were divided into two groups: 20 participants in the intervention group who received 500 mg purslane extract and 60 mg iron tablets, and 20 participants in the control group who received only 60 mg iron tablets for 14 days. Data were analyzed using the Wilcoxon test and paired sample t-test.

**Results:** In the intervention group receiving 500 mg purslane extract and 60 mg iron (Fe), the mean hemoglobin level increased by 0.71 g/dL (from 12.43 to 13.14 g/dL), with a statistically significant difference compared to the control group ( $p = 0.049$ ).

**Conclusion:** The administration of purslane (*Portulaca oleracea*) extract at a dose of 500 mg combined with 60 mg iron tablets has an effect on hemoglobin levels in adolescent girls.

**Keywords:** Adolescent girls; Anemia; Purslane Extract (*Portulaca Oleraceae*)

### Introduction

Adolescence is a developmental stage characterized by an increased requirement for iron, with a recommended intake of approximately 26 mg per day. This elevated need is primarily due to rapid growth and development during this period. In addition, physiological changes, particularly the onset of menstruation, further increase the risk of iron deficiency anemia among adolescent girls. Moreover, current dietary habits, including the frequent consumption of beverages such as tea, coffee, chocolate drinks, and milk, may inadvertently inhibit iron absorption. Compounds such as tannins found in tea, coffee, and chocolate, as well as calcium in milk, can bind to dietary iron and reduce its bioavailability. As a result, the body's iron requirements may not be adequately met, increasing the risk of anemia [1].

Anemia is a condition characterized by hemoglobin (Hb) levels in the blood that are lower than normal. It is commonly defined as a deficiency in the number of red blood cells (erythrocytes) or their oxygen-carrying capacity. The impact of anemia in school-aged children and adolescent girls includes decreased concentration, impaired cellular growth and brain development, as well as clinical symptoms such as pallor, fatigue, lethargy, and easy exhaustion. This condition can subsequently lead to reduced academic performance, diminished intellectual capacity, decreased physical fitness, and overall poor health status[2]. According to the World Health Organization, anemia is one of the major global public health problems. Groups at high risk include women of reproductive age, pregnant women, school-aged children, and adolescents[3].

According to Ministry of Health, Anemia is problem significant health problems that cause the sufferer experience fatigue, tiredness, and Weakness. Condition This can impact negative on creativity And productivity individual. Besides that, anemia increases vulnerability to disease in the future mature as well as potential produce generation with problem nutrition[4].

The prevalence of anemia in Indonesia remains relatively high. According to the 2018 Basic Health Research (Riskesdas) data, the prevalence of anemia among adolescent girls reached 32%, indicating that approximately 3 to 4 out of every 10 adolescents are affected by anemia. Factors contributing to this condition include suboptimal dietary intake and low levels of physical activity[5]. Although the government has implemented the distribution of iron supplementation tablets (Tablet Tambah Darah, TTD) as a preventive measure for anemia among adolescent girls, only 1.4% of adolescent girls reportedly consume TTD according to the recommended guidelines[6].

Besides with Fe supplementation, for prevent lack substance iron and anemia is needed approach with overcome factor potential causes. By because that, efforts For prevent And overcome lack substance iron and anemia consists of from therapy pharmacology and non-pharmacological. Therapy pharmacology between other administration of Fe tablets. While For non-pharmacological therapy Can done with consume material food tall substance iron. Effort the done For help government in prevent, overcome as well as speed up lower height cases of anemia[7].

Public has use purslane as source food containing mark nutrition tall. Usually, plants this processed become raw vegetables, pecel, urap, vegetables clear, or sauté. In 100 grams of purslane contain substance iron as much as 36 mg and contains Vitamin C, which is 25 mg. The vitamin C content in purslane classified as tall so that can helps the absorption process substance iron in body[8].

Plant weeds this known with various name in some areas, such as gelan in Sundanese, resereyar in Madura, jalu-jalu kiki in Ternate, and called Purslane in Java. Purslane is plants that have mark high nutrition And contain antioxidant level tall like sour omega 3 fats and compound phenolic, minerals, coumarin, glycosides heart And anthraquinones, and alkaloids. The high content sour fat essential on purslane can to smoothen absorption substance iron. Substance iron in the intestines is recycled repeat from macrophage with two method that is provide substrate sour desired fat For membrane biological And reduce inflammation through decline expression hepcidin And content sour linoleic (omega-6) so that increase the transfer of substances iron to marrow bone And increase hematopoiesis[9].

Benefit purslane has proven with research conducted by Shirani, Kobra et al (2023) regarding Portulaca methanol and water extract Oleracea in the phenylhydrazine anemia model on mouse wistar female mature with weight 180-200 g. Results study show that Portulaca methanol extract oleraceae with dose 500 mg/kg for 4 days more effective compared to with extract the water[10].

Previous studies have shown that one of the main barriers to overcoming anemia is inadequate dietary intake that fails to meet the Recommended Dietary Allowance (RDA), particularly for iron and vitamin C. A substantial proportion of adolescent girls experience anemia due to insufficient vitamin C intake, with one study reporting a prevalence of up to 67%[11].

Based on from results consultation expert in field pharmacology, then on study this obtained dose purslane extract 500 mg daily. Consumption purslane extract on study this as therapy complementary with Fe tablets for 14 days. Administration intervention done for 14 days refer to on cycle regeneration cell blood red and adaptation physiological body. The process of becoming erythrocytes ripe need time around 7-10 days. If there is a stimulus that influences hemoglobin levels, body need time for adapt production cell blood red. Effect from intervention or condition certain against hemoglobin usually new seen significant after 10-14 days. So from that, researcher do study for 14 days For ensure that response erythropoietic And change hemoglobin levels are already Enough visible[12].

## Methods

This study employed a quasi-experimental design with a pretest–posttest control group design. The aim of this study was to determine the differences in hemoglobin levels before and after the administration of purslane (*Portulaca oleracea*) extract among adolescent girls. The research was conducted in November–December 2024 at SMP N 1 Sumowono and the Foundation of Quran Reciters in Gunungpati. Ethical approval for this study was obtained from the Health Research Ethics Committee of the Health Polytechnic, Ministry of Health Semarang, with ethical clearance number 1184/EA/F.XXIII.38/2024.

Method taking sample using purposive sampling with a total of 40 respondents divided become two group. Group control (20 respondents) were given substance iron (Fe) 60 mg, while group intervention (20 respondents) was given substance iron (Fe) 60 mg and purslane extract 500 mg in form capsule every day for 14 days.

The inclusion criteria for this study were adolescent girls who were willing to participate and provided written informed consent, aged between 12 and 19 years, had regular menstrual cycles, and experienced a menstrual duration of 3–8 days. In addition, participants were those who exhibited symptoms of anemia, such as weakness, fatigue, lethargy, and tiredness (commonly referred to as the “5L” symptoms: lemah, letih, lesu, lelah, lunglai), often accompanied by headaches, dizziness, and blurred vision.

The exclusion criteria included adolescent girls diagnosed with certain medical conditions, such as HIV/AIDS, tuberculosis, kidney disease, heart disease, gastrointestinal disorders (including gastritis), bone marrow dysfunction, abnormalities of red blood cells, malaria, or those undergoing specific medical treatments. Participants who did not consume the purslane tablets during the study period were classified as dropouts. Additionally, participants who withdrew from the study at any time were also excluded.

## Results and Discussion

**Table 1.**  
**Distribution of Respondent Characteristics**

| Variables             | Category              | Group        |      |         |    |
|-----------------------|-----------------------|--------------|------|---------|----|
|                       |                       | Intervention |      | Control |    |
|                       |                       | n=20         | %    | n=20    | %  |
| Menstrual Duration    | Abnormal <3and>7 days | 8            | 40   | 4       | 20 |
|                       | Normal 3-7 days       | 12           | 60   | 16      | 80 |
| IMT                   | Thin (<18.5)          | 4            | 20.0 | 10      | 50 |
|                       | Normal (18.5-25)      | 15           | 75.0 | 10      | 50 |
|                       | Obesity (>27)         | 1            | 5.0  | -       | -  |
| Nutrition (Fe Intake) | Less <15 mg           | -            | -    | 19      | 95 |
|                       | Enough ≥15 mg         | 20           | 100  | 1       | 5  |

Table 1 shows the characteristics of respondents in the intervention group, where the majority had normal menstrual duration, normal BMI, and sufficient nutrition (Fe intake). The number of respondents with normal menstrual duration was 12 respondents (60%), with normal BMI 15 respondents (75%), and nutrition (Fe intake) 20 respondents (100%).

**Table 2.**  
**Differences in Hemoglobin Levels in the Intervention and Control Groups**

| Inferences in Hemoglobin Levels in the Intervention and Control Groups |    |               |                    |
|------------------------------------------------------------------------|----|---------------|--------------------|
| Group                                                                  | n  | Mean±SD       | p-value            |
| <b>Intervention</b>                                                    |    |               |                    |
| Pre-test                                                               | 20 | 12.43 ± 1.264 | 0.000 <sup>a</sup> |
| Post test                                                              | 20 | 13.14 ± 0.987 |                    |
| <b>Control</b>                                                         |    |               |                    |
| Pre-test                                                               | 20 | 13.39 ± 0.984 | 0.075 <sup>a</sup> |
| Post test                                                              | 20 | 13.62 ± 0.711 |                    |

<sup>a</sup>Wilcoxon Test <sup>b</sup> Paired Sample T-test

Wilcoxon test and paired sample t-test in the intervention group It can be seen that there is a difference in the average pre-test and post-test hemoglobin levels in the intervention group with a p-value = 0.000 ( $\alpha < 0.05$ ), so it can be said that there is a difference in hemoglobin levels before and after the purslane extract intervention was given. Meanwhile, the results of the Wilcoxon test and paired sample t-test in the control group showed that the p value  $> 0.05$  so that there was no difference in the average pre-test and post-test hemoglobin in the control group with a p-value = 0.075, meaning that there was no difference in hemoglobin levels before and after being given Fe tablets.

**Table 3.**

**Difference in Hemoglobin Levels in the Intervention Group and Control Group**

| Difference in Hemoglobin Levels in the Intervention Group and Control Group |              |       |           |       |         |
|-----------------------------------------------------------------------------|--------------|-------|-----------|-------|---------|
| Variables                                                                   | Group        |       |           |       | p-value |
|                                                                             | Intervention |       | Control   |       |         |
|                                                                             | Mean± SD     |       | Mean ± SD |       |         |
| <b>Hemoglobin</b>                                                           |              |       |           |       |         |
| Pre-Post test difference                                                    | 0.71         | 0.715 | 0.25      | 0.552 | 0.049   |

<sup>a</sup>Test Mann Whitney <sup>b</sup> Independent T-test

Based on the data in table 3, there is a difference in the increase in hemoglobin between the intervention group and the control group, indicated by the significance figure with the Mann Whitney test with a p-value = 0.049. So it can be concluded that the intervention group with the administration of 500 mg of purslane extract (*Portulaca Oleraceae*) and 60 mg of iron (Fe) more effective in increasing hemoglobin levels in adolescent girls.

Hemoglobin is a vital component found in red blood cells (erythrocytes) that can be measured using the Easy Touch method. It consists of two main elements: heme and globin. Heme is a combination of iron and protoporphyrin, while globin is a pigmented protein consisting of two alpha chains and two beta chains. Hemoglobin functions as a transporter of oxygen from the lungs to various parts of the body and also carries carbon dioxide from the body's tissues back to the lungs[13]. Hemoglobin synthesis takes about 7 to 10 days, and involves the formation of mature hemoglobin molecules ready to be distributed throughout the body via red blood cells (erythrocytes). Hemoglobin is found in red blood cells (erythrocytes) and has a lifespan of 120 days[14].

Administration of 500 mg of purslane (*Portulaca oleracea*) extract combined with 60 mg of iron (Fe) for 14 days has been shown to increase hemoglobin levels. This effect may be attributed to the iron content in purslane extract, which supports hemoglobin synthesis. Laboratory analysis indicated that purslane extract contains 2 mg/100 g of iron (Fe), while vitamin C was not detected. This absence may be explained by the instability of vitamin C, which is highly susceptible to oxidation. According to a study published in Scientific Reports (2021), ascorbic acid oxidation is triggered by oxygen, reactive oxygen species (ROS), and transition metal ions such as iron and copper, which act as catalysts that accelerate the oxidation process. Therefore, the vitamin C content in purslane extract may have degraded during processing or storage. This finding is not consistent with the theory proposed by the Directorate of Nutrition, Ministry of Health of Indonesia, which states that 100 grams of purslane contains approximately 25 mg of vitamin C[15].

Vitamin C plays an important role in increasing iron absorption by converting Fe<sup>3+</sup> into Fe<sup>2+</sup> which is more easily absorbed by the body. Hemoglobin, as the main component of erythrocytes, consists of heme and globin which function to transport oxygen and carbon dioxide in the blood. The results showed that the increase in hemoglobin levels was higher in the group consuming a combination of Fe tablets and purslane extract compared to the group consuming only Fe tablets, with a p-value = 0.034. This difference indicates that consuming purslane extract rich in iron and vitamin C can increase the effectiveness of iron absorption, which plays a role in hemoglobin synthesis. In addition to iron and vitamin C, other factors that support the formation of hemoglobin are protein and vitamin B6 (pyridoxine), which act as catalysts in the formation of heme. Although the increase in hemoglobin levels was statistically significant, the clinical relevance should also be considered. The mean increase of 0.71 g/dL may contribute to improvement in mild anemia status among adolescent girls. This research is in line with the journal presented by (Mokhtarifar, Ali.et al.) which shows that the Hb levels of mice fed purslane flavonoids are higher than those of mice given normal salt [9].

## Conclusion

The administration of purslane (*Portulaca oleracea*) extract at a dose of 500 mg once daily, along with iron supplementation tablets (60 mg once daily) for 14 days, significantly increased hemoglobin levels in adolescent girls with symptoms of anemia. The administration of purslane (*Portulaca oleracea*) extract at a dose of 500 mg once daily for 14 days may serve as an alternative therapy for the prevention of anemia in adolescent girls. Health workers, particularly midwives, are encouraged to promote the use of purslane extract as a non-pharmacological intervention to improve hemoglobin and hematocrit levels. Future researchers are recommended to conduct further studies combining purslane extract with other interventions, as well as to expand the study population by involving more diverse samples and research settings. The findings of this study may also provide scientific evidence for anemia prevention and serve as a reference for the development of obstetric practice.

This study has several limitations. First, the sample size was relatively small, which may limit the generalizability of the findings. Second, the study was conducted in a limited number of locations, which may not fully represent the broader population. Third, the duration of the intervention was relatively short, which may not be sufficient to observe long-term effects.

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