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Relation Between of Nutritional Status and Vitamin C Conditions with Hemoglobin Levels in Anemic Pregnant Women in The Working Area of Pauh Public Health Center, Padang City

Nurul Badriyah[1], Hasmiwati[2], Desmiwarti[3]

[1,2,3]Master's Program of Midwifery, Faculty of Medicine, Universitas Andalas

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ABSTRACT

Hemoglobin (Hb) level is a specific indicator for determining anemia in pregnant women. One of the factors that triggers anemia in pregnancy, namely nutritional status and vitamin C levels. The purpose of this study was to determine the relationship between nutritional status and vitamin C levels with hemoglobin levels in anemic pregnant women in the working area of Pauh Public Health Center, Padang City. This study is an observational study with cross sectional design on 57 pregnant women with anemia in trimesters II and III with consecutive sampling technique. The research was conducted at the Pauh Health Center and the Biomedical Laboratory of the Faculty of Medicine, Universitas Andalas, from March to May 2020.Nutritional status was checked by measuring upper arm circumference (LILA), vitamin C levels were checked by ELISA method and Hb levels was by hematology analyzer. Data analysis used Pearson correlation test and Spearman correlation test. The results showed that the average nutritional status was 23.68 ± 1,810 cm, the vitamin C level was 21.13 ± 12.502 ng/mL, and the Hb level was 9.85 ± 0.865 gr/dL. There was a significant relationship between nutritional status and Hb levels in anemic pregnant women with a value of p = 0.012 and (r = 0.330) and there was no relationship between vitamin C levels and Hb levels in anemic pregnant women with p = 0.177 and (r = -0.168). The conclusion is that there is a relationship between nutritional status and Hb levels, but there is no relationship between vitamin C levels and Hb levels in anemic pregnant women in the Pauh Public Health Center, Padang City.

E-mail:
Nurulzigy91@gmail.com

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1. Introduction

Hemoglobin (Hb) is one of the parameters used to determine the prevalence of anemia in pregnant women. Hemoglobin transports oxygen from the lungs and is circulated to all parts of the body; low Hb levels can indicate anemia. The problem of anemia in pregnant women can increase the mortality and morbidity rates for both mother and fetus.

One of the factors that influences the reduction of hemoglobin levels in the mother is nutritional status. Lack of nutrients during pregnancy can cause pregnancy complications; one of which is anemia. Anemia that occurs when a woman is pregnant is caused by many women who start pregnancy with insufficient food reserves so that when starting pregnancy, the nutrient reserves in the body are not good and at the time before pregnancy they are already experiencing anemia. Anemia can occur due to lack of nutrients that have a role in forming Hb such as iron, protein, pridoxin, vitamin B12, vitamin C, folic acid, and vitamin E

In addition to nutritional status, vitamin C levels also affect the Hb level of pregnant women because iron absorption can be influenced by several factors; one of which is vitamin C. Consumption of vitamin C can help increase iron absorption. Low vitamin C intake can have implications for the hemoglobin levels of pregnant women. Vitamin C has a role in the formation of Hb in the blood, where vitamin C helps the absorption of iron from food so that it can be processed into red blood cells again.

The purpose of this study was to determine the relationship between nutritional status and vitamin C levels with Hb levels in anemic pregnant women in the working area of Pauh Public Health Center, Padang City.

2. Method

This study is an observational study with a cross sectional design. Nutritional status and Hb levels were carried out at the Pauh Public Health Center, while the examination of vitamin C levels was carried out at the Biomedical Laboratory of the Faculty of Medicine, Universitas Andalas,

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West Sumatra from March 2020 to May 2020. The sample of this study was 57 pregnant women with anemia in trimesters II and III who met the inclusion criteria and exclusion criteria. The sampling technique was consecutive sampling.

3. Result and Discussion

a. Mean of nutritional status, vitamin C levels and Hb levels in anemic pregnant women in the Pauh Public Health Center, Padang City

The mean of nutritional status, vitamin C and Hb levels in anemic pregnant women in the Pauh Public Health Center in Padang City can be seen in Table 3.1 below.:

Tabel 1

The mean of nutritional status, levels of vitamin C and levels of Hb in pregnant women with anemia in the working area of Pauh Public Health Center, Padang City

Variable	Mean ± SD	Minimum	Maximum
Nutritional Status (LILA) (cm)	23,68 ± 1,810	19,5	27,0
Vitamin C Levels (ng/mL)	21,13 ± 12,502	2,09	44,68
Hemoglobin Levels (gr/dL)	9,85 ± 0,865	7,9	10,9

The results in Table 1 show that the mean of nutritional status of anemic pregnant women is 23.68 ± 1,810 cm. The threshold for LILA in women with the risk of Chronic Energy Deficiency in Indonesia is 23.5 cm, and the mean of vitamin C level is 21.13 ± 12.502 ng/mL. While the average Hb level in anemic pregnant women is 9.85 ± 12.502 gr/dL.

b. Relationship between nutritional status and hemoglobin levels in anemic pregnant women in the Pauh Public Health Center, Padang City

Based on the research results on the relationship between nutritional status and Hb levels in pregnant women with anemia in the Pauh Public Health Center, Padang City, it can be seen in Fig 2 below :

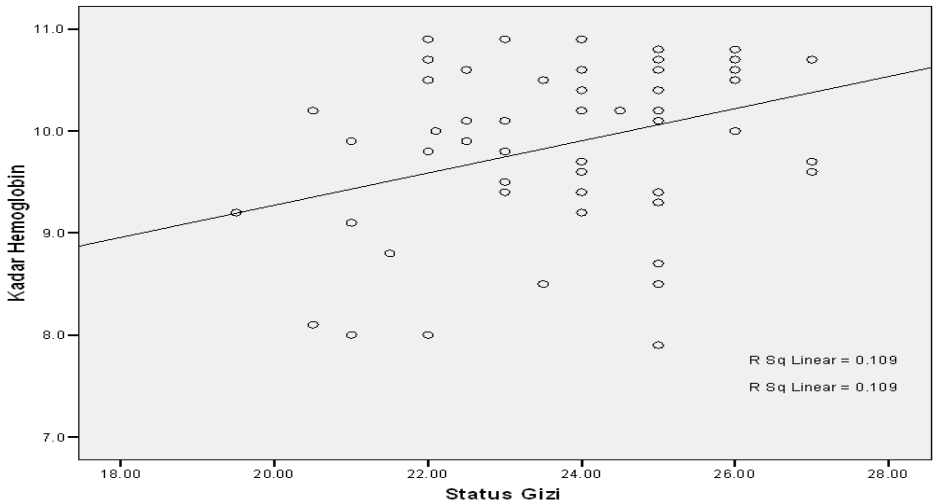

Fig 1 Relationship between nutritional status and hemoglobin levels in pregnant women in the working area of Pauh Health Center, Padang City

In Fig 1, it can be seen that there is a relationship between nutritional status and Hb levels in pregnant women with anemia in the Pauh Public Health Center, Padang City, p = 0.012 (p <0.05). The data analysis showed that the direction of the positive relationship with the strength of the relationship was low, the value of r = 0.330, meaning that the higher the nutritional status, the higher the Hb level. The value of Linear R Sq = 0.109 means that nutritional status contributes 10.9% to hemoglobin levels.

c. The relationship between vitamin C levels and hemoglobin levels in anemic pregnant women in the Pauh Public Health Center, Padang City

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Based on the research results on the relationship between vitamin C levels and Hb levels in anemic pregnant women in the Pauh Public Health Center, Padang City, it can be seen in Fig 2 below:

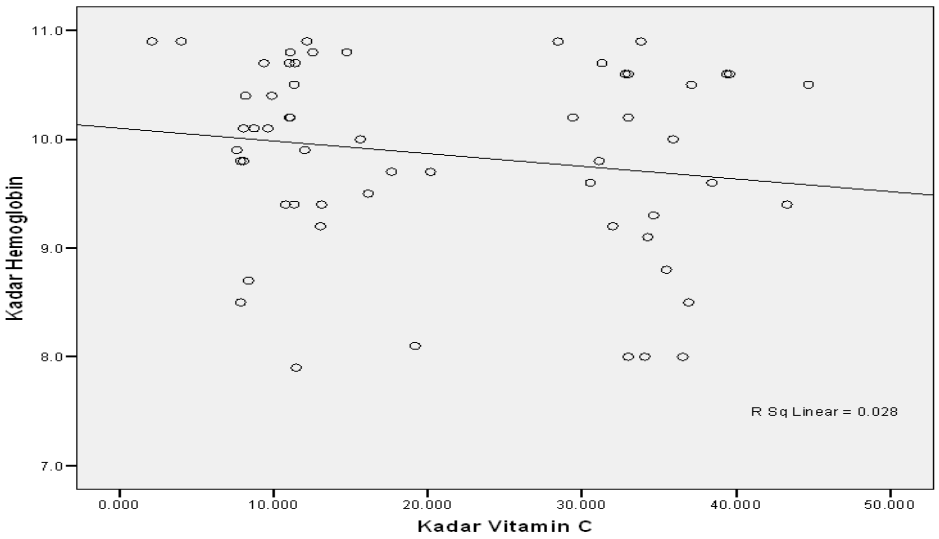

Fig 2 Relationship between vitamin C levels and hemoglobin levels in anemic pregnant women in the working area of Pauh Public Health Center, Padang City

In Fig 2, it can be seen that there is no relationship between vitamin C levels and Hb levels in anemic pregnant women in the Pauh Public Health Center, Padang City with a p value = 0.177 (p> 0.05). The data analysis shows that the direction of the negative relationship with the strength of the relationship is extremely weak with r = -0.168 meaning that in this study, the tendency is that the higher the vitamin C level, the lower the Hb level of anemic pregnant women with a linear R Sq value = 0.028, meaning that vitamin C levels contribute 2.8% on Hb levels.

d. The relationship between nutritional status and hemoglobin levels in anemic pregnant women

The results of this study showed a statistically significant positive relationship between nutritional status and Hb levels in pregnant women with anemia in the Pauh Public Health Center, Padang City with a weak relationship strength (p = 0.012 r = 0.330). The data analysis showed that there is a tendency that the better the nutritional status, the higher the Hb level; here may be other factors that influence such as parity, gestational age, iron and folic acid intake..

In this study, there was a significant relationship between nutritional status and hemoglobin levels in pregnant women, where a deficient nutritional status would lead to a decrease in Hb levels. Food substances that are very influential in influencing the reduction of Hb levels are iron intake so that if there is iron deficiency in the body it triggers a decrease in Hb levels. However, it should be noted that the hemoglobin level or the incidence of anemia in pregnant women is not only influenced by BMI and LILA, but pregnancy spacing also affects the hemoglobin level of pregnant women. Repeated pregnancies for a short period of time deplete the mother of iron reserves. It is recommended that pregnancy spacing of at least two years is a concern so that the mother is ready to accept the fetus again without having to spend iron reserves during pregnancy.

The nutritional status of pregnant women will affect the levels of Hb in the blood. Lowering blood Hb levels is called anemia. Anemia is characterized by reduced Hb levels in the blood, namely Hb levels <11.0 gr / dl (Hoffbrand and Moss, 2016). Anemia that occurs when a woman is pregnant is caused by many women who start pregnancy with insufficient food reserves so that when starting pregnancy, the reserves of nutrients in the body are not good and at the time before pregnancy, they are already experiencing anemia. Anemia can occur due to lack of nutrients that have a role in forming Hb such as iron, protein, pridoxin, vitamin B12, vitamin C, folic acid, and vitamin E (Akhtari and Hasan, 2012).

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A pregnant woman must pay attention to nutritional status because nutritional status before and during pregnancy affects fetal growth. If the mother's nutritional status is normal before and during pregnancy, it is likely that she will give birth to a baby who is healthy, at full term and of normal weight. This means that the quality of babies born depends on the nutritional status of the mother before and during pregnancy. Pregnant women who are at risk of experiencing Chronic Energy Deficiency may suffer from anemia. Poor nutritional status is a result of economic, socio-cultural, knowledge, food intake and environmental problems (Handayani, 2014).

This research is in line with research conducted by Mulyani (2017) regarding the relationship between nutritional status and hemoglobin levels of pregnant women in the second trimester at the Bandarharo Public Health Center, North Semarang, that there is a significant relationship between nutritional status and hemoglobin levels in mothers. Research by Oktaviani and Elsanti (2020) also shows a relationship between the length of the upper arm and the hemoglobin level of pregnant women. LILA and hemoglobin levels play an important role in fetal development and growth. Pregnant women with LILA <23.5 cm are at risk of experiencing Chronic Energy Deficiency, because pregnant women do not have adequate nutritional reserves to provide the physiological needs of pregnancy so that the supply of nutrients to the fetus is reduced as a result of stunted fetal growth (Aguscik and Ridwan, 2019).

Ruchayati (2012) stated that anemia in pregnant women causes nutritional deficiencies so that they are at risk of causing growth and developmental problems of conception. Good nutrition is needed by pregnant women for fetal growth. The nutritional status of pregnant women has a direct impact on pregnancy and the fetus, especially on the normal growth and function of the fetus. Nutritional disorders in pregnant women will have an effect on the lack of blood volume and increased cardiac output so that blood flow to the placenta decreases and results in a small size of the placenta (Almatsier et al., 2011).

Research conducted by Marlpan (2013) analyzed the relationship between nutritional status and the incidence of anemia in pregnant women using the Chi-square statistical test, it was found that there was a relationship between nutritional status and the incidence of anemia in pregnant women and the odds ratio showed that pregnant women were Chronic Energy Deficiency with arm circle <23.5 cm have a 3 times greater risk of experiencing anemia than pregnant women with nutritional status who are not at risk of Chronic Energy Deficiency.

e. Relationship between vitamin C levels and hemoglobin levels in anemic pregnant women

In this study, there was no statistically significant relationship between vitamin C levels and hemoglobin levels in pregnant women in the Pauh Public Health Center, Padang City with a negative direction (p = 0.177 r = -0.168). This shows a tendency that the higher the vitamin C level, the lower the Hb level.

The results of the study also found that all pregnant women with normal vitamin C levels had anemia with Hb levels <11 g/dL. This occurs because vitamin C only plays a role in the process of reducing ferric iron to ferrous iron and does not play a role in the synthesis of Hb so that vitamin C levels do not have an important role. The absence of a positive relationship or correlation between vitamin C levels and Hb levels in this study could be influenced by other factors such as nutritional status related to the adequacy of iron in the body and other nutrients. The absence of a relationship between vitamin C and anemia is caused because when vitamin C levels are sufficient but not balanced with consuming iron sources and the consumption of iron-blocking foods, it will result in low levels of Hb in the blood so that pregnant women experience anemia.

One of the efforts that can be done to prevent anemia in pregnant women is by giving Fe tablets to pregnant women for three months. Fe tablets are essential micro-elements for the body which are indispensable for the formation of blood, namely in the formation of Hb (Proverawati, 2013). According to Hoffbrand and Moss (2016) lack of Hb levels in the body can cause anemia in pregnancy. Prevention can be done by fulfilling nutritional needs during pregnancy. One of the government programs in Indonesia to prevent anemia in pregnancy is iron supplementation which is distributed free of charge through Community Health Center

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and Integrated Service Post by distributing iron tablets containing 60 mg of elemental iron as much as 90 tablets or a minimum of 90 days during pregnancy (Rena, 2013).

In addition, to achieve health goals in reducing the incidence of anemia in pregnant women, it is to recommend consuming Vitamin C as a combination in giving Fe tablets. Vitamin C plays a role in helping speed up the process of iron absorption. The role of vitamin C in the process of iron absorption is to help reduce ferric iron (Fe^{3+}) to be ferro (Fe^{2+})in the small intestine so that it is easy to absorb, the reduction process will be even greater if the pH in the stomach gets more acidic. Vitamin C can increase acidity so that it can increase iron absorption by up to 30% (Mehta and Hoffbrand, 2006). The need for vitamin C for a pregnant woman is 85 mg per day (Cunningham, 2015).

This study is in line with research conducted by Purwaningtyas (2017) stating that there is no relationship between vitamin C adequacy and the incidence of anemia. There is no correlation between the level of vitamin C adequacy and the incidence of anemia, it is possible that the respondents' habit of consuming vitamin C sources is not accompanied by consuming iron-rich food sources so that it has no significant impact. In addition, respondents who consume vitamin C in the form of fresh fruit are also at risk of inhibiting iron absorption, this is because the fiber content in fresh fruit is still high(Masthalina, 2015).

In contrast to research conducted by Setyaningsih, et al. (2018) stating that there is a relationship between the adequacy of vitamin C and Hb levels. Research by Yuliati, et al (2017) stated that the higher the Hb level, the higher the vitamin C adequacy rate. The difference from this study is that in the study Setyaningsih, et al. (2018) looked at the intake of vitamin C, while in the research that the researchers did, it looked at the levels of vitamin C in the body.

Research by Putri et al (2019) suggested that there is no relationship between anemia status of pregnant women and vitamin C intake during pregnancy (p value = 0.82) with very weak correlation strength (r = 0.0). This means that the absence of a relationship between vitamin C and anemia status of pregnant women can occur due to the habit of respondents who may consume vitamin C sources that are not accompanied by dietary sources of iron so that they do not have a significant impact on iron availability in the body.

4. Conclusion

Based on the results of the study, the relationship between nutritional status and hemoglobin levels in anemic pregnant women showed a relationship, while the relationship between vitamin C levels and hemoglobin levels in anemic pregnant women did not show relationship.

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