GIVING FERROUS FUMARATE COMBINATION WITH VIGNA RADIATE AS A PHARMACOLOGICAL AND NON PHARMACOLOGICAL THERAPY IN IMPROVING PREGNANT WOMEN'S HEMOGLOBIN

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ABSTRACT

Purpose: This study aims to prove the effectiveness of giving mung bean juice to pregnant women as a companion to Fe tablets. Two control groups, pretest-posttest design with the control group of 26 pregnant women. The one control group was given Fe tablets and mungbean extract twice a day (morning and evening) / 250 ml for seven days. 26 pregnant women, as the second control group, were administered with Fe tablets. Measurement of hemoglobin levels using the Quick Check (GChb) method on day 8.

Methods: The experiments used a two-group pretest-posttest design with a control group. The sampling was conducted at Banten Girang Health Centre, Serang City, Banten Province. A random sampling technique with a sample of 52 pregnant women was used. The control group was divided into two groups of 26 each. One control group was given Fe tablets, and the second experimental group of 26 pregnant women was given Fe tablets and 250ml of mung bean extract twice a day, morning and evening, for seven days. The analysis used the Wilcoxon and Mann Whitney tests and the N-Gain score.

Results: Average HB after pretest control group = 10.735 gr% and posttest = 10.777 gr% p-value = 0.042 > 0.05. While the pretest average in the experimental group = 10.735 gr%. While the posttest = 11.215 gr%, p-value = 0, 000 <0.05. Mann Whitney test, Z count = -4.563. While the Z table value is obtained from the Z table with an alpha of 5% or 0.05 of -1.645. Meanwhile, the p-value obtained is 0,000. Z count> Z table, namely -4.563 > -1.645 or a sig value of 0,000 <0.05.

Conclusion: There is an effect of giving Fe tablets combined with mung bean juice in the experimental group with the average H.B. respondent before being given the treatment is categorized as mild anemia. However, after the treatment was classified as not anemia / H.B. Normal. There was a significant difference between H.B. levels in the experimental and control groups after receiving the treatment. The N-Gain test concluded that the increase in H.B. levels in the experimental group was categorized as moderate (0.3 ≤ g ≤ 0.7).

Keywords: Iron Supplements, Green Bean Extract, Hemoglobin Levels, Pregnant Women

I. INTRODUCTION

Pregnancy is a critical window in fetal development (1). Fetal is associated with increased demand for all nutrients such as iron (Fe), copper (Cu), zinc (Zn), Vitamin B12, folic acid, and ascorbic acid, making it impossible to correct anemia. Only with the use of Fe supplements (2). Iron and folate requirements during pregnancy are not easily met through diet alone. Thus, many mothers recommend taking iron and folic acid supplements (3). Reversible iron deficiency anemia, with proper nutritional supplements (4). The food intake habits of pregnant women contribute mainly to anemia (5). Anemia category according to WHO criteria based on hemoglobin levels, namely no anemia / normal (≥11 g/dl), mild (10-10.9 g / dl), moderate (7 -9.9 g / dl), or severe (<7 g / dl) according to many sources (6)

Anemia is a major global health problem affecting approximately 42% of pregnant women worldwide (7); anemia in pregnancy is also reported to be a common problem (8). Although it is found in women in both high and middle-income countries, it is more prevalent in low / middle-income countries. Anemia during pregnancy can cause the phenomenon of hemorrhagic syndrome, which is the leading cause of maternal mortality (9,10),
increased risk of preterm labor, low birth weight babies, low APGAR, intrauterine growth retardation, and increased perinatal mortality. To overcome the widespread problem, many strategies were devised, among which iron tablet supplementation was considered one of the best strategies. Starting from the national anemia control program in 1971, all pregnant women were recommended to be given iron supplements with the latest guidelines recommending 60 mg of iron. Iron supplementation in the capsule formulation increased blood hemoglobin levels, although it was not clinically significant.

Mung bean is a plant in Asia and other parts of the world consumed as a typical food for thousands of years. Currently, green beans are accepted by different people worldwide for their physiological functions, such as antiangiotensin I conversion enzyme inhibitor (A.C.E.), antitumor, antioxidant, and anti-diabetic. This product is rich in vitamins, minerals, protein, and essential amino acids, and green bean protein is about 25-28% dry basis of body weight. Giving green bean juice to pregnant women as a companion to the Fe tablets given at A.N.C. is expected to help increase the hemoglobin level of pregnant women and prevent anemia in pregnancy.

Indonesian Basic Health Research (Riskesdas) reports the proportion of the risk of chronic energy deficiency in pregnant women in 2018 in the age group of women at risk, namely 15-19 years of 33.5%, at reproductive age the incidence of chronic energy deficiency in pregnant women is 12.3%. At age> 35 years, the incidence of chronic energy deficiency was 8.5%. It can be concluded that the incidence of chronic energy deficiency that is most at risk for pregnant women in terms of age is 15-19 years of age. From the data obtained in the BantenGirang Health Center Work Area in 2018, the number of pregnant women with normal Hb levels was (40%), and pregnant women with Hb levels <11 g / dl were (60%). Furthermore, if a population survey finds an anemia prevalence of 5% or more, the WHO considers it a public health problem. There is a severe public health problem if the prevalence of anemia is ≥40% in a population.

The high presentation of anemia and the variety and effects that causes anemia is a critical condition to be handled by it; the researchers are interested in further examining the combination of ferrous fumarate with vigna radiate as a pharmacological and non-pharmacological therapy in improving maternal hemoglobin.

II. RESEARCH MATERIALS & METHODS

1. Ingredients (green bean juice)

The ingredients needed to present green beans (vigna radiate) are 100 grams of green beans, two tablespoons of granulated sugar, 500 ml of water.

Processing

Green beans are washed and then soaked in water until broken for ± 1 hour, then boil 500 ml of water to a boil and add the green bean marinade, cook until soft and then add two tablespoons of granulated sugar, stir until the sugar dissolves, then turn off the heat. Wait for it to cool, then it can be served, drink it two times a day, namely in the morning and during the day.

2. Research Methods

Experiments using two groups, pretest-posttest design with control group design, were carried out. Sampling was carried out using a random sampling technique with a total of 52 pregnant women who were recorded at the BantenGirang health center, SerangCity, Banten Province. The groups were divided into 26 pregnant women as a control group, who was only given Fe tablets and an experimental group of 26 pregnant women, who were given Fe tablets and Manug green bean juice twice a day, namely in the morning and evening as much as / 250 ml, for seven days, starting on 21 June to 20 July 2019.

Observations were made twice, namely before the experiment and the pretest and after the experiment with the post-test. Each test aimed to measure the H.B. level of the respondent before and after being given the treatment in both the experimental and control groups. The data collection instrument was in the observation guidelines, measuring hemoglobin levels in the blood using the Quick Check (GChb) method, which was carried out on the 8th day after giving green bean extract.

Normality test using Kolmogorov Smirnov, analysis using Wilcoxon and Mann Whitney tests, and N-Gain score to determine whether there is a significant increase in hemoglobin levels and blood cells between pretest and
post-test the intervention group by giving Fe tablets and mung bean juice and the group control given only Fe. Decision making from the results of this statistical test is that if the sig value is <0.05, then there is a significant difference between the intervention group and the control group, and if the sig value > 0.05, then there is no significant difference between the experimental group and the control group.

III. RESULT

Table 1. Frequency Distribution of Respondent Characteristics

<table>
<thead>
<tr>
<th>Characteristic of Respondent</th>
<th>Control Group (n=26)</th>
<th>(%)</th>
<th>Experimental Group (n=26)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>3</td>
<td>11.53</td>
<td>4</td>
<td>15.39</td>
</tr>
<tr>
<td>20-35</td>
<td>23</td>
<td>88.47</td>
<td>20</td>
<td>76.92</td>
</tr>
<tr>
<td>&gt;35</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Age of Pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimester I</td>
<td>6</td>
<td>23.07</td>
<td>18</td>
<td>69.24</td>
</tr>
<tr>
<td>Trimester II</td>
<td>16</td>
<td>61.54</td>
<td>6</td>
<td>23.07</td>
</tr>
<tr>
<td>Trimester III</td>
<td>4</td>
<td>15.39</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primigravida</td>
<td>9</td>
<td>34.62</td>
<td>15</td>
<td>57.70</td>
</tr>
<tr>
<td>Multigravida</td>
<td>17</td>
<td>65.38</td>
<td>11</td>
<td>42.30</td>
</tr>
<tr>
<td>Pregnancy spacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never (0)</td>
<td>9</td>
<td>34.62</td>
<td>15</td>
<td>57.70</td>
</tr>
<tr>
<td>≤2</td>
<td>1</td>
<td>3.84</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>&gt;2</td>
<td>16</td>
<td>61.54</td>
<td>9</td>
<td>34.61</td>
</tr>
<tr>
<td>Obedience</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>23</td>
<td>88.47</td>
<td>22</td>
<td>84.62</td>
</tr>
<tr>
<td>Irregular</td>
<td>3</td>
<td>11.53</td>
<td>4</td>
<td>15.38</td>
</tr>
</tbody>
</table>

Source: Data primer, 2019

Based on the table above, it is known that mothers in the control group (giving F.E. tablets only) aged <20 were 3 (11.53%) people, 20-35 were 23 (88.77%), 1st-trimester gestation age was 6 (23.07%), Trimester II as much as 16 (61.54%), Trimester III as much as 4 (15.39%). Primigravida parity 9 (34.62%), Multigravida as much as 17 (65.38%). Pregnancy distance with the category never (0) was 9 (34.62%), ≤2 was 1 (3.84%), >2 was 16 (61.54%), and compliance with regular F.E. consumption was 23 (88.47%) and irregular as much as 3 (11.53),

while the mothers in the experimental group (giving F.E. tablets plus green bean juice) aged <20 were 4 (15.33%) people, 20-35 were 20 (76.92%), the first-trimester gestation age was 18 (69.24%), Trimester II as much as 6 (23.07%), Trimester III as much as 2 (7.69%). Parity Primigravida 15 (57.70%), Multigravida as much as 11 (42.30%). Pregnancy distance with category never (0) was 15 (57.70%), >2 was 2 (7.69%), >2 was 9 (34.61%) and compliance with regular FE consumption was 22 (84.62%) and irregular was 4 (15.38%).

Table 2. Wilcoxon test results H.B. levels in the control group

<table>
<thead>
<tr>
<th>Test</th>
<th>Median</th>
<th>Minimum - Maximum</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest (n=26)</td>
<td>10,735</td>
<td>10,1 - 11,5</td>
<td>0.042</td>
</tr>
<tr>
<td>Post test n=26</td>
<td>10,777</td>
<td>10,2 - 11,5</td>
<td></td>
</tr>
</tbody>
</table>

The table above shows the pretest median value of H.B. level of 10.735 gr% of the data; it can be concluded that the respondent is declared to be in the mild anemia category, and for the post-test, 10.777 gr% of respondents stated that they still have mild anemia, the minimum value on the results of the significance of the p-value is 0,042> 0.05, it can be concluded that there is no effect of giving Fe tablets to respondents to increase the hemoglobin level of pregnant women.

Table 3. Results of the Wilcoxon Post test-Pretest Test Analysis in the Control Group

<table>
<thead>
<tr>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Hb Levels Before –</td>
<td>Negative Ranks</td>
</tr>
<tr>
<td></td>
<td>Control Hb Levels After</td>
<td>Positive Ranks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>
Control Hb Levels After < Control Hb Levels Before
Control Hb Levels After > Control Hb Levels Before
After control Hb levels = Control Hb levels Before

The Wilcoxon test results obtained negative ranks of 0. These data indicate that there are no respondents who get lower H.B. levels than before the treatment. The Ties results equal to the acquisition of 21, defines that there are respondents who earn a fixed value results of the comparison between the pretest and the post-test. There are 5 respondents based on exposure to positive ranks, which indicates that the respondent gets an increase in H.B. levels after being given treatment.

Table 4. Wilcoxon test results H.B. levels in the Experiment group

<table>
<thead>
<tr>
<th>Test</th>
<th>Median</th>
<th>Minimum - Maximum</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest (n=26)</td>
<td>10,735</td>
<td>10,0 - 11,5</td>
<td>0,000</td>
</tr>
<tr>
<td>Post test n=26</td>
<td>11,215</td>
<td>10,3 - 11,7</td>
<td></td>
</tr>
</tbody>
</table>

The table above shows the median pretest H.B. level of 10.735 gr% of the data, it can be concluded that the respondent is declared to be in the mild anemia category and for the post-test 11.215 gr% of the respondents are declared not experiencing anemia / H.B. Normal, the minimum value on the results of the significance p-value is 0, 000 <0.05, it can be concluded that there is an effect of giving Fe tablets to respondents to increase the hemoglobin levels of pregnant women.

Table 5. Results of the Wilcoxon Posttest-Pretest Test Analysis in the Experimental Group

<table>
<thead>
<tr>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>16,96</td>
<td>441,00</td>
</tr>
<tr>
<td>26</td>
<td>36,04</td>
<td>937,00</td>
</tr>
</tbody>
</table>

The Wilcoxon test results obtained negative ranks of 0. These data indicate that there are no respondents who get lower H.B. levels than before the treatment. The same is found in the Ties results with an acquisition of 0, which defines that no respondent gets a fixed value on the comparison results between the pretest and the post-test. There were 26 respondents based on exposure to positive ranks, which indicated that all respondents had increased H.B. levels after treatment.

Table 6. Different Test of Research Samples Using Mann Whitney

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
<th>Mann-Whitney U</th>
<th>Z</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>26</td>
<td>16,96</td>
<td>441,00</td>
<td>90,000</td>
<td>-4.563</td>
<td>0.000</td>
</tr>
<tr>
<td>Experiment</td>
<td>26</td>
<td>36,04</td>
<td>937,00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the table above, the calculated Z value is -4.563, and the Z table value is obtained from the Z table with an alpha of 5% or 0.05 of -1.645. In comparison, the P-Value value is 0.000. Because Z count> Z table, namely -4.563> -1.645 or sig value 0.000 <0.05 according to the statistical test used, it can be concluded that there is a significant difference between experimental and control H.B. levels after each treatment is given.

Formula, the N-Gain test, was conducted to determine the respondent's increased hemoglobin level before and after treatment.

\[
\text{Gain (G)} = \frac{\text{SkorPosttest} - \text{SkorPretest}}{\text{SkoreMaksimal} - \text{SkorPretest}}
\]
The N-Gain test calculation results were 0.5 according to the N-Gain criteria table. It can be concluded that the increase in H.B. levels of respondents after giving Fe tablets combined with green beans can be categorized as moderate ($0.3 \leq g \leq 0.7$).

**IV. DISCUSSION**

Wilcoxon test results H.B. levels in the control group stated that there was no effect of giving Fe tablets to the respondents to increase the Hemoglobin levels of pregnant women, and respondents indicated that they were in the mild anemia category. This result is in line with (19), which explains that there is no difference in hemoglobin levels of pregnant women at the beginning of the examination and the end of the examination during the use of Fe tablets only. The same thing was also explained that iron supplements would be effective with oral supplements rather than iron supplementation alone (20).

Consuming iron supplementation has a role in determining hemoglobin levels. Oral iron supplementation as ferrous fumarate in capsule formulations results in an increase in blood hemoglobin levels that is not clinically significant12, the average use of iron supplementation folic acid is less than optimal (20). Early iron supplementation at a dose of $\sim 100\text{mg}/\text{d}$ improves the mother's biochemical status independently of her pre-pregnancy iron status. It does not make a significant difference for women who are not iron deficient (21).

Anemia in pregnancy is caused due to dilution of H.B. concentration which is known as gestational hemodilution or physiological pregnancy anemia. Heavy menstrual bleeding and pregnancy can also cause iron deficiency (22,23). Adolescent girls have a higher risk of developing anemia due to menstruation which can become severe during pregnancy due to the increased need for iron to grow both the mother and the developing fetus (24). An adequate diet supported by folic acid-iron (I.F.A.) supplementation has been shown to reduce anemia (25), fetal growth restriction, premature and neonatal mortality (26).

The prevalence of anemia is higher in second-trimester pregnant women (23% of 63%) and in the third trimester (27% of 63%) (27). Mild anemia often occurs at 32-34 weeks of gestation, followed by moderate anemia (28). There is a need for calories and nutrients to support increased maternal metabolism, blood volume, and nutrients for the fetus during pregnancy. This demand increases during the second and third trimesters. In the first trimester, there is a marked decrease in iron absorption due to lower iron requirements and menstruation stops, saving an average of 0.56 mg Fe / day (160 mg/pregnancy) (29). prophylactic iron, folic acid, and antiretroviral therapy during pregnancy are possible reasons for the decreased prevalence of anemia at 32 weeks gestation. This finding is in line with other studies (30).

The results in the experimental group using Fe combined with Mung beans (vignaradiata) found that there was an increase in H.B. levels. The conclusion was that there was an effect of giving Fe tablets combined with Mung bean extract (vignaradiata) to respondents to increase the Hemoglobin levels of pregnant women. This study is in line with, who indicated an increase in maternal H.B.levels after consuming Fe tablets and green beans compared to pregnant women who only consumed Fe tablets. The results of other studies showed that giving mung bean extract was proven to increase Hb and ferritin levels and reduce M.D.A. levels in anemic rats (31). Vignaradiata L. germinated inhibits anemia in male albino rats (32).

Diverse dietary intake is a reliable measure to assess the micro and macronutrient adequacy of women of reproductive age (33,34). One type of legume that contains high iron is green beans (vignaRadiata). Mung beans contain substances needed to form blood cells to overcome the effects of reducing H.B. The iron content in green beans is 6.7 mg per 100 grams of green beans. Mung beans also contain phytate by 2.19%. The interaction of phytate with protein and vitamins causes limited nutritional value that the body can utilize. The adverse effects of phytate can be reduced by soaking green beans (35). Vignaradiata is rich in vitamins, minerals, protein, and essential amino acids, and green bean protein is around 25-28% (36). Green bean protein hydrolysis (MBPHs-I) has excellent potential as a natural functional ingredient for supplements (37).
V. CONCLUSION

1. There is no effect of giving Fe tablets to the control group respondents to increase the hemoglobin level of pregnant women.

2. There is an effect of giving Fe tablets combined with green bean juice on experimental group respondents to increase the Hemoglobin levels of pregnant women.

3. There was a significant difference between H.B. levels in the control group and the experimental group after being given their respective treatments.

4. The increase in H.B. levels of respondents after giving F.E. tablets combined with green bean juice can be categorized as moderate \((0.3 \leq g \leq 0.7)\).

REFERENCES


