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Intravenous iron sucrose in postnatal iron deficiency anaemia: A safe option

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Abstract
Introduction: Iron deficiency anaemia is the most common type of reversible anemia encountered during postpartum period and may lead to long-standing iron deficiency. If treated, it facilitates a healthy future for mother and children.
Aims and Objectives: To know safety of intravenous iron sucrose in treatment of postpartum iron deficiency anaemia.
Materials and Methods: 91 postnatal women with iron deficiency anaemia with haemoglobin between 7-10g/dl were included prospectively at IGGMCH Nagpur. These women were given 200 mg of elemental iron infused over 30 minutes every alternate day until the required dosage is infused. The blood samples of all the patients were collected and analyzed for Hb and other RBC indices before and after therapy.
Result: Majority of the patients were multi-para (63.76%) belonging to lower socio-economic groups. All blood parameters were increased significantly when compared from baseline values. Mean raise in Hb, hematocrit, MCV, MCH, MCHC and serum ferritin are 1.3, 2.3, 3.4fL, 2.3pg, 3.5 gm/dl and 53.71mcg/l respectively after 30 days of treatment.
Conclusion: Intravenous iron sucrose was very well tolerated and safe for treating postnatal iron deficiency anaemia.

Keywords: Anaemia, postnatal women, iron deficiency, intravenous iron sucrose

Introduction

Anaemia is a major public health problem worldwide. According to the World Health Organization (WHO) 2019, global anaemia prevalence was around 30% in women of reproductive age; equal to over half a billion women aged 15-49 years. Prevalence was 29.6% in non-pregnant women of reproductive age, and 36.5% in pregnant women.

The situation is grave in Southeast Asian countries where around 50% of all global maternal deaths are due to anaemia. It is found that maternal anaemia contributes to 18% of perinatal mortality and 20% of maternal mortality in South Asian countries including our India [1].

Anaemia is the most common health hazard in pregnancy and among all other types iron deficiency anaemia is the commonest of them all.

The iron deficiency in pregnant Indian women is amongst the highest in the world as per the prevalence rate. Untreated iron deficiency has significant consequences on mother and foetus.

The prevalence of postpartum anaemia is 27% and a haemoglobin level of less than 8 g/dl is seen in around 10% of women. The risk of maternal morbidity in postpartum period has a incidence rate of 56%. In majority the aetiology of postpartum anaemia is decreased serum iron level. Post-partum haemorrhage is the cause of anaemia in 5-10% of women [2].

Postpartum anemia is a major cause of maternal morbidity such as tiredness, dizziness, lactation failure due to mastitis, delayed wound healing, urinary tract infections, puerperal sepsis and postpartum depression and mortality in poor countries. Anaemia may result from inadequate dietary intake, parasitic infection, malaria or might be an exacerbation by the physiological effects of pregnancy and blood loss at the time of birth.

To treat this, traditional treatment is oral iron supplementation while blood transfusions are reserved for more severe cases of anaemia. High doses of oral iron usually causes side effects, including constipation, nausea, and gastric irritation, affecting compliance. Blood transfusion gives excellent results but it is associated with high risk of infections particularly with hepatitis B, hepatitis C, and human immunodeficiency virus and some serious transfusion reactions [3]. In such cases intravenous iron has been considered as an alternative.

Intravenous iron combines the advantages of complete bioavailability with no gastro-intestinal side effects and faster recovery of haemoglobin than oral iron. In the past, only iron dextran could be given intravenously but it was associated with severe anaphylactic reactions. The new iron–sucrose complex is very safe with minor side effects and with evidences to suggest their use in frontline settings for pregnancy associated iron deficiency anemia and to treat postpartum anemia [4].
Therefore, this study was conducted to study effectiveness, tolerability and safety of intravenous iron sucrose in iron deficiency anaemia in postnatal women.

Methods

This was a prospective observational study conducted in Indira Gandhi Government Medical College and Hospital, Nagpur from September 2020 to June 2022. Ninety-one post-natal women with iron deficiency anaemia with haemoglobin percentage between 7gm/dl and 10gm/dl were included in this study.
Patients of age >18 years and diagnosed with postpartum anaemia with Hb% equal to or greater than 7 g/dl and less than 10 g/dl were included in the study. Patients with history of allergy to iron containing medications, or with history of allergic conditions or bronchial asthma, thalassemia, history of bleeding tendency, non-iron deficient anaemia were excluded from the study.
After getting approval from institutional ethics committee, informed consent was taken from all the patients. Detailed history of the patient was taken and clinical examination was carried out in a predesigned proforma.
Relevant investigations were done and injection iron sucrose was infused according to requirement.
The total amount of iron sucrose required in mg is determined using Ganzoni's formula-

Ganzoni's formula

Total required iron dose (mg) =2.4x (target hb-actual hb in g/dl) x pre-pregnancy weight + 500 mg. (for replenishment of stores)

The patients were given 200 mg of elemental iron diluted in 100 ml of 0.9% normal saline and infused over 20-30 minutes every alternate day until the required dosage is infused.
Before therapy, blood investigations were sent for the patients who were clinically anaemic within the first 48 hours of either vaginal or caesarean delivery, which includes Haemoglobin, hematocrit, MCV, MCH, MCHC and tests to confirm iron deficiency anaemia by peripheral smear and serum ferritin. During therapy patients were observed for their vitals (temperature, pulse rate and BP), adverse effects like nausea, vomiting, abdominal pain, chills and rigor, joint pain, thrombophlebitis, pain at injection site and anaphylactic reactions.
Patients were discharged after infusing the required dose of iron and asked to attend the gynecology OPD after four weeks of therapy and the following parameters haemoglobin in g/dl, hematocrit, MCV, MCH, MCHC serum ferritin were assessed.

Results

Table 1: Socio-demographic characteristics of study participants

Characteristics	N	Percentage
Age in years		
<20	12	13.18
21-25	38	41.75
26-30	33	36.26
31-35	07	07.69
36-40	01	01.09
Socio-economic status		
III	11	12.08
IV	53	58.24
V	27	29.67
Booking status		
Booked	49	53.84
Un-booked	42	46.15
Parity status		
Para-1	33	36.24
Para-2	33	36.24
Para-3	18	19.77
Para-4	5	5.49
Para-5	2	2.18
Mode of delivery		
Vaginal Delivery	40	43.95
LSCS	51	56.04

Table 1 presents the socio-demographic status of the patients. Among the 91 women maximum (41.75%) were in age group 21 – 25 yrs followed by 36.26% in age group 26 – 30 yrs and 13.18%, 7.7% and 1.09% in the age groups of < 20 yrs, 31 – 35 yrs and 36-40 yrs respectively. Maximum women belonged to lower socio economic groups Class IV (58.24%) and Class V (29.67%) and very few (12.08%) in class III. Among them 53.84% were booked and 46.15% were un-booked. Among these women 36.24% are para-1, 36.24% are para-2, 19.77% are para-3, 5.5% and 2% are para-4 and para-5 respectively. Amongst them (56.04%) were delivered by LSCS and rest (43.95%) by vaginal delivery.

Table 2: Laboratory parameters before and after treatment

Parameters	Before treatment	After treatment	Mean change	P-value
Haemoglobin (gm/dl)	8.26	9.50	1.3	<0.001
Haematocrit (%)	29.00	31.38	2.3	<0.001
MCV(fl)	75.51	78.91	3.4	<0.001
MCH(pg)	25.40	27.70	2.3	<0.001
MCHC(gm/dl)	32.83	36.35	3.5	<0.001
Serum ferritin(mcg/l)	25.71	79.42	53.71	<0.001

The mean Hb% was raised significantly by the end of the treatment (9.5 gm/dl) compared to baseline 8.26 gm/dl (p<0.001). As shown in Table 2, highly significant mean difference with p value of <0.001 was observed for all the other parameters before and after completion of the treatment (hemoatocrit-2.3%; MCVs-3.4fl; MCH 2.3 pg; MCHC 3.5 gm/dl and serum ferritin 53.71 mcg/l).

Table 3: Side effects of the treatment

Side effects	No. of Mothers	Percentage
No side effects	79	86.81
Nausea/vomiting	02	2.19
Headache	03	3.29
Abdominal pain	01	1.09
Chills and rigors	04	4.39
Thrombophlebitis	02	2.19
TOTAL	91	100

Of the total women majority (86.81%) had no side effects and only 4.39% had chills and rigor and 3.29% had headache, 2.19% female had nausea/vomiting and 2.19% had thrombophlebitis with 1% women having abdominal pain. No serious adverse effects or anaphylactic reactions were noted.

Discussion

Iron deficiency is the most common disorder in the world and one of the common causes of anemia. The first choice in the treatment of iron deficiency anemia for almost all patients is oral iron replacement because of its effectiveness, safety and low cost. Its efficacy is limited in many patients because of the gastrointestinal side effects and metallic taste and the long course needed to treat anemia and replenish iron stores. Non-adherence to a prescribed course of oral iron is common and, even in adherent patients, poor intestinal absorption fails to compensate for iron need. Intravenous iron has the capability of bypassing all these issues. The use of intravenous iron sucrose is a safe and effective option in the treatment of post-natal women with iron deficiency anemia who lack satisfactory response to oral iron therapy. Intravenous iron sucrose is well tolerated and with a clinically manageable safety profile when used with appropriate dosing and monitoring. The use of intravenous iron sucrose would potentially improve compliance and thereby reduce morbidities from iron deficiency [5].

In current study, 91 postnatal patients with iron deficiency anaemia were selected according to the inclusion and exclusion criteria and 200 mg iron sucrose was given intravenously 2 days apart according to the requirement and was followed up after 1 month interval.

In the current study, significant rise in hemoglobin percentage, hematocrit, MCV, MCH, MCHC, Serum ferritin values when compared from baseline values i.e. from before to after treatment period. These findings were similar with the observation of Dr. Preetha *et al*. [6] and Syal Neeru *et al*. [7]

Of the 91 total patients majority (86.81%) had no side effects and only 4.39% had chills and rigor and 3.29% had headache, 2.19% female had nausea/vomiting and 2.19% had thrombophlebitis with 1% having women abdominal pain. No serious adverse effects or anaphylactic reactions were noted. Similar observation was done by R. Niranjana *et al*. [8] In his study out of 44 women 88% had no side effects and only 12% had minor side effects. In another study by Dheeba *et al*. [9] 96% women had no side effects and only 3.5% had minor side effects. No patient had severe anaphylactic reactions.

Conclusion

Intravenous iron sucrose is emerging as a front-line drug in treating iron deficiency anaemia in postnatal women. Intravenous Iron sucrose has been found to be effective in improving hemoglobin, hematocrit & ferritin values significantly in postnatal women with iron deficiency anaemia. To conclude Intravenous iron sucrose is very safe and effective with hardly any side effects and with mounting evidence to suggest their use in frontline settings.

Ethical approval

The study was approved by the Institutional Ethics Committee

Conflict of Interest

Not available

Financial Support

Not available

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