

## EFFECTIVENESS OF RED GUAVA AND RED SPINACH COMBINATION JUICE TO INCREASE HEMOGLOBIN LEVELS OF MIDWIFERY STUDENT AT MEDAN HEALTH POLYTECHNIC

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### ABSTRACT

*Anemia is one of the health problems that adolescents often suffer, while in young women it has a big impact, among others, it can cause irregular menstruation which, if left unchecked, will have an impact on their reproductive health, as future mothers. The combination of guava juice and red spinach can increase the hemoglobin level of adolescent girls. The purpose of this study was to determine the difference in the effectiveness of the combination of red guava juice and red spinach with Fe tablets on increasing hemoglobin levels in female adolescents in the dormitory of the Midwifery department at Poltekkes Medan. This research is a quasi- experimental study examining a population consisting of 30 female adolescents, where 15 respondents were included in the combination group of red guava juice and red spinach, while 15 others were included in the Fe tablet group. Through research, the following results were obtained: the average hemoglobin level before consuming the combination of red guava juice and red spinach was 10.9400, after that it became 14.4133; the average hemoglobin level before consumption of Fe tablets was 11.1333 and after that it became 13.5800. It was found the effectiveness of consuming a combination of red guava juice and red spinach on increasing hemoglobin levels with a p-value of  $0.000 < 0.05$ , and it was also found that the effectiveness of consuming Fe tablets on increasing hemoglobin levels with a p-value of  $0.000 < 0.05$ . It was found that there was a difference in the effectiveness of consuming a combination of red guava juice and red spinach with consumption of Fe tablets on increasing hemoglobin levels, where the p-value was  $0.024 < 0.05$ . It is expected that health workers provide dissemination about the benefits of guava juice combined with red spinach to increase hemoglobin levels in female adolescents.*

**Keywords:** Red Guava Juice; Red Spinach ; Iron Tablets ; Hemoglobin Levels

### INTRODUCTION

Anemia is one of the most common health problems for adolescents. Globally, anemia is a health problem, especially in developing countries (Sulistyoningtyas S, 2022). There are four nutritional problems experienced by Indonesian adolescents, such as Protein Energy Malnutrition (PEM), iron deficiency anemia, iodine deficiency disorder, and vitamin A deficiency. The most frequent one to occur in Indonesian adolescents is the iron deficiency anemia (Zuiatna D, 2020). Many women suffer from anemia due to monthly menstruation or

iron expenditure so it is important to pay attention to nutritional intake to avoid the iron deficiency (Handayani TY, 2021). The normal hemoglobin level for adult males is >13 g/dL, and for adult females, it is >12 g%. Anemia is classified as mild if the hemoglobin level is between 10-12 g%, moderate if between 8-10 g%, and severe if the hemoglobin level is less than 8 g% (Rusdi PHN, 2018).

WHO states that out of 273 million children aged 6-59 months, 9.6 million suffer from severe anemia. Among 469 million non-pregnant women aged 15-49, 19.4 million experience severe anemia, while 32.4 million pregnant women (within the same age range) also face severe anemia. There are 505 pregnant women, 49% of non-pregnant women, and 42% of child cases suffering from iron deficiency anemia (Fauziah DA, 2022).

According to WHO data, the low prevalence of anemia is estimated at 1.32 billion people or around 25% of the world's population. Africa has the highest rate at 44.4%, Asia at 25%-33%, and the lowest is in the Americas at 7.6% (Zuiatna D, 2020).

The Ministry of Health of the Republic of Indonesia (Kemenkes RI) reported in 2018 that the prevalence of anemia in the age group of 5-14 years was 26.8%. Meanwhile, for the age group of 15-24 years, there was an increase from 18.4% in 2013 to 32% in 2018. Additionally, anemia among pregnant women aged 15-24 years experienced a significant rise from 37.1% in 2013 to 84.6% in 2018. The PKPR (Youth Health Care Services) is one of the government's programs aimed at providing healthcare services for adolescents. As part of this initiative, a synchronized effort has been implemented involving the weekly administration of iron supplementation tablets to adolescent girls. This measure is taken to prevent the escalation of anemia incidence among adolescent girls.

Information on Maternal and Child Health from the Ministry of Health indicates that the indirect causes of maternal mortality during childbirth include anemia, accounting for 40%. According to the Riskesdas survey in North Sumatra Province in 2018, the proportion of individuals with anemia in the age group of 15-24 years was reported to be 84.6%. based on research (Simanullang Desi, 2018).

Conducted in SMA Negri 1 Parlilitan, Humbang Hasundutan District in 2018, out of 80 respondents, 33 individuals experienced anemia (41.2%). Furthermore, an initial survey conducted in November at the Midwifery Dormitory of Poltekkes Medan found that out of 90 first-year students pursuing a D-III Midwifery degree, 32 individuals were identified with anemia (35.5%). These findings underscore the prevalence of anemia in various demographic groups, emphasizing the importance of addressing this health concern to improve maternal and

child health outcomes.

Based on research on 15 girls adolescents as control group in Pondok Pesantren Nurul Jadid Kumpai, before consuming guava juice and Fe pills, it showed that the minimum hemoglobin level was 11,2 gr/dL with the maximum 13,5%, so the average was 12,3% gr/dL. After consuming guava juice and Fe pill, the minimum of hemoglobin level was 12,1 gr/dL with the maximum 14,3% gr/dL, so the average was 13,41% gr/dL. There is 1,1 gr/dL difference on hemoglobin level before and after consuming guava juice and Fe pill with the p value ( $p < 0,05$ ). So it can be concluded that guava juice and Fe pill can increase hemoglobin level on adolescent (Damayanti DF, 2020).

Based on the research conducted at the Tri Murni Orphanage in Padang Panjang, the average hemoglobin level in the pretest group was found to be 10.26 g/dL with a standard deviation of 1.06. The average hemoglobin level in the intervention group before receiving red guava juice was 10.50 g/dL with a standard deviation of 1.04. The average hemoglobin level in the control group (posttest) was 10.98 g/dL with a standard deviation of 0.99. The average hemoglobin level in the intervention group after receiving red guava juice was 12.48%, with a standard deviation of 0.67. The T-Test yielded a p-value  $< 0.001$ , indicating a significant difference between hemoglobin levels before and after the administration of red guava juice. In conclusion, red guava juice can influence hemoglobin levels in adolescent girls with anemia (Nusantri Rusdi PH, 2020).

Based on the research on 29 teenage girls involving intervention of guava juice for 7 consecutive days revealed an increase in hemoglobin levels. Initially, only 20 adolescent (68.9%) showed an increase, but after the intervention, all 29 participants (100%) exhibited elevated hemoglobin levels. The Wilcoxon signed-rank test was conducted, and the Asymp Sig (2tailed) value of 0.000, which is less than 0.05, suggests a statistically significant effect of red guava juice on the increase in hemoglobin levels among adolescent girls at the Girls' Dormitory of SMA Muhammadiyah 2 Yogyakarta (Sulistyoningtyas S, 2022).

Based on a study involving 10 pregnant women in Rawe 4, Neighborhood 5, Tangkahan Subdistrict, Medan Labuhan, the average hemoglobin levels before being given red spinach leaf juice indicated moderate anemia (7-8 g/dL). However, after consuming red spinach leaf juice, the average hemoglobin levels of pregnant women increased to mild anemia (9-10 g/dL) in 9 individuals. The statistical analysis using the paired sample T-test yielded a p-value of 0.000 ( $p < 0.05$ ), indicating a statistically significant impact of red spinach leaf juice on the increase in hemoglobin levels among pregnant women in Rawe 4, Neighborhood 5, Tangkahan

Subdistrict, Medan Labuhan (Suwardi, S., dkk. 2021).

The results of a study involving 30 third- trimester pregnant women, with 15 receiving guava juice and 15 receiving red spinach juice, showed an increase in hemoglobin levels among all participants. However, there was no significant difference in the increase in hemoglobin levels, with a p-value of 0.787 ( $p > 0.5$ ). The average increase in hemoglobin levels for guava juice was higher than that for red spinach juice, with a mean difference of 0.49 g/dL (Yulyana N, Mizawati A, 2019).

In another study conducted on 31 female high school students in the Jatinangor Subdistrict who were anemic and given iron supplementation tablets (Fe Tablets), the results indicated an increase in hemoglobin levels before and after the administration of Fe Tablets. The Wilcoxon test revealed a p-value of 0.000, which is less than 0.05, indicating a statistically significant increase. The average increase in hemoglobin levels for adolescent girls was 1.01 g/dL (Nuraeni R, Sari P. 2019).

Given the context of the above cases, the researcher is interested in conducting a study to determine the differences in the effectiveness of a combination of red guava juice and red spinach juice compared to Fe Tablets in increasing hemoglobin levels among adolescent girls in the dormitory of the Midwifery department at Poltekkes Kemenkes Medan.

## **METHOD**

The research employed a Quasi Experimental method with a two-group pretest- posttest design. Quasi Experimental research involves direct investigation aimed at understanding changes resulting from interventions conducted by the researcher. This design includes two groups: an experimental group receiving a combination of guava and red spinach juice, and another experimental group receiving Fe tablets.

Sampling for the study utilized the Accidental Sampling technique, involving 30 female students in the dormitory of the Midwifery department at Poltekkes Medan, meeting the inclusion criteria: students experiencing anemia, those not menstruating, those not consuming iron supplements, and those not taking antacid medications.

The data used in this study were primary, obtained by directly observing patients, measuring hemoglobin levels in first-year D-III Midwifery students in the dormitory of the Midwifery department at Poltekkes Medan before and after the intervention.

Univariate analysis was conducted to analyze each variable, summarizing measurement

data to transform it into useful information. The univariate analysis presented maximum and minimum hemoglobin level values before and after the intervention. Bivariate analysis, a statistical analysis when two variables are observed against each other, was performed. One variable served as the dependent variable, and the other as the independent variable. The test applied was the Paired t-test (Dependent t-test), used to determine whether there was a difference in the average of two paired or related groups. In this study, the dependent t-test measured the average hemoglobin level data before and after the intervention in the experimental group receiving a combination of red guava and red spinach juice, and the average hemoglobin level data before and after the intervention in the experimental group receiving Fe tablets.

## RESULT

Table 1.  
Frequency Distribution of Hemoglobin Levels Before Administration of the Combination of Red Guava and Red Spinach Juice

| Hemoglobin Level               | Combination Group of Red Guava Juice and Red Spinach |            |           |            |
|--------------------------------|------------------------------------------------------|------------|-----------|------------|
|                                | Before                                               |            | After     |            |
|                                | F                                                    | %          | F         | %          |
| Mild Anemia (11-11,9 gr/dl )   | 9                                                    | 60         | -         |            |
| Moderate Anemia (8-10,9 gr/dl) | 6                                                    | 40         | -         |            |
| Normal ( $\geq 12$ gr/dl)      |                                                      |            | 15        | 100        |
| <b>Total</b>                   | <b>15</b>                                            | <b>100</b> | <b>15</b> | <b>100</b> |

In Table 1, it can be observed that in the group before being given the Combination of Red Guava and Red Spinach Juice, 9 respondents (60.0%) had mild anemia, while 6 respondents (40.0%) had moderate anemia. After being given the Combination of Red Guava and Red Spinach Juice, all respondents (100%) experienced normal hemoglobin levels.

Table 2.  
Frequency Distribution of Hemoglobin Levels Before Administration of the Fe Tablets

| Hemoglobin Level | Fe Tablets |   |       |   |
|------------------|------------|---|-------|---|
|                  | Before     |   | After |   |
|                  | f          | % | f     | % |

|                                |           |            |           |            |
|--------------------------------|-----------|------------|-----------|------------|
| Mild Anemia (11-11,9 gr/dl )   | 8         | 53.3       |           |            |
| Moderate Anemia (8-10,9 gr/dl) | 7         | 46.7       |           |            |
| Normal ( $\geq 12$ gr/dl)      |           |            | 15        | 100%       |
| <b>Total</b>                   | <b>15</b> | <b>100</b> | <b>15</b> | <b>100</b> |

In the group before being given Fe tablets, 8 respondents (53.3%) had mild anemia, and 7 respondents (46.7%) had moderate anemia. After being given the Combination of Red Guava and Red Spinach Juice, all respondents (100%) achieved normal hemoglobin levels.

Table 3.  
Effectiveness of Administering a Combination of Red Guava and Red Spinach Juice

| Group  | $\bar{x}$ | SD      | Difference | Lower    | Upper    | <i>p- value</i> |
|--------|-----------|---------|------------|----------|----------|-----------------|
| Before | 10.9400   | .90301  | -3.47333   | -4.37664 | -2.57003 | 0.000           |
| After  | 14.4133   | 1.15503 |            |          |          |                 |

Tabel 3. presents the average hemoglobin levels before and after treatment in the combination of red guava and red spinach juice group. It is observed that before the treatment, the average hemoglobin level was 10.9400 with a standard deviation of 0.90301, and after the treatment, the average hemoglobin level was 14.4133 with 1.1 5503. The mean difference obtained is - 3.47333, indicating an increase in the average hemoglobin level by 3.47333 between before and after.

From the results of the Paired Samples Test, the probability (*p*) is  $0.000 < 0.05$ . This signifies a significant difference in the average before and after the treatment. Therefore, it can be concluded that the administration of a combination of red guava and red spinach juice is effective in increasing hemoglobin levels in adolescent girls in the dormitory of the Midwifery department at Poltekkes Kemenkes Medan.

Table 4  
 Effectiveness of Iron Tablet Administration

| Group  | $\bar{x}$ | SD     | Difference       | Lower           | Upper           | p-value |
|--------|-----------|--------|------------------|-----------------|-----------------|---------|
| Before | 11.1333   | .62183 | $\bar{-2.44667}$ | $\bar{2.89941}$ | $\bar{1.99392}$ | 0.000   |
| After  | 13.5800   | .69714 |                  |                 |                 |         |

Tabel 4 illustrates the average hemoglobin levels before and after the administration of iron tablets. It is known that before the treatment, the average hemoglobin level was 11.3333 with a standard deviation of 0.62183, and the average hemoglobin level after the administration of iron tablets was 13.5800 with a standard deviation of 0.69714. The mean difference obtained is -2.44677, signifying an increase in the average hemoglobin level by 2.44677 between before and after.

From the results of the Paired Samples Test, the probability (p) is  $0.000 < 0.05$ . This indicates a significant difference in the average before and after the treatment. Therefore, it can be concluded that the administration of iron tablets is effective in increasing hemoglobin levels in adolescent girls in the dormitory of the Midwifery department at Poltekkes Kemenkes Medan.

Table 5  
 Difference in Effectiveness Between the Administration of a Combination of Red Guava and Red Spinach Juice and the Administration of Iron Tablets in Increasing

| Variable                                       | $\bar{x}$ | SD      | Difference | Lower   | Upper   | P-Value |
|------------------------------------------------|-----------|---------|------------|---------|---------|---------|
| Combination of Red Guava and Red Spinach Juice | 14.4133   | 1.15503 | 0.83333    | 0.07473 | 1.59193 | 0.032   |
| Fe                                             | 13.5800   | .69714  |            |         |         |         |

Based on Table 5, it is known that the mean difference between before and after hemoglobin levels in the combination of red guava and red spinach juice group and the iron tablet group is 0.83333, indicating a difference in the average hemoglobin levels between the combination of red guava and red spinach juice group and the iron tablet group. The obtained average shows that the average Hb in the combination of red guava and red spinach juice group is higher, which is 14.4133 compared to the iron tablet group, which is 13.5800.

From the results of the Independent Test (a test conducted on different samples or

groups), the probability (p) is  $0.032 < 0.05$ . Thus, it can be concluded that there is a difference in the effectiveness between the administration of a combination of red guava and red spinach juice and the administration of iron tablets in increasing hemoglobin levels in adolescent girls at Asrama Kebidanan Politeknik Kesehatan Medan. Hemoglobin level is 14.4133 with a standard deviation of 1.15503. The calculated difference in average is -3.47333, indicating an increase in average hemoglobin levels by 3.47333 units between the pre-treatment and post-treatment phases.

The results of the Paired Samples Test show a probability (p) of 0.000, which is less than 0.05. This implies a significant difference in average hemoglobin levels before and after the intervention. Therefore, it can be concluded that the administration of a combination of red guava and red spinach juice is effective in increasing hemoglobin levels in adolescent girls in the dormitory of the Midwifery department at Poltekkes Kemenkes Medan. This study aligns with the research conducted by Nusantri Rusdi in 2020. In the study conducted at the Tri Murni Orphanage in Padang, the pretest average hemoglobin level found to be 10.26 g/dl with a standard deviation of 1.06. The intervention group's pre hemoglobin level before receiving red juice was 10.50 g/dl with a standard deviation of 1.04. The control group's post-test average hemoglobin level was 10.98 g/dl with a standard deviation of 0.99. The intervention group's average hemoglobin level after receiving red guava juice was 12.48% with a standard deviation of 0.67. The T-Test resulted in a p-value of less than 0.001, indicating a significant difference between hemoglobin levels before and after receiving red guava juice. It is concluded that red guava juice can influence hemoglobin levels in anemic adolescent girls (Nusantri Rusdi PH, 2020).

The results of the study conducted on 29 adolescent girls, with the intervention of red guava juice for 7 consecutive days, showed an increase in hemoglobin levels from initially only 20 girls (68.9%) to all 29 girls (100%). Based on the Wilcoxon rank sum test with a p-value of 0.000 ( $p < 0.05$ ), it can be concluded that there is an influence of red guava juice on the increase in hemoglobin levels in adolescent girls at the Muhammadiyah 2 Yogyakarta Girls' Dormitory (Sulistyoningtyas S, 2022).

## **DISCUSSION**

In the research findings presented in Table 3, it is known that the average hemoglobin levels before and after given the treatment with combination of red guava and red spinach juice group show a pre- treatment average hemoglobin level of 10.9400 with a standard deviation of 0.90301, while the post-treatment average. In the research involving 10 pregnant women in Rawe 4, District 5, Tangkahan Subdistrict, Medan Labuhan, the average hemoglobin level before being given red spinach leaf juice indicated moderate anemia (7-8 g/dl). After being given red spinach leaf juice, the average hemoglobin level of pregnant women increased to mild anemia (9-10 g/dl) in 9 individuals. The paired sample T-test with a p-value of 0.000 ( $p < 0.05$ ) indicates the significant effect of red spinach leaf juice on the increase in hemoglobin levels in pregnant women in Rawe 4, District 5, Tangkahan Subdistrict, Medan Labuhan (Suwardi, S., dkk. 2021).

The study conducted on 30 third-trimester pregnant women, with 15 receiving guava juice and 15 receiving red spinach juice, revealed an increase in hemoglobin levels among the participants. However, there was no significant difference in the increase in hemoglobin levels, with a p-value of 0.787 ( $p > 0.5$ ). The average increase in hemoglobin levels for guava juice was higher compared to red spinach juice, with a mean difference of 0.49 g/dl (Yulyana N, Mizawati A, 2019).

From a theoretical standpoint, Vitamin C in red guava and red spinach juice plays a crucial role in transferring iron from transferrin in the plasma to liver ferritin. Blood transferrin carries iron to the bone marrow and other parts of the body. Inside the bone marrow, iron is utilized for hemoglobin formation (Muthmainnah, 2018). Iron and Vitamin C form a soluble iron ascorbate complex that is easily absorbed by various organs in the human body. The conversion of non-heme iron in the form of inorganic ferric ( $\text{Fe}^{3+}$ ) compounds into ferrous ( $\text{Fe}^{2+}$ ) compounds is more effective in an acidic stomach environment. Vitamin C contributes to increasing acidity, thereby aiding iron absorption in the stomach. In this context, Vitamin C can enhance iron absorption by up to 30% (Muthmainnah, 2018). Hastuty YD et al. (2020) found that the administration of iron combined with vitamin C and vitamin A accelerates iron absorption and increases hemoglobin levels in adolescents.

The researcher assumes that the combination of red guava and red spinach juice can elevate hemoglobin levels in adolescent girls, thereby preventing the occurrence of anemia. In the research findings presented in Table 4, it is observed that the average hemoglobin levels before and after administration in the Iron Tablet group indicate that before the intervention, the

mean hemoglobin level was 11.3333 with a standard deviation of 0.62183, while the mean hemoglobin level after the administration of iron tablets was 13.5800 with a standard deviation of 0.69714. The calculated difference in mean is -2.44677, signifying an increase in the average hemoglobin level by 2.44677 between the *before* and *after* periods. The results of the Paired Samples Test yielded a probability (p) value of  $0.000 < 0.05$ . This implies a significant difference in mean hemoglobin levels before and after the intervention. Consequently, it can be concluded that the administration of iron tablets is effective in increasing hemoglobin levels in adolescent girls in the dormitory of the Midwifery department at Poltekkes Kemenkes Medan.

This research aligns with the findings of Nuraeni et al., in 2019, where a study on 31 high school female students in the Jatinangor District, who were anemic and received blood supplement tablets (Fe Tablets), revealed an increase in hemoglobin levels before and after receiving the iron tablets. The Wilcoxon test results showed a p-value of  $<0.05$ , specifically  $p=0.000$ , indicating a significant average increase in hemoglobin levels of 1.01 g/dL in adolescent girls (Nuraeni R, Sari P, 2019).

It is assumed by the researcher that iron tablets can enhance hemoglobin levels in adolescent girls, thus preventing the occurrence of anemia. Based on the research results in Table 1, it can be observed that in the group before being given a combination of red guava and red spinach juice, 9 respondents (60.0%) had mild anemia, and 6 respondents (40.0%) had moderate anemia. After being given a combination of red guava and red spinach juice, all respondents (100%) experienced normal hemoglobin levels. In the group before being given iron tablets, 8 respondents (53.3%) had mild anemia, and 7 respondents (46.7%) had moderate anemia. After being given a combination of red guava and red spinach juice, all respondents (100%) experienced normal hemoglobin levels. Based on the research results in Table 5, the difference in the average hemoglobin levels before and after in the group receiving a combination of red guava and red spinach juice and the group receiving iron tablets is 0.83333, indicating a difference in the average hemoglobin levels between the group receiving a combination of red guava and red spinach juice and the group receiving iron tablets. The obtained average Hb in the group receiving a combination of red guava and red spinach juice was 14.4133, compared to 13.5800 in the iron tablet group.

From the results of the independent t-test (a test conducted on different samples or groups), the obtained probability (p) was  $0.024 < 0.05$ . Therefore, it can be concluded that there is a difference in the effectiveness of giving a combination of red guava and red spinach juice

compared to iron tablets in increasing hemoglobin levels in adolescent girls in the dormitory of the Midwifery department at Poltekkes Kemenkes Medan. According to research conducted on 15 adolescent girls as a control group at Nurul Jadid Kumpai Islamic Boarding School, before consuming red guava juice and iron tablets, the minimum distribution of hemoglobin levels was 11.2 g/dl, maximum 13.5%, resulting in an average hemoglobin level of 12.3% g/dl. After being given red guava juice and iron tablets, the minimum hemoglobin level was 12.1 g/dl, maximum 14.3% g/dl, resulting in an average hemoglobin level of 13.408% g/dl. There was a difference of 1.1 g/dl in hemoglobin levels before and after being given red guava juice and iron tablets with a p-value ( $p < 0.05$ ), so it can be concluded that red guava juice and iron tablets can increase hemoglobin levels in adolescents (Damayanti DF, 2020).

According to the researcher's assumption, the combination of red guava and red spinach juice is more effective and natural in increasing hemoglobin levels in adolescent girls, thus preventing anemia.

## **CONCLUSION**

The administration of a combination of red guava and red spinach juice has been proven effective in increasing hemoglobin levels, with a p-value of  $0.000 < 0.05$ . Similarly, the use of iron tablets is also effective in raising hemoglobin levels, with the same p-value of  $0.000 < 0.05$ . However, there is a significant difference in effectiveness between the two, as indicated by a p-value of  $0.032 < 0.05$ . The combination of red guava and red spinach juice leads to a greater increase in hemoglobin levels compared to the administration of iron tablets. Further research is needed to explore the challenges of using potent herbal remedies to increase hemoglobin levels in adolescents, as well as to enhance massive and continuous promotion efforts to prevent anemia.

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hemoglobin level measurements and data collection. Finally, we are deeply grateful to our families and friends for their continuous motivation and support during the research process. We hope this study contributes to raising awareness about the benefits of red guava and red spinach juice as a natural alternative to improving hemoglobin levels in female adolescents.

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