

## RESEARCH ARTICLE

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## Three-Month Iron Supplementation as Treatment for Microcytic Hypochromic Anemia in Pregnancy

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### Abstract

In pregnant women there is a twofold increase in iron requirements due to increased blood volume without the expansion of plasma volume. Pregnant women are very prone to suffering from iron deficiency anemia. Iron deficiency anemia generally has an erythrocyte index which represents hypochromic microcytic. This study aimed to determine the effect of three-month iron tablet supplementation as a therapy against microcytic hypochromic anemia in pregnancy. This was a quantitative quasi-experimental study using pre-test and post-test design. The study was conducted in May-September 2020 at the Arifin Achmad Regional General Hospital, Riau Province, Indonesia. Subjects were 30 pregnant women with microcytic hypochromic anemia. Primary data were analyzed using statistical paired sample t-tests. Results showed that there was an increase in hemoglobin levels after the supplementation of iron tablet from an average of  $9.1 \pm 1.2$  gr/dL to  $11.8 \pm 1.0$  g/dL. This change was significant based on the results of the T-test ( $p=0.003$ ) Thus, iron supplementation for three month significantly increases hemoglobin levels in pregnant women.

**Keywords:** Iron supplementation, microcytic hypochromic anemia, pregnancy

## Suplementasi Zat Besi Selama 3 Bulan sebagai Tatalaksana Anemia Mikrositik Hipokrom Dalam Kehamilan

### Abstrak

Pada ibu hamil terjadi peningkatan kebutuhan zat besi dua kali lipat akibat peningkatan volume darah tanpa ekspansi volume plasma. Ibu hamil sangat rentan untuk menderita anemia defisiensi besi. Anemia defisiensi besi umumnya memiliki gambaran indeks eritrosit sebagai mikrositik hipokrom. Penelitian ini bertujuan mengetahui efek suplementasi tablet besi selama tiga bulan sebagai terapi terhadap anemia mikrositik hipokrom dalam kehamilan. Jenis penelitian yang digunakan yaitu penelitian kuantitatif, dengan desain penelitian quasi eksperimen jenis *one group pre-test* dan *post-test*. Penelitian dilakukan pada bulan Mei-September 2020 di Rumah Sakit Umum Daerah Arifin Achmad Provinsi Riau. Subjek penelitian ini adalah 30 ibu hamil dengan anemia mikrositik hipokrom. Dilakukan analisis pada data primer dengan menggunakan uji statistik *paired sample t-test*. Hasil penelitian menunjukkan kenaikan rata-rata kadar hemoglobin dari sebelum pemberian suplementasi zat besi, yaitu  $9,1 \pm 1,2$  gr/dL menjadi  $11,8 \pm 1,0$  gr/dL (sesudah pemberian tablet besi). Perubahan ini signifikan berdasar atas hasil uji-t ( $p=0,003$ ). Simpulan, suplementasi zat besi selama tiga bulan secara signifikan meningkatkan kadar hemoglobin pada ibu hamil.

**Kata kunci:** Anemia mikrositik hipokrom, kehamilan, tablet besi

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## Introduction

Pregnant women are one of the groups prone to malnutrition, because there is an increase in nutritional needs to meet the needs of the mother and the fetus. One of the most common nutritional problems in pregnant women is nutritional anemia, which is the biggest and most difficult micro-nutrition problem to overcome in the world.<sup>1,2</sup> The World Health Organization (WHO) reports that 52% of pregnant women experience anemia in developing countries. In Indonesia (Susenas and the Ministry of Health-Unicef Survey) it is reported that of about 4 million pregnant women, half have nutritional anemia and one million experience chronic energy deficiency.<sup>3</sup>

A report by United States Agency for International Development (USAID), Micronutrient and Child Blindness Project, and Food and Nutrition Technical Assistance shows that about 50% of all types of anemia are thought to result from iron deficiency. Iron deficiency anemia often occurs as a result of pregnant women with a twofold increase in iron demand due to increased blood volume without expansion of plasma volume, to meet maternal needs (to prevent blood loss during childbirth) and fetal growth. Iron deficiency anemia is manifested on the erythrocyte index in the form of microcytic hypochromic anemia.<sup>4</sup>

There is a close correlation between anemia during pregnancy with fetal death, abortion, congenital defects, low birth weight, reduced iron stores in children or children born with nutritional anemia. This condition causes the perinatal mortality rate to remain high, as well as maternal mortality and morbidity. In addition, it can worsen and cause bleeding during childbirth which is the main cause (28%) of maternal mortality/childbirth in Indonesia. Anemia in pregnancy is linked to post partum hemorrhage in terms of uterine atony. Decreased uterine blood flow or low uterine muscle strength may contribute to inefficient uterine contractility (uterine atony).<sup>5</sup> Therefore, researchers are interested in conducting research on the effect of giving iron tablets for three months as a therapy for microcytic hypochromic anemia in pregnant women at the Arifin Achmad Regional General Hospital, Riau province in order to reduce complication of anemia on maternal and fetal mortality and morbidity.

## Methods

The research was conducted from May 2020 to September 2020 at the Midwifery Polyclinic of the Arifin Achmad Regional General Hospital, Pekanbaru, Riau Province. Determination of the sample size was taken using the Slovin technique, as many as 30 samples. The type of sample in this study is purposive sampling. Purposive Sampling is a sampling technique with certain considerations or special selection. The inclusion criteria were pregnant women with hypochromic microcytic anemia. Meanwhile, the exclusion criteria were pregnant women with congenital blood disorders and kidney disorders; and pregnant women with acute bleeding.

For pregnant women, the hemoglobin levels and levels of mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC) were checked to find pregnant women with hypochromic microcytic anemia. The above pregnant women are classified as samples. The research sample will then be given iron tablets for 3 months (90 iron tablets). At the second visit to the field (3 months later), the anemia status will be re-evaluated by checking the hemoglobin levels in pregnant women.

The data collected is primary data obtained directly using a hematological measuring device, Sysmex XN-1000 year 2019, namely the difference in hemoglobin levels before and after consuming Fe tablets in pregnant women. Data in the form of numbers before and after consuming Fe tablets, are presented in the form of a descriptive table. Data analysis was carried out to see the relationship between Fe tablets and anemia improvement in pregnant women at the Arifin Achmad Regional General Hospital, Riau Province.

This type of quantitative research, one group pretest-posttest design. The population was all pregnant women, namely 102 pregnant women who checked their pregnancies at the Regional General Hospital Arifin Achmad, Riau Province from May to September 2020. The research sample was 30 taken by purposive sampling technique. Data analysis using statistical test T dependent sample. This research was conducted after passing the Ethical Study of the Faculty of Medicine, Riau University No: B/137/UN19.5.1.1.8/UEPKK/2020.

**Table 1 Sample Characteristic**

Parameter	(n=30)
Education	
Bellow high school/ equal	7
High school/ equal	15
Above high school/ equal	8
Age	
<20 y.o	2
20–30 y.o	25
>30 y.o	3
Gravida	
Primigravida	3
Multigravida	27
Pregnancy gap on multigravida	
<2 years	7
>2 years	20

**Results**

This study attempted to analyze the sample characteristic data of a total of 30 patients with anemia in this study. Data analysis was carried out based on age group, education level, number of parity and gap between pregnancies. From the results of data analysis as shown in Table 1, it is found that low education does not guarantee a pregnant woman suffers from anemia, the highest incidence of anemia is found in patients with middle level of education, which is then followed by a high level of education. Based on age, it was also found that younger group of pregnant woman and older group of pregnant woman also did not make up the majority of pregnant women with anemia. It was found that women in the middle age were the majority of pregnant women who suffered from anemia.

Women with more than one parity (multigravida) appear to belong to the group of pregnant women who experience anemia more than primigravda women. And a pregnancy interval of more than 2 years in pregnant women appears to have anemia more than the women

**Table 2 Comparison of Hb Levels Before and After Iron Supplementation**

Hemoglobin Levels (Hb)	Hb (gr/dL) mean±SD	p
Hb before	9.1±1.2	0.003
Hb after	11.8±1.0	

whose pregnancy that less than two years.

This study analyzed the effects of iron supplementation before and after iron supplementation in this study groups. From the observation analysis, it was found that there was a significant increase in Hb levels after iron supplementation (p=0.003) as shown in Table 2.

**Discussion**

From Table 2, it can be seen that the average hemoglobin level in pregnant women with anemia before giving iron (Fe) tablets is 9.1±1.2, while after giving iron tablets (Fe) the average hemoglobin levels of anemic pregnant women are 11.8±1.0. Based on statistical analysis with the t test, it can be concluded that giving iron tablets before and after anemic pregnant women affects hemoglobin levels with a p.value of 0.003, this value is <(0.05).

Based on the sample examination, it was found that the average hemoglobin level in pregnant women before giving iron (Fe) tablets was 9.1 g/dL and the hemoglobin level after giving iron (Fe) tablets was 11.8 g/dL. These results indicate an increase in hemoglobin levels in pregnant women after consuming iron (Fe) tablets of 2.7 g/dL. Age does not affect the low levels of hemoglobin in pregnant women who are anemic. Low hemoglobin levels in pregnant women are influenced by the lack of consumption of foods containing iron and high consumption of substances that can suppress iron absorption.<sup>6</sup>

The results of this study are in line with research conducted by Fanny at the Tamamaung Health Center in 2011. This study also showed the same outcome as Ratih, there was an increase in hemoglobin by an average of 3.7 g/dL in anemic pregnant women with iron supplementation.<sup>7</sup>

Until now, iron supplementation is an effort to increase hemoglobin levels in pregnant women who are prone to suffering from anemia. For the dose of supplementation, according to research conducted by Vazquez et al.,<sup>8</sup> It was found that iron supplementation at a dose of 40–80 mg per day (with an average of 60 mg) had a much better outcome compared to supplementation of 20–40 mg per day without any adverse side effects for both mother and fetus.

Research by Abu Ouf et al.<sup>6</sup> and Arija et al.<sup>9</sup> on pregnant women with anemia who were given iron tablet supplementation for 1–3 months also showed the same outcome as this study. The output obtained was an increase in maternal hemoglobin levels and a better outcome in

infants. This study also shows that all pregnant women are prone to anemia. Both those who have a normal body mass index or obesity also have the same risk of suffering from anemia. Thus, iron supplementation must be encouraged for all groups of pregnant women.<sup>10</sup>

According to the Dietary Reference Intake, the need for iron in pregnant women increases from 18 mg/day in adult women to 27 mg/day in pregnant women. World Health Organization (WHO) recommends that every pregnant woman consume Fe supplement 60 mg per day for 6 months. Providing iron supplements, namely 60 mg day preparations can increase hemoglobin levels by 1 g%/month.<sup>11</sup> This theory is in accordance with the results of research which shows an average increase in hemoglobin 2.8 g/dL in the sample for 3 months.

The weakness of this study is that it does not do direct monitoring of medication adherence and does not check ferritin levels before and after iron tablet therapy. We need larger sample and better monitoring in the future. This study revealed excellent hemoglobin responses to iron supplementation in the study participants. These results indicate an increase in hemoglobin levels in pregnant women after consuming iron (Fe) tablets of 2.7 g/dL in average.

In conclusion, this study showed that three months iron supplementation improved the hemoglobin level of microcytic hypochromic anemia in pregnancy.

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