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Original Research Article

A Hospital-Based Study to Evaluate the Efficacy of Intravenous Iron Sucrose for the Treatment of Iron Deficiency Anemia in Pregnancy

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Abstract

Aim: The aim of the present study was to evaluate the efficacy of intravenous iron sucrose for the treatment of iron deficiency anemia in pregnancy.

Methods: The present study carried out in department of obstetrics and Gynaecology The duration of the study was about 12 months. 200 pregnant women were enrolled for this study.

Results: The results showed that the mean age of the pregnant women was 23.67±5.06 years, their mean weight was 54.56±12.28 kg, their mean gestational week was 26.84±4.08, 32 (16%) of them had gestational diabetes, 24 (12%) of them had hypertension, 14 (7%) of them had hyperthyroidism, 6% had asthma and 5% genitourinary infection whereas 8 (4%) of them had chronic kidney disease.

Conclusion: This study concluded that the administration of iron sucrose intravenously (Axifer) is a secure and effective choice in the management of iron deficiency anemia in pregnant women particularly for those who had inadequate response to oral iron supplementation. Intravenous iron sucrose is well accepted along with controllable safety profile clinically and enhanced Hemoglobin and ferritin level both and thus decrease complications during pregnancy due to iron deficiency anemia.

Keywords: Iron deficiency anemia, intravenous iron sucrose, Efficacy, Safety

Introduction

The World Health Organization [1] refers to this condition as anemia when hemoglobin is less than 11 grams/dl and hematocrit is less than 33. It is also known as the most common medical disorder in pregnancy. Anaemia is indirectly responsible for 40 percent to 50 percent of maternal deaths, especially in developing countries. [2] In well-developed countries, about 18 percent of females are affected by anemia. Moreover, in developing countries, about 35% to 75% of females are affected by anaemia. [3] All around the world, the most common cause of anaemia in pregnancy is the deficiency of iron. [4] It is reported by the World Health Organisation that women of fertile age are mostly affected by iron deficiency anaemia, representing a 50% proportion. [5] Multiple factors are involved in anemia in pregnant women in the developing countries that vary by topographical areas. [6] Globally, deficiency of iron is the major cause of anemia throughout pregnancy, while the secondary cause is the constant insufficient intake and menstruation, increased requirement of the fetus and increase volume of maternal blood in pregnancy, physiologically. [6,7]

In iron deficiency in pregnancy, females are susceptible to suffer from increased tiredness and weakness, temporary loss of remembrance, reduced concentration period and less performance at work, amplified stress on the cardiovascular system because of inadequate Hb level and low levels of diffusion and infiltration of blood oxygen, poorer resistance to diseases and a decreased acceptance to considerable loss of blood due to surgical procedures in labor. [8] The first choice for prophylaxis and treatment of mild iron deficiency anaemia in pregnancy is oral iron therapy, however, compliance to oral iron is poor because of gastrointestinal side-effects. [9,10] But in patients with moderate and severe anaemia, parenteral iron preparations such as iron dextran, iron sucrose, sodium ferric gluconate, and ferric carboxymaltose are recommended as an alternative treatment modality for pregnant women who fail to respond to oral therapy. [11,12] In cases of severe anaemia, blood transfusion depending upon individual basis (degree of anaemia, haemodynamic status, period of gestation, etc) remains the mainstay treatment. [11,13]

The determinants of birth weight and intrauterine growth are maternal weight and parental height. In 80% of the patients, the target is to achieve a haemoglobin of 11 g/dl, which can be achieved by giving intravenous iron sucrose. [14] For iron-defined patients, erythropoiesis is used to incorporate intravenous iron into haemoglobin within three to four weeks. [15] Intravenous iron is effective as it has no serious adverse effects and restores iron more effectively and faster. [16] It is a very safe, effective, and convenient therapy to treat iron deficiency anaemia in pregnancy. [17]

The aim of the present study was to evaluate the efficacy of intravenous iron sucrose for the treatment of iron deficiency anemia in pregnancy.

Materials and Methods

The present study carried out in department of obstetrics and Gynaecology, PMCH, Patna, Bihar, India .The duration of the study was about 12 months. 200 pregnant women were enrolled for this study.

Pregnant women with Hb level equivalent to or <10 g/dl, Serum ferritin level equivalent to or <15 ng/l, with the age ranging from 18-40 years, gestational age of 16 weeks till at term were included in the study while identified allergic reaction to any active component, anemia not caused by lack of iron (such as hemolytic anemia), chronic or acute bacterial infection, pregnant women with gestational age <16 weeks, excess of iron or interruption in consumption of iron (such as haemosiderosis, haemochromatosis), liver cirrhosis and hepatitis, treated with iron products intravenously or transfusion of blood in 4 weeks were excluded from the study.

Demographic data and co-morbidities were recorded at the time of registration. A two times-weekly dose of 200 mg of iron sucrose (Axifer) intravenously were infused to pregnant women, until the aim of Hb level of patient accomplished. The total collective dose of iron sucrose, equal to the total iron deficit (mg) can find out by the hemoglobin level (Hb) and body weight (BW). The dose of iron sucrose was individually calculated for each patient according to the total iron deficit with this formula.

Data Analysis

SPSS version 22 was applied to analyze the data. Frequency and percentages were calculated for categorical variables such as gender, co-morbidities and adverse effects etc. Mean±Standard deviation was calculated for numerical variables such as age, Hb and Ferritin level. Wilcoxon rank- test was used to compare mean Hb and ferritin level at, baseline and at term. P<0.05 were taken as statistically significant level.

Results

Table 1: Baseline profile of pregnant females

Variables	N (%)/Mean±SD
Age (years)	23.67±5.06
Maternal weight (kg)	54.56±12.28
Gestational week	26.84±4.08
Gestational diabetes	32 (16)
Hypertension	24 (12)
Hyperthyroidism	14 (7)
Asthma	12 (6)
Chronic kidney disease	8 (4)
Genitourinary infection	10 (5)

The results showed that the mean age of the pregnant women was 23.67±5.06 years, their mean weight was 54.56±12.28 kg, their mean gestational week was 26.84±4.08, 32 (16%) of them had gestational diabetes, 24 (12%) of them had hypertension, 14 (7%) of them had hyperthyroidism, 6% had asthma and 5% genitourinary infection whereas 8 (4%) of them had chronic kidney disease.

Table 2: Comparison of baseline and term of hematological values

Variables	Day-zero	at Term	P
	Mean±SD	Mean±SD	value
Hb (mg/dl)	9.04±0.76	12.88±11.07	<0.001
Ferritin (ng/ml)	9.81±12.48	51.77±58.42	<0.001
Mean corpuscular volume (fl)	75.45±12.24	78.42±12.08	<0.001
Pack cell volume (%)	29.91±5.16	39.28±40.06	<0.001

The study results further showed that both the hemoglobin ($p<0.001$) and ferritin levels ($p<0.001$) of females were significantly increased at term after receiving intravenous iron sucrose as compared to the baseline. Furthermore, significant difference was observed in PCV ($p<0.001$) and MCV as well ($p<0.001$).

Discussion

Globally, one of the most frequent nutritional deficiency is anemia. Even though, both the genders and all the ages are affected by nutritional anemia, the dilemma is more wide spread in women that lead to maternal morbidity and death, in addition to low weight of their babies at birth. [18] In developing countries, it has been predicted that about two-third of pregnant women are affected by the nutritional anemia. Though, in developing countries mostly women were anemic at the time of conception by a projected occurrence of anemia approximately 50% amongst non-pregnant women. Multiple factors are involved in anemia in pregnant women in the developing countries that vary by topographical areas. [19] Globally, deficiency of iron is the major cause of anemia throughout pregnancy, while the secondary cause is the constant insufficient intake and menstruation, increased requirement of the fetus and increase volume of maternal blood in pregnancy, physiologically. [19,20]

Generally, this iron is activated from iron stores. Moreover, women with already deprived stores of iron, develop deficiency of iron during pregnancy. One of the study has revealed that Hb levels less than 8 g% (moderate to severe anemia) in pregnancy are related to higher maternal morbidity whereas Hb <5 g% is linked with cardiac de- compensation and edema of lungs. Loss of even 200 ml of blood in third phase of labor leads to abrupt shock and fatality in these women. [21] The results showed that the mean age of the pregnant women was 23.67±5.06 years, their mean weight was 54.56±12.28 kg, their mean gestational week was 26.84±4.08, 32 (16%) of them had gestational diabetes, 24 (12%) of them had hypertension, 14 (7%) of them had hyperthyroidism, 6% had asthma and 5% genitourinary infection whereas 8 (4%) of them had chronic kidney disease. Multiple studies have proposed that IV iron sucrose is harmless and effective substitute to oral iron in the management of Iron deficiency anemia. [22-24]

The study results further showed that both the hemoglobin ($p<0.001$) and ferritin levels ($p<0.001$) of females were significantly increased at term after receiving intravenous iron sucrose as compared to the baseline. Furthermore, significant difference was observed in PCV ($p<0.001$) and MCV as well ($p<0.001$). A randomized control assessment reported by Neeru et al [25], utilized iron sucrose intravenously in contrast with oral iron for management of iron deficiency anemia and observed that efficacy of iron sucrose was more in raising hemoglobin level significantly (23.62% vs 14.11% in oral iron) ($p<0.05$). In another randomized study by Dubey et al [26] after administration of iron sucrose intravenously or oral iron in 200 pregnant women, it was observed that iron sucrose augmented hemoglobin level and iron stores more rapidly as compared to oral iron significantly ($p<0.001$). The high acceptance of the drug has been partially accredited to sluggish discharge of iron from the iron sucrose complex and also because of low tendency to cause allergic reaction of sucrose. [27] The finding of the above study was contradictory to present study, where no major side effect was reported.

Conclusion

This study concluded that the administration of iron sucrose intravenously (Axifer) is a secure and effective choice in the management of iron deficiency anemia in pregnant women particularly for those who had inadequate response to oral iron supplementation. Intravenous iron sucrose is well accepted along with controllable safety profile clinically and enhanced Hemoglobin and ferritin level both and thus decrease complications during pregnancy due to iron deficiency anemia.

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