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Research Article

The Effectiveness of Venopheric Infusation on Feritine Levels in Pregnant Women with Iron Deficiency Anemia in RSPAD Gatot Soebroto

Ida Nopiah S.[1]* | **Nofa Anggraini[2]**

[1,2]Sekolah Tinggi Ilmu Kesehatan Abdi Nusantara, Jakarta – Indonesia

***contact**

novia228@gmail.com

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Abstract

Aims: In normal pregnancies accompanied by nausea, parenteral iron is seen as an attractive option for IDA therapy and is becoming more popular because of newer intravenous iron preparations with better side effects compared to older preparations, which allow high doses of iron to be administered. given rapidly in one treatment. The purpose of this study was to determine the effectiveness of Venofer infusion on ferritin levels in pregnant women with iron deficiency anemia at Gatot Soebroto Hospital in 2022.
Methods: Quasi experimental research method with to one group pretest posttest design. The instrument uses Standard Operating Procedures for giving Venofer Transfusion. The sample technique used total sampling, a sample of 46 respondents. Univariate analysis showed the distribution of Iron Deficiency Anemia, Bivariate T test analysis.
Results: This study found a significant difference from Iron Deficiency Anemia before and after administration of Venofer infusion.
Conclusion and Suggestion: So that the administration of Venofer infusion can increase Ferritin levels in pregnant women with iron deficiency anemia. There is a difference in the average increase in Ferritin levels between before and after administration of Venofer infusion.

Keywords
Venofer Infusion, Iron Deficiency Anemia, third trimester of pregnancy

INTRODUCTION

Iron deficiency anemia (IDA) is the most common medical problem in pregnant women and affects about 80% of pregnant women (1).

Statistics from the World Health Organization suggest that anemia affects about 14% of the population. According to recent statistics, IDA is 17.4% as common among pregnant women in developed nations as it is among those in underdeveloped nations, where it is 56.6%. In a nutshell: (2). The Central Bureau of Statistics reports that in 2018, the prevalence of anemia in pregnant women in Indonesia was 48.9%, which is higher than the global average of 38.6%, with the highest incidence in the 15-24 age group at 84.6%. (Beijing: National Statistics Office, 2020). Pregnant women in the 15-24 age range had the highest prevalence of anemia

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(84.6%), followed by those in the 25-34 age range (33.7%), the 35-44 age range (33.6%), and those in the 45-54 age range (24%). These statistics come from the DKI Jakarta Provincial Health Office in 2018. Central Jakarta is rated as the third best area in all of DKI Jakarta.

Pregnant women have an increased demand for iron to satisfy the needs of both the mother (to prevent blood loss during birthing) and the growing fetus, hence iron deficiency anemia is common (3). In pregnant women, anemia is often diagnosed when the hemoglobin level drops below 11 g/dl (4). Hemoglobin levels below 10 g/dl are indicative of anemia throughout pregnancy, and should prompt evaluation and treatment due to the potential for catastrophic implications for both mother and baby, including an increased risk of intrauterine growth retardation and premature birth.

Even though oral iron supplementation is commonly used to treat IDA, not all patients respond effectively to this treatment method. One reason for this is that oral iron has undesirable side effects that discourage patients from taking their medication consistently. Large numbers of people taking oral iron preparations experience unwanted side effects, most commonly gastrointestinal distress (2).

Serum ferritin levels below 20–30 g/l indicate severe DB, while levels between 70 and 100 g/l indicate mild to moderate DB. Since ferritin is the body's primary iron storage protein, measuring its levels has been used as a surrogate diagnostic for DB (2). The function of ferritin is to store iron, especially in the liver, spleen, and bone marrow. Excess iron will be stored and when needed can be mobilized again. The liver is the largest storage site for ferritin in the body and plays a role in the mobilization of serum ferritin.

In normal pregnancies accompanied by nausea, parenteral iron is seen as an attractive option for IDA therapy and is becoming more popular because of newer intravenous iron preparations with better side effects compared to older preparations, which allow high doses of iron to be administered. given rapidly in one therapy (5).

Ferrous sucrose (Venofer®; Vifor Pharma Ltd., Glattbrugg, Switzerland) and low-molecular-chain iron dextran (Cosmofer®; Pharmacosmos Ltd., Holbaek, Denmark) are two examples of second-generation products that contain irons that are connected to one another. After the first trimester, 26 IDA patients were found to benefit more from intravenous iron than from the faster-acting oral iron therapy, and this was especially true when using third-generation intravenous iron compounds like ferric iron carboxymaltose (Ferinject®; Vifor Pharma Ltd.) and ferric iron isomaltulose 1000 (Monofer®; Pharmacosmos Ltd.) (6) Iron aster oral aster (6).

Prof. Alfa Kriplani conducted a prospective study on the use of intravenous iron sucrose in pregnant women with iron deficiency anemia (hemoglobin between 5-9 g %) at a tertiary care hospital in north India to assess the response and effect of intravenous (iv) iron sucrose (ISC) compounds on hemoglobin status and other parameters. This demonstrates an excellent tolerance level and a large rise in hemoglobin levels among pregnant women (7).

Compared to oral iron therapy, the frequency of responders (Hb > 11g percent) was higher in the intravenous group in that study evaluating the efficacy of two and three doses of intravenous iron sucrose (75 vs 80 %). Prenatal iron reserves (ferritin > 50 mg/l) were significantly higher in the group that received three doses of intravenous iron (49 vs. 14 percent ; P0.001) compared to the group that received oral iron (7).

Hemoglobin levels of at least 120 g/l can be attained with intravenous iron doses. Additionally, compared to 1000 mg. iron, a dose of 1500 mg. iron produces a faster and

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stronger Hb response, allows more patients to reach the target Hb level, and requires more time to interpret with additional IV iron. Literature review and data analysis demonstrated that in many IDA patients, a dose of 1500 mg of IV iron, rather than the more commonly used dose of 1000 mg, was more appropriate for repeat iron (8).

METHODS

When comparing the effectiveness of oral iron therapy with two and three doses of intravenous iron sucrose, the frequency of responders (Hb > 11g percent) was higher in the intravenous group (75 vs 80 %). The group that received three doses of intravenous iron had significantly higher prenatal iron stores (ferritin > 50 mg/l; P0.001) than the group that received oral iron (8).

Hemoglobin levels of at least 120 g/l can be attained with intravenous iron doses. Additionally, compared to 1000 mg. iron, a dose of 1500 mg. iron produces a faster and stronger Hb response, allows more patients to reach the target Hb level, and requires more time to interpret with additional IV iron. Literature review and data analysis demonstrated that in many IDA patients, a dose of 1500 mg of IV iron, rather than the more commonly used dose of 1000 mg, was more appropriate for repeat iron (8).

RESULTS

From the results of the study, it was found that the Ferritin level of pregnant women before giving Venofer infusion was obtained by the majority of respondents with severe Ferritin levels, namely 45 (97.8%), with moderate Ferritin levels, namely 1 (2.2%), while there were no respondents with Ferritin levels. mild or normal.

Meanwhile, the Ferritin level of pregnant women after giving the Venofer infusion was obtained by respondents with heavy Ferritin levels as many as 11 (23.9%), moderate Ferritin levels as many as 16 (34.8%), mild Ferritin levels as many as 12 (26.1%) and normal as much as 7 (15.2%).

The results also describe the difference in the average ferritin level before and after being given Venofer infusion, the mean ferritin level before being given Venofer infusion is 10.33 with SD of 6.53, while the mean ferritin level after being given Venofer infusion is 55.22 with SD 42.91. The results of statistical tests obtained p value 0.000 (p<α,), it can be concluded that there is a significant effectiveness between ferritin levels before and after being given Venofer infusion, with severe ferritin levels before being given Venofer infusion as much as 45 (97.8%) and after being given infusion Venofer to 11 (23.9%).

Table 1.
Ferritin levels before giving Venofer infusion at Gatot Soebroto Army Hospital in 2022

Ferritin Level	Frequency	Percentage
	N	%
Heavy	45	97,8
Currently	1	2.2
Light	0	0
Normal	0	0
Amount	46	100

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Table 2.
Ferritin levels after administration of Venofer infusion at Gatot Soebroto Army Hospital in 2022

Ferritin Level	Frequency	Percentage
	N	%
Heavy	11	23,9
Currently	16	34,8
Light	12	26,1
Normal	7	15,2
Amount	46	100

Table 3.
Differences in the average changes in ferritin in pregnant women with iron deficiency anemia before and after being given Venofer infusion at Gatot Soebroto Army Hospital in 2022

Group	Mean	SD	SE	*P value*	N
Before	10,33	6,53	0,96		46
After	55,22	42,91	6,32	0,000	46

DISCUSSION

1. Average Ferritin levels before giving Venofer infusion in pregnant women with IDA

Based on the results of the study, it was found that the Ferritin levels of pregnant women before giving Venofer infusion obtained the majority of respondents with Heavy Ferritin levels, namely 45 (97.8%), with moderate Ferritin levels, namely 1 (2.2%), while there were no respondents with Ferritin levels. mild or normal., this is in accordance with the theory of Ford BA, 2018 which states that in pregnant women serum ferritin falls dramatically below 20 g/l during the II and III trimesters even in women receiving iron supplements. The threshold or cut-off of ferritin levels varies greatly depending on the method of checking used or the provisions of research results in a particular area. Vander Broeker (2009) determined the cut off ferritin for iron deficiency was 30 g/L, Laros et al determined < 20 g/L, the International Nutritional Anemia Consultative Group (INACG) was < 12 g/L. (9)

According to Almatsler, in 2019 said that Iron Deficiency Anemia can be fatal for pregnant women because pregnant women require a lot of energy to give birth. After that, Since large amounts of blood are typically lost during childbirth, anemia can complicate the health of the mother. Lack of blood and acute bleeding are the main causes of death of pregnant women during childbirth.

According to Soeprono, anemia's effects during pregnancy range from mild complaints to complications such as abortion, immature/premature parturition, prolonged labor, bleeding

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atony, subinvolution of the uterus, reduced resistance to infection and stress, decreased milk production, and fetal disorders (abortion, dysmaturity, microsomy, low birth weight, perinatal death, etc.). Premature birth is a risk factor for developing iron deficiency anemia (IDA), which is linked to a host of additional issues like low birth weight, impaired immune response, and a propensity toward behavioral and cognitive delays. The continuation of this pattern is linked to lower IQ and impaired cognitive functioning. All of these factors contribute to a decline in human capital, with negative productivity and economic repercussions as a result (10).

Signs and symptoms of iron deficiency anemia are not typical, almost the same as anemia in general, namely fatigue or fatigue due to insufficient oxygen storage in muscle tissue so that muscle metabolism is disturbed; headache and dizziness is a compensation in which the brain is deprived of oxygen due to reduced hemoglobin carrying capacity; difficulty breathing, sometimes shortness of breath is a symptom, where the body needs more oxygen by compensating for faster breathing; palpitations, where the heart beats faster followed by an increase in pulse rate; and pallor of the face, palms, nails, mucous membranes of the mouth, and conjunctiva (11)

2. Average Ferritin levels before giving Venofer infusion in pregnant women with IDA

A. Based on the results of the study, it was found that the Ferritin levels of pregnant women after giving Venofer infusion obtained respondents with severe and moderate levels of Ferritin respectively 16 (34.8%), respondents with mild and normal levels each 7 (15.2%). According to the theory of Suega, K. (2), iron deficiency can be classified as severe DB. Mild to moderate DB is present if serum ferritin is between 20 and 30 gr/l. If serum ferritin concentrations are 70–100 g/l, the condition is considered normal. As ferritin is the body's primary iron storage protein, measuring serum ferritin levels is commonly used as a surrogate marker for diagnosing DB. The function of ferritin is to store iron, especially in the liver, spleen, and bone marrow. Excess iron will be stored and when needed can be mobilized again. The liver is the largest storage site for ferritin in the body and plays a role in mobilizing serum ferritin.

B. The concentration of iron stores in the body can be measured by measuring serum ferritin. Serum ferritin levels, as the earliest indicator of declining iron stores, are routinely checked in patients seeking a diagnosis of iron deficiency due to their reliability. Due to changes in ferritin levels during an infection, the true nature of the situation may be misconstrued. The protein ferritin has 22 subunits called apoferritin, and its nucleus contains a phosphate/iron complex with 4000-5000 iron molecules. Water and plasma solubility have been demonstrated for ferritin. If there's a lot of ferritin floating around in your blood, that's because it's dissolved in your plasma. Female ferritin levels are typically between 20 and 150 g/L. (12). Even with iron supplementation, serum ferritin drops dramatically in the second and third trimesters of pregnancy in women (13). The threshold or cut-off of ferritin levels varies greatly depending on the method of checking used or the provisions of research results in a particular area. Vander Broeker (2019) determined

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the ferritin cut off for iron deficiency at 30 g/L, Laros et al determined < 20 g/L, the International Nutritional Anemia Consultative Group (INACG) was < 12 g/L. (9)

3. The effectiveness of Venofer infusion on Ferritin levels in pregnant women with IDA

Based on the results of the study, the mean ferritin level before the Venofer infusion was 10.33 with an SD of 6.53, while the mean ferritin level after the Venofer infusion was 55.22 with an SD of 42.91. The results of the statistical test obtained p value 0.000 (p<α,), so it can be concluded that there is a significant effectiveness between ferritin levels before and after Venofer infusion is given.

The results of this study are in line with the results of a study conducted by Tatiana Purba, et al entitled Comparison of the effectiveness of intravenous and oral iron therapy on iron deficiency anemia in pregnancy in 2007, the results of the study found that the increase in the patient's Hb value after iron sucrose therapy was higher (1, 6 g/dL) was compared with an increase in Hb value who received oral iron therapy (0.6 g/dL), but there was no statistically significant difference. The ferritin value of patients after iron sucrose therapy was significantly higher than the ferritin value of patients receiving oral iron therapy (p=0.041). This shows that the patient's iron stores are restored better in patients who receive iron sucrose.

However, the results of this study are not in line with the research conducted by Wildayani, et al, with the title The effect of giving zinc and iron tablets to hemoglobin and ferritin levels in pregnant women with iron deficiency anemia in 2018, the results showed that there was no effect of giving zinc and iron tablets to hemoglobin levels. and ferritin in pregnant women with iron deficiency anemia

Deficiency in iron during pregnancy is common and must be treated to prevent complications. Iron deficiency anemia during pregnancy was the subject of another study that compared the efficacy of intravenous and oral iron therapy. Twenty-one pregnant women with iron deficiency anemia between 14 and 36 weeks of gestation participated in a randomized, unblinded clinical trial. Two groups were randomly assigned to receive either ferrous sulfate (3 x 300 mg) or iron sucrose (60 mg/day). Hemoglobin, reticulocyte, and ferritin levels were measured at the one month mark following treatment. Both the unpaired t test and the Mann-Whitney U test were used for the statistical analysis. In the iron sucrose group, the increase in Hb was 1.6 g/dL 0.92 g/dL, with a maximum value of 3.8 g/dL, while in the oral group, it was 1 g/dL 0.85 g/dL, with a maximum value of 2.2 g/dL. There was no statistically significant difference. The ferritin levels in the oral group were lower (29.71 ug/L 18.37 ug/L) than those in the iron sucrose group (68.21 ug/L 55.69 ug/L), and this difference was statistically significant (p = 0.041). It was concluded that iron sucrose is an alternative therapy for iron deficiency anemia in pregnancy that can restore the body's iron stores quickly without serious side effects. However, in the midwife's authority, it is stated that in terms of administering drugs, midwives may take certain treatments in the field of obstetrics as long as it is not through injection.

According to the researchers from the results of this study, there were still 11 respondents (23.9%) who experienced low Ferritin Levels after administering Venofer infusion. This was due to the large number of respondents with high parity, where parity had a significant effect on the incidence of anemia, the more often a person has anemia. mothers giving birth make the frequency of iron in the mother's body decreases so that it has an impact on

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decreasing Hb levels which makes the mother anemic in her pregnancy. And another reason is because the majority of respondents are in the third trimester, where at 32 weeks of gestation there is a peak increase in blood volume and erythrocyte mass. experiencing an imbalance. As a result, there is a physiological hemodelution which will cause hemoglobin levels to decrease so that mothers with this condition experience anemia during pregnancy, so further treatment is needed for respondents who do not increase Ferritin levels according to the applicable SOP.

CONCLUSION

Infusion of Venofer is effective in increasing Ferritin levels in pregnant women with IDA. There is a difference in the average increase in Ferritin levels between before and after administration of Venofer infusion.

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