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Comparative Study of Intravenous Iron Sucrose Versus Ferric Carboxymaltose for the Treatment of Iron Deficiency Anemia during Pregnancy and Postpartum Period

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Abstract

Objectives: The present study aims at advantages of ferric carboxymaltose therapy over iron sucrose in iron deficiency anaemia of ante natal and postnatal patient. *Methods*: A prospective observational study was carried out at ACPM medical college during January 2017 to December 2017 for 50 antenatal and 50 postnatal women, total 100 women. Diagnosis of iron deficiency anemia done by proper history taking, examination, peripheral blood smear and blood indices. Baseline haemoglobin and serum ferritin levels were noted on first, eighth, fifteenth and thirtieth day of treatment with iron sucrose or ferric carboxymaltose for randomly selected 50 antenatal and 50 postnatal women. *Results*: The mean rise of haemoglobin value was 4.3 g/L for ferric carboxymaltose and 4.0 g/L for iron sucrose in pregnant women. For postpartum women mean rise of haemoglobin was 4.9 g/L after treatment with ferric carboxymaltose and 4.4 g/L for iron sucrose. *Conclusion*: For the treatment of iron deficiency anaemia in pregnancy as well as postnatal women ferric carboxymaltose is safe, efficient and having many advantages over iron sucrose.

Keywords: Iron deficiency anaemia; Iron sucrose; Iron ferric carboxymaltose

Introduction

In India anaemia is the major contributing factors for most of maternal mortality and morbidity. Reproductive age group, particularly pregnant women are the most common affected group. It is estimated to contribute 20% of all maternal deaths and 40% of perinatal mortality [1]. AND 27% of postpartum morbidity like lactational failure, subinvolution and postpartum anaemia [2]. Therefore, adequate and early treatment of anaemia in antepartum and postpartum period will improve quality of life in women of childbearing age group and hence even further on.

In 95% pregnant women cause of anaemia is iron deficiency anaemia [3] the reason being increased demands of growing foetus [4,5], physiological hemodynamic changes and changes like nausea, vomiting, motility disorders, delayed gastric emptying, indigestion, constipation, development of haemorrhoids in pregnancy aggravates iron deficiency anaemia, hence supplementation of iron should be there to fulfil this deficiency [6] complications related to postpartum anaemia includes lactational failure, subinvolution, depression, anxiety; problems in growth development of infants [7,8] there are no fixed guidelines for treatment of postpartum anaemia at present, it varies from institute to institute [9]. In postnatal women, also iron requirement remains high due to pre-existing iron deficiency anaemia during pregnancy, associated other risk factors and co-morbidities [10]. Intrapartum blood loss, inflammatory responses decreases-haemopoesis [11].

Iron salts are available in both oral as well as parental form. Since era routinely oral salts are supplemented to all antenatal women, but incidence of iron deficiency anaemia is still high, may be because of few GI side effects and low compliance of

patient with oral preparation [12]. Considering this parental iron is best alternative to treat iron deficiency anaemia. Since last few decades iron dextran, iron sorbitol and iron sucrose are widely used preparations [13]. Higher dose of these preparations showed anaphylactic reaction and few systemic side effects as well, which warrants their use in low dose only [14]. Rapidcorrection in haemoglobin level as well as iron storage proves its advantages over old parental iron preparations. This motivated us to carried out this study to evaluate efficacy and safety of ferric carboxymaltose & to compare it with iron sucrose for treatment of antenatal and postnatal iron deficiency anaemia.

Material and Methods

Study Design, Study Setting and Study Period

Hospital based observational study was carried out in the obstetrics and gynae department of ACPM Medical College, Dhule, Maharashtra; during the period of 1 year from December 2016 and November 2017.

Selection of Cases

A total of 100 pregnant women who attended antenatal clinics of the department of obstetrics and gynaecology of ACPM Medical College Dhule as well as those admitted in the antenatal ward were selected for the study.

Inclusion and Exclusion Criteria

Inclusion Criteria

Postpartum patients with HB between 7 to 11 gm/dL at 24 to 48 hours after delivery and willing to give consent.

Antenatal patients with iron deficiency anaemia.

Exclusion Criteria

- Any haematological disorder other than iron deficiency anaemia
- Patients suffering from chronic illness like renal cardiac, hepatic and immunological disorders
- Known hypersensitivity and resistance to injectables and compounds
- Patients with severe anaemia in decompensated state requiring blood transfusion
- Patients suffering from anaemia due to acute blood loss for example PPH
- Any other serious medical illnesses like patients with history of asthma, thromboembolism and Signs of infection
- Patients with iron treatment or blood transfusions within 4 weeks prior to treatment or historyof erythropoietin treatment.

After brief history taking, clinical examination and ruling out causes of anaemia other than iron deficiency anaemia with few investigations like blood count, peripheral blood smear; levels of serum ferritin we randomly selected antenatal and postnatal women from our institute.

In our prospective observational study, 50 women (25 antenatal & 25 postnatal) with anaemia were randomized to receive IV iron sucrose (Group A) in divided doses with maximum daily dose of 200mg in 100ml normal saline over 20 mins.

50 women in group B (25 each of antenatal & postnatal iron deficiency anaemia) received IV ferric carboxymaltose in single infusion of 100 ml normal saline over 10 to 15 mins. Maximum infusion dose was 1000mg.

Total required dose to be given for treatment was calculated using following formula.

Required iron dose = (2.4 × (11- Hb level) × weight in kg + 1000 mg.

Post treatment haemoglobin and serum ferritin levels were noted on 8^{th}, 15^{th} & 30^{th} day.

Result Obtained as follows.

Table 1: Comparison of hemoglobin level in both treatment modalities in Pregnant Women

Hemoglobin Levels	Participants given iron sucrose (n=25)	Participants given ferric carboxymaltose (n=25)	p- value
Hb at 0 day	7.4 +/- 2.4	7.3 +/- 2.5	P < 0.001
Hb at 8^{th} day	8.5 +/- 1.8	9.1 +/- 1.6	P < 0.001
Hb at 15^{th} day	10.2 +/- 1.5	10.5 +/- 1.5	0.03
Hb at 30^{th} day	11.5 +/- 1.1	12.0 +/- 1.2	0.04

Table 2: Comparison of hemoglobin level in both treatment modalities in post-partum women

Hemoglobin Levels	Participants given iron sucrose (n=25)	Participants given ferric carboxymaltose (n=25)	p- value
Hb at 0 day	7.5 +/- 2.5	7.2+/- 2.6	P < 0.001
Hb at 8th day	8.5 +/- 1.8	9.5 +/- 1.8	P < 0.001
Hb at 15th day	10.4 +/- 1.6	10.8 +/- 1.6	0.02
Hb at 30th day	11.6 +/- 1.2	12.4 +/- 2.0	0.02

Table 3: Comparison of serum ferritin in both treatment modalities in Pregnant women

Serum Ferritin	Participants given iron sucrose (n=25)	Participants given ferric carboxymaltose (n=25)	p- value
On 0 day	10.5 +/- 7.4	10.8 +/- 7.6	P < 0.001
On 30th day	21.2 +/- 3.5	22.5 +/- 3.6	P < 0.001

Table 4: Comparison of hemoglobin level in both treatment modalities inpost-partum women

Serum Ferritin	Participants given iron sucrose (n=25)	Participants given ferric carboxymaltose (n=25)	p- value
On 0 day	10.8 +/- 7.6	10.6 +/- 7.5	P < 0.001
On 30th day	20.8 +/- 3.4	23.2 +/- 3.3	0.02

Results

There was a rise in the mean level of haemoglobin in both treatment modalities. On day 15th and 30th rise was more in ferric carboxymaltose as compared to iron sucrose in both pregnant as well as in postpartum women and it was statistically significant [Table 1 & 2]

Serum ferritin also shows increment in both treatment modalities on day 30th. Mean rise of serum ferritin levels were higher in ferric carboxymaltose as compared to iron sucrose in both pregnant as well as in postpartum women and it was statistically significant on day 30th in postpartum women. [Table 2 & 3].

Adverse reactions like fever, chills, headache, itching, injection site pain, hyper or hypotension, breathlessness, nausea, vomiting, and anaphylactic reactions,were milder in both the cases and mostly related to local reaction found more in iron sucrose as compare to ferric carboxymaltose.

Discussion

In developing countries like India Iron deficiency anaemia remains most common contributing factor for maternal morbidity, mortality as well as perinatal morbidity or mortality. Prompt treatment to improve haemoglobin level and correct depleted iron Store is recommended.

Amongst all different iron preparations available parental ions are already proved effective because of low compliance and side effect like GI disturbance, constipation, blackening of stools [13].

There was no statistically significant difference in rise of haemoglobin and serum ferritin level between iron sucrose and ferric carboxymaltose group women. Registered adverse effects were all mild and quickly reversible and mostly restricted to local reactions at infusion site. There were no treatment-related serious adverse events. So both are equally efficient for correction as well as restoring and storage

To achieve desired rise in hemoglobin level we required frequent hospitalization or counselling for iron Sucrose while the same results we got with single dose IV ferric carboxymaltose. Hence ferric carboxymaltose is found superior as per compliance and also cost effectiveness is concerned. However, subsequent meta- analysis has confirmed the safety of ferric carboxymaltose [15] and a recent prospective study has shown that ferric carboxymaltose reduces the risk of hospitalisations in patients with heart failure compared to placebo [16]. And alsoferric carboxymaltose gives faster and better results in restoring the hemoglobin and serum ferritin levels in antepartum as well as Postpartum patients.

Conclusion

Amongst all available parental iron preparations; iron Sucrose as well as ferric carboxymaltose are

effective in treating mild to moderate iron deficiency anaemia of antenatal as well as postnatal women.

Ferric carboxymaltose appears to correct haemoglobin and serum ferritin level s rapidly than iron Sucrose also it is better for short hospital stay and patientscompliance.

Conflict of Interest: None

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