

## Original Research Article

# The effect of guava juice toward haemoglobin levels in pregnant women

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### ABSTRACT

**Background:** The prevalence of anemia among pregnant women is 33-75% in developing countries. Iron deficiency is a common cause of anaemia. Absorption of iron can be achieved by increasing the content of diets containing vitamin C or ascorbic acid (AA) such as those in vegetables and fruit. The purpose of this study was to assess the effect of guava juice on the haemoglobin levels of pregnant women.

**Methods:** The study was conducted using quasi-experiment. Sample was determined by the consecutive sampling method. 29 respondents were selected from each group. Both groups were given iron supplements of 2x1 for 2 weeks, while the control group besides receiving iron supplement therapy also consumed 200 ml/day guava juice for 2 weeks, with the inclusion criteria of third trimester pregnant women, anemia, no pregnancy complications and willing to be a respondent by signing an informed consent. Exclusion criteria not having a routine ANC at the Kalasan primary Health. Data collection was conducted using demographic data questionnaire, Observation Sheet of the provision of Fe tablets and guava juice and the measurement of hemoglobin levels with a hemocue.

**Results:** There was an increase in Haemoglobin levels in the group given iron supplement therapy and consumption of 200 ml guava juice/day for 2 weeks with a p value of <0.05.

**Conclusions:** Consumption of guava juice of 200 ml/day for 2 weeks increases the haemoglobin in pregnant women with anemia.

**Keywords:** Anemia, Guava juice, Haemoglobin, Pregnancy

### INTRODUCTION

Anemia in pregnant women is a major health problem in developing countries since it is highly related to maternal and infant conditions.<sup>1</sup> The prevalence of anemia in pregnant women amounts to 33-75% in developing countries.<sup>2</sup> Anemia is associated with maternal and infant morbidity and mortality. Anemia contributes 20-40% to maternal mortality either directly or indirectly through several complications such as heart failure, preeclampsia, labor bleeding, postpartum hemorrhage and puerperal infection.<sup>3</sup> Anemia in the pregnant women increases the

risk of a slow growing fetus, premature labor, low birth weight and infant mortality.<sup>1</sup>

Factors causing anemia in developing countries include socioeconomic conditions, healthy living behaviors, lifestyles and cultural differences.<sup>3</sup> In Ethiopia, the causes of anemia include socioeconomic, third trimester pregnancy, insufficient iron supplementation, and unbalanced diet.<sup>4</sup>

Iron deficiency is a common cause of anemia, but it can also be due to lack of other nutrients (Folic Acid, Vit A, Vit B12). Iron is derived from hem and non-hem food

sources. Hem iron are found in animal protein such as meat, fish, seafood, while non-hem iron sources are derived from vegetable proteins such as fruit and nuts. Hem is easily absorbed by the body and is the largest source of iron when compared to non-hem iron.<sup>5</sup> The body's ability to absorb iron from animal protein (hem) is better than its ability to absorb iron from vegetable protein (non-hem). AA has long been recognized as an increase in absorption of good non-hem iron.

The effectiveness of non-hem can be increased by increasing the diet nutrient content that can maximize the absorption of iron such as vitamin C or ascorbic acid (AA) or the nutrient that decreases the absorption of iron such as calcium.

Guava (*Psidium guajava*) is a tropical plant that is easy to grow, especially in Indonesia. Guava is a fruit with a high AA content depending on its type (50-400 mg/100 g) that decreases by about 50 mg when it reaches the peak of ripeness and also when canned and stored. Guava is one source of important minerals including iron (0.6-1.4 mg / 100gram).<sup>6</sup> An increase of AA intake is the appropriate nutritional advice to treat and prevent anemia. In Mexico, an experiment of the provision of guava juice containing of 200 mg AA led to an increase in levels of 0.64 mg/dl.<sup>7</sup> In Indonesia, guava juice research has been carried out to increase Hemoglobin levels and the results show an increase in Hemoglobin levels.<sup>8,9</sup> This study aims to assess the effect of the provision of guava juice containing AA of 200mg/100 grams and Fe tablets 2 times a day on the increase in hemoglobin levels in third trimester pregnant women..

**METHODS**

This study is a quasi-experimental. The population were pregnant women conducting antenatal care (ANC) in community health center of Kalasan a number of people is 207. It involved a total of 29 pregnant women as the research sample in each group using consecutive sampling technique. This study was carried out in March-August 2019. The inclusion criteria were third trimester pregnant women, pregnant women with anemia, having no pregnancy complications and willing to be a respondent by signing an informed consent sheet. Exclusion criteria were not having a routine ANC at the Kalasan Community Health Center.

The data were collected using a questionnaire to explore a) socio demographic data (age, education, and occupation) and b) history of reproduction (parity and gravida). It also used observation Sheet of Fe tablets and guava juice provision and measurement of hemoglobin levels with a hemocue.

Respondents who met the inclusion criteria were given an informed consent after receiving the explanation about the aims and objectives of the study orally. These respondents initial Hemoglobin levels were checked to

diagnose whether they had an anemia. If they were diagnosed with anemia they would be included as the research respondents.

Respondents were divided into two groups, the treatment group and the control group. Both groups were given 2 x 1 iron supplement therapy for 2 weeks, while the treatment group in addition to getting iron supplement therapy was also provided with 200 ml/day guava juice for 2 weeks.

Increased Hb levels will be evaluated 2 weeks after being given treatment by examining Hb levels. Monitoring of iron tablet and guava juice consumption is carried out by researchers calling or texting / WA to ensure that the respondent has consumed iron or guava juice, and the respondent writes in the monitoring table. The data that has been obtained is done coding, processed and analyzed using Mann Whitney u test.

**RESULTS**

This study shows that giving guava juice 200ml/day for 2 weeks effective increased haemoglobin level for pregnant women. The result can be seen in (Table 1).

Based on (Table 1), it is found that the characteristics of respondents in the treatment group were 26 (89.7%) were at the age of not at risk, 11 (37.9%) of primipara, and 27 (93.1%) had history of anemia, while in control group were 6 (20,7) at the age risk, 25 (86%) had high education, 17 (58,6%) unemployed and 27 (93,1%) has no history anemia.

**Table 1: Respondent's characteristics.**

Criteria	Control		Intervention	
	F	%	F	%
Age				
Risk	6	20,7	3	10,3
Not at risk	23	79,3	26	89,7
Education				
Low	4	13,7	3	10,3
High	25	86	26	89,6
Occupation				
Employed	12	41,4	17	58,6
Unemployed	17	58,6	2	41,4
Parity				
Multipara	17	62.1	18	58.6
Primipara	12	41.4	11	37.9
History of anemia				
Yes	2	6,9	2	6,9
No	27	93,1	27	93,1

Based on table 2 it is known that there was an increase in Hemoglobin levels in the intervention group with a p value <0.05, which means that the provision of guava juice can increase Hb levels in pregnant women with anemia.

Average score of control group and intervention group is significant different with p value <0.05.

**Table 2: The effect of guava juice on the increase of Hemoglobin levels.**

Variable	Group	Mean	SD	P value
Initial Hb	Control	9.77	0.93	0.80
	Intervention	9.83	0.87	
Hb of Intervention	Control	10.33	1.18	0.01
	Intervention	11.24	0.85	
Difference average	Control	0.57	0.81	0.02
	Intervention	1.41	1.21	

**DISCUSSION**

The research reveals that the provision of guava juice of 200 ml / day for 2 weeks can increase Hb levels in anemic pregnant women. Guava contains vitamin C or ascorbic acid (AA). AA influences the formation of red blood cells in bone formation and the maintenance of normal Hb levels.<sup>10</sup> Previous research on the provision of guava leaf extract indicates that it can increase Hb levels in adolescents with anemia.<sup>11</sup>

Predisposing factors for anemia in pregnancy according to Wylie and Bryce are lack of nutrition or poor absorption of nutrition and malabsorption.<sup>12</sup> The purpose of diet in pregnancy is to optimize the health of the mother and improve the health of the developing fetus. Diets must consist of micronutrients such as vitamins and minerals the body needs.

Iron malabsorption can occur due to lack of intake of vitamin C for a long time. The possible therapy for iron malabsorption is by administering 200 mg 2X1 Ferro sulphate or 600 mg 2X1 ferrous glutamate while giving ascorbic acid (vitamin C) as a supplement (iron substance 250-500 mg 2x / day to increase iron absorption.<sup>12</sup> The research by Abhriha et al, found an anemia prevalence of 19.3%.<sup>13</sup>

Guava juice in this study was used to increase Hb levels because they contained a lot of AA, which was influential in the formation of red blood cells in the bone structure as well as in maintaining normal Hb levels.<sup>10</sup> Previous studies have shown that administration of guava juice in children with anemia every day to 300 ml containing approximately 200 AA has significantly increased Hb levels.<sup>7</sup>

Iron sufficiency in pregnant women, adolescents and children affects the level of growth. Low amounts of iron in food can occur in people with a lack of menu/food variations and poor absorption of food due to consumption of foods containing carbohydrates and less consumption of foods containing iron.<sup>14</sup> Iron can be in the form of hem found in animal flesh and its absorption is doubled when compared with non-hem contained in

vegetables. The absorption of iron can be optimized by the consumption of hem and non-hem iron simultaneously.<sup>15</sup>

In addition, consumption of foods that contain lots of vitamin C such as vegetables and fruit can help the absorption of iron. Research conducted by Yeni found an increase in Hb level 1. It soared to 34 after being given a diet of food in the form of iron hem and non-hem for 14 days.<sup>14</sup> Sinaga et al, research on the provision of guava juice to athletes reveals that it can increase Hb levels and improve physical activity.<sup>16</sup>

The provision of guava juice can increase Hb levels because it prevents hemolysis of red blood cells. In addition, guava juice can prevent the process of lipolysis because of the antioxidant properties in red guava. Red guava contains antioxidants, vitamin C, vitamin A, iron, calcium and phosphorus. Moreover, the vitamin C content of guava is 5 times higher than that of oranges.<sup>16</sup>

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