

Comparison Of Parenteral Iron Sucrose And Oral Iron Therapy In Managing Iron Deficiency Anemia In The Post-Partum Period

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Abstract

Objective: The goal of this study is to assess the effectiveness of parenteral iron sucrose therapy vs oral iron supplements in the treatment of iron deficiency anaemia (IDA) in the postpartum period.

Methods: This study is conducted in the OBS and Gynae department of PAF Hospital Islamabad. This is a randomized control trial (RCT). A total of 130 women, 65 in each group were recruited who were diagnosed with iron deficiency anaemia (as per operational definition), 48hrs after delivery. In group A females were prescribed intravenous iron sucrose therapy according to post-delivery hemoglobin level by using the formula $(2.4 \times (\text{target Hb} - \text{actual Hb}) \times \text{post-pregnancy weight (kg)}) + 1000 \text{ mg}$ every alternate day. In group B females were prescribed daily oral iron supplements along with folic acid. Follow-up of both groups was done after 4 weeks in OPD.

Results: The mean age was 29 years $\pm$ 2.688 in group A, while in group B it was 30 years with SD $\pm$ 2.422. In group A (Intravenous iron sucrose therapy) mean ferritin level was 140.94 ± 3.292 and the mean hemoglobin level was 11.11 ± 0.710 . In group B (Oral iron supplements) mean serum ferritin level was 125.34 ± 6.551 and the mean Hemoglobin level was 10.65 ± 0.623 after treatment.

Conclusion: Our study concludes that there is no significant difference in treatment between intravenous iron sucrose therapy and oral iron supplements for iron deficiency anaemia in the post-partum period.

Keywords: Postpartum period, Iron, Anemia, ferrous sulphate, iron sucrose

Introduction

The most prevalent cause of maternal death and morbidity in the subcontinent is anaemia. Iron deficiency is more common during pregnancy and is the leading cause of maternal anaemia. The incidence of anaemia in the global population is believed to be between 20 and 50%.^{1,2} Oral and parenteral iron treatment were both successful in treating peripartum anaemia, although intravenous iron replenished reserves more quickly than oral iron.³ Women who had iron deficiency anaemia during pregnancy had the greatest postpartum anaemia rate (49%). In recent years, several methods have been utilized to treat anaemia in the prenatal and postnatal period,⁴ including oral iron, intravenous iron, intramuscular iron, and blood transfusion. Oral iron is the preferred method since it is readily available, although it has a low bioavailability,⁵ and poor compliance, parenteral iron bypasses these obstacles and provides a quick and adequate iron delivery.⁶

Both ferric carboxy-maltose and intravenous iron sucrose formulations show promise in pregnancy in terms of efficacy, but intravenous iron sucrose is easier to administer and has a superior safety profile in both the prenatal and postpartum periods. Oral iron is the most commonly given therapy in pregnancy for mild to severe anaemia, however, compliance is low due to gastrointestinal side effects such as diarrhoea and bloating. Parenteral iron preparations are often given during pregnancy as an alternate modality in situations when females do not react to therapy or are non-compliant with medication. Various parenteral formulations are available, including iron sucrose,

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R.A, M.K, M.A, A.S.A, A.F - Conception of study
- Experimentation/Study Conduction
R.A, M.A, A.N - Analysis/Interpretation/Discussion
R.A, M.K, A.N - Manuscript Writing
R.A, M.K, M.A, A.S.A, A.F- Critical Review

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dextran, ferric gluconate, and ferric. Der isomaltose after IV administration, iron sucrose dissociates into iron and sucrose. The iron then binds to transferrin, which transfers it to the bone marrow. It is converted into haemoglobin within red blood cells. It is swiftly removed from serum and hence readily accessible for erythropoiesis. 4 Postpartum anaemia is one of the major global maternal health issues. 7 Postpartum anaemia (PPA) makes it more difficult for mothers to satisfy physiological needs following childbirth. 8 In general, anaemia is more widespread in developing nations such as India, with women of reproductive age being the most affected group. Historically, oral iron has received a lot of attention, but it is also linked to greater negative effects. 10

Tigga and Debbarna found that the mean haemoglobin level after treatment was observed as 10.96 ± 0.46 g/dl with oral iron while 11.20 ± 0.51 g/dl with iron sucrose therapy ($p < 0.05$). 6 While Neeru et al., conducted another trial and showed that the mean haemoglobin level after treatment was observed as 11.06 ± 0.63 g/dl with oral iron while 11.24 ± 0.70 g/dl with iron sucrose therapy ($p > 0.05$), but serum ferritin level significantly increased as 27.33 ± 14.96 vs 139.93 ± 122.13 with oral versus iron sucrose therapy ($p < 0.05$). 11 Bhavi and Jaju also found that mean hemoglobin level was 106 ± 110.3 vs. 106.4 ± 13 g/L ($p > 0.05$) while serum ferritin level was 30.62 ± 9.88 vs. 120.85 ± 87.91 respectively. 12

All of these studies were done in pregnant females. Vishwakarma et al conducted a study in the postpartum period and reported that the mean haemoglobin level after treatment was observed as 10.16 ± 0.877 g/dl with oral iron while 10.91 ± 0.770 g/dl with iron sucrose therapy ($p < 0.05$), and serum ferritin level significantly increased as 23.88 ± 5.339 vs 58.35 ± 14.537 with oral versus iron sucrose therapy ($p < 0.05$). Thus, iron sucrose had a better outcome than oral iron. 9

The purpose of this study is to evaluate the outcomes of iron sucrose therapy and oral iron supplements in the treatment of iron deficiency anaemia in the postpartum period. According to the literature, IV iron is more effective in improving haemoglobin and ferritin levels in the blood than oral iron therapy because it absorbs more and faster in the blood, whereas oral iron therapy has gastrointestinal effects, and compliance is often compromised, with females forgetting to take medicine on time or skipping it on purpose.

In contrast, compliance with intravenous treatment is higher. Furthermore, no local studies have been identified in the literature that might assist us in implementing a more appropriate kind of iron treatment for iron deficiency anaemia in the postpartum period. The goal is to help the broader people. The findings will assist us in developing a regimen between the two for correcting postpartum anaemia and establishing guidelines to decrease morbidity during the postnatal period. As a result, we want to undertake this study at a local scale and use the findings in a local environment.

Materials And Methods

This is a comparative study. This study is conducted in OBST and Gynae Dept., Pakistan Air Force Hospital Islamabad. The duration of the study was 6 months i.e., from 15.5. 2023 to 15. 11.2023. The sampling technique was non-probability consecutive sampling, sample size was 130 i.e., 65 females in group A and 65 in group B.

Inclusion criteria were females aged 18-40 years with parity of < 5 diagnosed with iron deficiency anaemia (as per operational definition) 48 hrs. after delivery.

All women with a history of allergy to iron supplementation with multiple pregnancies or with Hb of < 8 g/dl or who had postpartum haemorrhage were excluded from the study. Data was collected after approval from the local ethical committee.

After obtaining informed consent demographic information (name, age, parity, gestational age at delivery, BMI, socioeconomic status, mode of delivery and need for blood transfusion after delivery due to excessive blood loss) was recorded. All baseline, blood samples were taken and sent to the laboratory for assessment of haemoglobin and serum ferritin levels. Then females were randomly divided into two groups by using the lottery method. In group A, females were prescribed intravenous iron sucrose therapy according to post-delivery haemoglobin level by using the following formula i.e. $(2.4 \times (\text{target Hb} - \text{actual Hb}) \times \text{post-pregnancy weight (kg)}) + 1000$ mg every alternate day. In group B, females were prescribed daily oral iron supplements. Then females were followed-up after 4 weeks in OPD. After 4 weeks, blood samples were taken and sent to the laboratory for assessment of haemoglobin and serum ferritin levels. Reports were assessed and levels were recorded (as per the operational definition). All this information was recorded on a specially designed proforma.

Mean and standard deviation were calculated for variables like (Hb and age) and percentage and frequency were calculated for variables (parity, S.E, and modes of delivery). Data was entered and analyzed through SPSS version 25. Both groups were compared for mean haemoglobin and serum ferritin levels by using independent samples and chi-square was used to check for differences in 2 groups. P-value ≤ 0.05 was taken as significant.

Results

Our study revealed that the age distribution among two groups was evaluated, with 44 (67.7%) women in group A (intravenous iron sucrose treatment) being between the ages of 18 and 30, and 21 (32.3%) being between the ages of 31 and 40. The mean age was 29 years, with a standard deviation of ± 2.688 . In group B (oral iron supplements), 46 (70.8%) of the women were between the

ages of 18 and 30, with 19 (29.2%) falling between the ages of 31 and 40. The mean age was 30 years, with a standard deviation of ± 2.422 . (Table 1).

Table 1: Mean and standard deviation of all the variables

Age	Group A	Group B	Total	Mean And Sd	P Value
18-30 yrs	44(67.7%)	46(70.8%)	65(100%)	29.80 $\pm$ 2.688	0.5193
31-40 yrs	21(2.3%)	19(29.2%)	65(100%)	30.09 $\pm$ 2.422	0.5193
BMI					
$\leq 27 \text{ Kg/m}^2$	42(64.6%)	44(67.7%)	65(100%)	27 $\pm$ 3.24	0.0608
$> 27 \text{ Kg/m}^2$	23(35.4%)	21(32.3%)	65(100%)	28 $\pm$ 2.77	0.0608
PARITY					
≤ 3	40(61.5%)	39(60.0%)	65(100%)	3 $\pm$ 1.57	1.0000
> 3	25(38.5%)	26(40.0%)	65(100%)	3 $\pm$ 1.63	1.0000
GESTATIONAL AGE					
37-39 weeks	45(69.2%)	47(72.3%)	65(100%)	38 $\pm$ 1.84	1.0000
39 -41 weeks	20(30.8%)	18(27.7%)	65(100%)	38 $\pm$ 1.77	1.0000
BLOOD TRANSFUSION					
Yes	3(4.6%)	5(7.7%)	65(100%)		
No	62(95.4%)	60(92.3%)	65(100%)		0.4654
OUTCOME					
Serum ferritin Level	140.94 $\pm$ 3.292	125.34 $\pm$ 6.551	65(100%)		0.0000
Haemoglobin Level	11.11 $\pm$ 0.710	9.65 $\pm$ 0.623	65(100%)		0.0000

BMI distribution among two groups was analyzed as in group A (Intravenous iron sucrose therapy) 42(64.6%) women had a BMI $\leq 27 \text{ Kg/m}^2$ and 23(35.4%) women had a BMI $> 27 \text{ Kg/m}^2$. Whereas in group B (Oral iron supplements) 44(67.7%) women had BMI $\leq 27 \text{ Kg/m}^2$ and 21(32.3%) women had BMI $> 27 \text{ Kg/m}^2$

Parity distribution among two groups was analyzed as in group A 40(61.5%) women had parity

≤ 3 and 25(38.5%) women had parity > 3 . Whereas in group B 39(60%) women had parity ≤ 3 and 26(40%) women had parity > 3

The gestation age among the two groups was analyzed in group A

45(69.2%) women had POG ≤ 39

Weeks and 20(30.8%) women had POG > 39 weeks. Where as in group B (Oral iron supplements) 47(72.3%) women had POG ≤ 39 weeks, 18(27.7%) women had POG > 39 weeks

Socioeconomic status among two groups was analyzed as in group A 28(43.1%) women were low class, 30(46.2%) women were middle class and 7(10.8%) women had high class. Where as in group B (Oral iron supplements) 30(46.2%) women were low class, 30(46.2%) women were middle class and 5(7.7%) women had high class.

Mode of delivery among two groups was analyzed as in group A 20(30.8%) women had caesarean section and 45(69.2%) women had NVD. Where in group B (Oral iron supplements) 22(33.8%) women had caesarean section and 43(66.2%) women had NVD.

The outcome among the two groups was analyzed as in group A (Intravenous iron sucrose therapy) mean serum ferritin level was 140.94 $\pm$ 3.292 and the mean hemoglobin level was 11.11 $\pm$ 0.710. Whereas in group B (Oral iron supplements) mean ferritin level(Fe) was 125.34 $\pm$ 6.551 and the mean Hemoglobin(Hb) level was 10.65 $\pm$ 0.623.

Discussion

Both oral and intravenous iron treatments effectively corrected anaemia in the peripartum period. However, intravenous iron replenished iron stores more quickly than oral iron, offering a faster recovery for the mothers.³ Our study shows that in group A mean age was 29 years with SD ± 2.688 . Whereas in group B mean age was 30 years with SD ± 2.422 . In group A (Intravenous iron sucrose therapy) mean serum ferritin level was 140.94 $\pm$ 3.292 and the mean haemoglobin level was 11.11 $\pm$ 0.710. Whereas in group B (Oral iron supplements) mean serum ferritin level was 125.34 $\pm$ 6.551 and the mean Hemoglobin level was 9.65 $\pm$ 0.623. Similar findings were observed in another study carried out by Tigga and Debbarma,⁶ found that the mean haemoglobin level after treatment was observed as 10.96 $\pm$ 0.46 g/dl with oral iron while 11.20 $\pm$ 0.51 g/dl with iron sucrose therapy ($p < 0.05$). In another study carried out by Neeru et al,¹¹ conducted another trial and showed that the mean haemoglobin level after treatment was observed as 11.06 $\pm$ 0.63 g/dl with oral iron while 11.24 $\pm$ 0.70 g/dl with iron sucrose therapy ($p > 0.05$), but serum ferritin level significantly increased as 27.33 $\pm$ 14.96 vs 139.93 $\pm$ 122.13 with oral versus iron sucrose therapy ($p < 0.05$)

Another study carried out by Bhavi and Jaju,¹² also found that the mean haemoglobin level was 10.6 ± 11.3 vs. 10.6 ± 13 g/L ($p > 0.05$) while serum ferritin level was 30.62 ± 9.88 vs. 120.85 ± 87.91 respectively.⁸

A similar observation was detected in a study conducted by Vishwakarma et al,¹³ which showed the mean haemoglobin level after treatment to be 10.16 ± 0.877 g/dl with oral iron while 10.91 ± 0.770 g/dl with iron sucrose therapy ($p < 0.05$), and serum ferritin level significantly increased as 23.88 ± 5.339 vs 58.35 ± 14.537 with oral versus iron sucrose therapy ($p < 0.05$). Thus, iron sucrose had a better outcome than oral iron.

Conclusions

Our study concludes that there is no significant difference between iron sucrose therapies when compared to oral iron supplements in the treatment of iron deficiency anaemia in the post-partum period. Not much work is done on post-partum anaemia locally so more work is required with a bigger sample size.

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