

A COMPARATIVE STUDY OF INTRAVENOUS FERRIC CARBOXYMALTOSE VERSUS ORAL FERROUS SULFATE IN IRON DEFICIENCY ANAEMIA IN POST PARTUM WOMEN

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ABSTRACT

Introduction: Anaemia is the most common nutritional deficiency in the world. The group with the greatest number of individuals affected being pregnant women (41.8%). Menstrual blood loss, pregnancy and delivery are the main causes of anaemia in reproductive-age women. Anaemia is an important cause of maternal mortality. Complaints like lethargy, easy fatigability, dizziness, lactation failure, post-partum depression are not unusual findings in patients with postpartum anaemia (PPA). It is estimated that 20–40% of maternal deaths in India are due to anaemia.

Aims: To find out and compare the efficacy, safety, and tolerability of intravenous ferric carboxymaltose and oral ferrous sulfate in improving haemoglobin concentration in iron deficiency anaemia during post partum period.

Materials and Methods: The present study was a Hospital based study in which prospective, comparative observation study. This Study was conducted from 18 months at Department of Dept. of Obstetrics and Gynaecology, Chittaranjan Seva Sadan College of Obs. Gnae. And Child Health, 37, S.P Mukherjee Road, Kolkata -700026.

Result: showed that the mean level of Ferritin of the patients in Intravenous Group was significantly higher than that of the patients in Oral Group ($p < 0.0001$).

Conclusion: In this present study Ferric carboxymaltose produced significantly greater and sustained increases in Hb and Ferric carboxymaltose was superior to oral iron in improving iron stores, as measured by ferritin.

Keywords: Ferric carboxymaltose, Anaemia, easy fatigability and maternal mortality.

INTRODUCTION

Anaemia is the most common nutritional deficiency in the world. The group with the greatest number of individuals affected being pregnant women (41.8%). Menstrual blood loss, pregnancy and delivery are the main causes of anaemia in reproductive-age women. Anaemia is an important cause of maternal mortality. Complaints like lethargy, easy fatigability, dizziness, lactation failure, post-partum depression are not unusual findings in patients with postpartum anaemia (PPA). It is estimated that 20–40% of maternal deaths in India are due to anaemia¹. Iron deficiency anemia, is the most common cause of anemia in the postpartum period, with rates as high as 37% reported in the first postpartum week.² Postpartum anemia is caused primarily by inadequate iron intake prior to and during pregnancy and by peripartum blood

loss.³ Postpartum anemia has been associated with postpartum depression, stress, anxiety, cognitive impairment, poor mother-infant interactions, and delayed infant development.⁴ Oral iron therapy is currently the treatment of choice for the majority of patients with iron deficiency anemia; however, the utility of oral iron is limited by gastrointestinal complaints and patient nonadherence. Postpartum anaemia has been defined by WHO as an Hb level of ≤ 10 g% during post-partum period. The prevalence of PPA is high ranging from 4 to 27%. So ferric carboxymaltose is an intravenous iron preparation and as it does not contain dextran, the risk of anaphylaxis or serious hypersensitivity reactions is very low, and a test dose is not required.¹¹ Ferric Carboxymaltose can be administered in single doses up to 1000 mg over minutes.⁵ A recently published trial of postpartum iron deficiency anemia found that intravenous ferric carboxymaltose was as effective as oral iron in increasing Hb ≥ 2 g/dL or greater. So our study was designed to test the hypothesis that ferric carboxymaltose is superior to oral iron in the correction of postpartum iron deficiency anemia. Iron deficiency affects more women than any other condition, constituting an epidemic public health crisis. It is usually present with subtle manifestations and should be considered as a chronic slowly progressing disease that is often underestimated and untreated worldwide despite several warnings and awareness campaigns by the WHO. Because of the magnitude and consequences of iron deficiency anaemia in the world, especially in women in their childbearing period, several international conferences on nutrition have addressed this issue in order to reduce the prevalence of iron deficiency in women of childbearing age without major success.

Targeted iron supplementation, an iron-rich diet, or both, can improve iron deficiency. However, the variability of bioavailable iron compounds limits its value against nutritional iron deficiency. Therefore, laboratory measures of iron stores should be utilised to determine iron deficiency and monitor therapy.⁶ The balance of iron metabolism in healthy individuals predominantly reflects three variables: nutritional intake, iron loss, and current demand. The nutritional iron intake relates to the amount of digested iron in food and the ability to absorb iron from the digestive tract. The amount of iron absorbed depends largely on the presence or absence of pathology of the gastrointestinal tract or a comorbidity (such as chronic inflammatory diseases) that may result in expression of the iron regulatory proteins and a peptide called hepcidin, which ultimately blocks iron absorption.⁷

MATERIALS AND METHODS

Study Setting and Timelines: - Tertiary Teaching Hospital, 18 months

Study Design: - This will be Hospital based study in which prospective, comparative observation will be made.

Place of study: - Postnatal Ward, Dept. of Obstetrics and Gynaecology, Chittaranjan Seva Sadan College of Obs. & Gynaecology and Child Health, 37, S.P. Mukherjee Road, Kolkata - 700026.

Study Population : - Population consist of all the mother delivered here having post partum haemoglobin level less than 10 gm% and serum ferritin level less than 30 micro gram/L.

Inclusion Criteria: -

- 1) Healthy mother clinically present with severe iron deficiency anaemia .
- 2) Tolerance to oral iron therapy
- 3) Post-partum haemoglobin level less than 10 gm%
- 4) Post-partum ferritin level less than 30 micro gram/L
- 5) Who gave consent

Exclusion Criteria: -

- 1) Those who are non- anaemic
- 2) Those who has H/O anaemia due to cause other than iron deficiency anaemia
- 3) Who has serum ferritin level more than 30 microgram/ L
- 4) Those who has H/O myelosuppressive therapy.
- 5) Those who has H/O taking erythropoiesis stimulating agents
- 6) Who have hepatitis HIV infection and haematologic disorder other than iron deficiency anaemia
- 7) Patient who received blood transfusion
- 8) Who has H/O allergy to intravenous ferric carboxymaltose

RESULT AND DISCUSSION

The study was aimed to compare the safety, efficacy, and tolerability of intravenous ferric carboxymaltose in term of improvement of haemoglobin level and to compare the same with oral iron formulation in post partum iron deficiency anaemic patients. Approval of Institutional ethical committee was obtained before commencing the study. 120 postpartum anemic women with Hb less than 10 gm/dl delivered here, after satisfying inclusion and exclusion criteria were included in the study. Patients were assigned to two groups of 60 each . One group received 325 mg of oral ferrous sulphate tablets thrice daily for 6 weeks. Other group received a single dose of 1000 mg of injection FCM. All the patients were followed up at 2 weeks and 6 weeks postpartum and their clinical and hematological state was reassessed.

There was no statistical significant difference between the two groups with respect to age of the patients, socio-economic status, religion, parity, and maternal education (p-value>0.005)

In the present study, the mean age of patients in oral group was 24.37 ± 3.85 years and in the I/V group was 24.87 ± 4.12 years. Thus majority of patients were young and belonged to reproductive age group .

In Another studies by Breymann et al ⁸, Van Wyck et al⁹, Seid et al ¹⁰, where the mean age of patients in oral and i/v group were 27.5 ± 5.4 and 27.7 ± 5.5 years, 26.1 ± 6.0 and 26.9 ± 6.4 years, 26.49 ± 5.55 and 26.39 ± 5.97 years respectively.

In the present study, majority of patients(41.7% in oral group and 36.7% in intravenous group) belonged to lower socio-economic status with intake of diet deficient in essential nutrients and minerals, . This observation is in corroboration with study by Bodnar et al I0¹¹.where the risk of iron deficiency among women with a poverty index ratio < or = 130% who were 0-6, 7-12 and 13-24 mo postpartum was 4.1 (95% confidence interval 2.0, 7.2), 3.1 (1.3, 6.5) and 2.0 (0.8, 4.1)

times as great, respectively, so the low income postpartum women bear a substantially greater iron deficiency risk, so more attention should be given to preventing iron deficiency among low income women during and after pregnancy.

The majority of patients in both the groups were multipara, 56.6 % (n=29) in oral group and 76.6 % (n=38) in I/V group similar to studies (34.2% multipara and 26.9% of primipara were found to have postpartum anemia). This highlights the significance of multiparity as an important risk factor for postpartum anemia because repeated pregnancies result in depletion of iron stores

Majority of patients in our study were educated only upto primary school (45.0 % in oral group and 36.6 % in I/V group), which could be due to lower socio-economic status. This is similar to a study by Bodnar et al ¹² where 29.8% of patients with < 12 years of education were diagnosed to have postpartum anemia as compared to 23.3% of patients with >12 years of education.

Chi-square (χ^2) test showed that there was no significant association between religion and the patients of the patients of two groups (p=0.85).

Thus the patients of the two groups were comparable for their religion

We have observed in our study that the values of hemoglobin, and serum ferritin have increased post-treatment in both the groups, but the rise of these parameters was more in the I/V group.

In oral group Hb increased from baseline mean of 8.47 ± 0.88 g/dl to 10.34 ± 0.54 g/dl and in I/V group the increase was from 8.38 ± 0.83 g/dl to 11.23 ± 0.64 g/dl. at 2 weeks postpartum after the treatment of the patients.

So at 2 weeks postpartum after the treatment of the patients of the two groups (that is oral group and intravenous group) t-test showed that the mean level of Hb of the patients in Intravenous Group was significantly higher than that of the patients in Oral Group (p<0.0001).

Similarly In oral group Hb increased from baseline mean of 8.47 ± 0.88 g/dl to 11.28 ± 0.53 g/dl and in I/V group the increase was from 8.38 ± 0.83 g/dl to 13.27 ± 0.99 g/dl. at 6 weeks postpartum after the treatment of the patients

So at 6 weeks postpartum after the treatment of the patients of the two groups (that is oral group and intravenous group) t-test showed that the mean level of Hb of the patients in Intravenous Group was significantly higher than that of the patients in Oral Group (p<0.0001).

Similarly, Also a rise in serum ferritin was seen in both the groups.

For oral group, serum ferritin levels increased from baseline value of 22.29 ± 4.27 mcg/L to 42.09 ± 1.24 mcg/L at 2 weeks postpartum and a much more rise from 21.79 ± 4.01 mcg/L to 45.13 ± 2.69 mcg/L in I/V group at 2 weeks postpartum. after the treatment of the patients

So at 2 weeks postpartum after the treatment of the patients of the two groups (that is oral group and intravenous group) t-test showed that the mean level of ferritin of the patients in Intravenous Group was significantly higher than that of the patients in Oral Group (p<0.0001).

For oral group, serum ferritin levels increased from baseline value of 22.29 ± 4.27 mcg/L to 290.17 ± 20.74 mcg/L at 6 weeks postpartum and a much more rise from 21.79 ± 4.01 mcg/L to 342.00 ± 37.49 mcg/L in I/V group at 2 weeks postpartum. after the treatment of the patients.

CONCLUSION

In this present study Ferric carboxymaltose produced significantly greater and sustained increases in Hb and Ferric carboxymaltose was superior to oral iron in improving iron stores, as measured by ferritin. In our study, 1 course of ferric carboxymaltose resulted in significantly replenished iron stores at study completion (day 42). Our study clearly illustrates that ferric carboxymaltose was safe and well tolerated with efficacy and superior to that of oral iron in the treatment of postpartum iron deficiency anaemia. There were no serious side effects with FCM except for few allergic reactions. Hospital stay was significantly reduced.

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Table-5: Distribution of level of education of the patients of two groups

Level of education	Oral Group (n=60)	Intravenous Group (n=60)	TOTAL	P - value
Illiterate	7	9	16	0.5850
Row %	43.7	56.3	100.0	
Col %	11.6	15.0	13.3	
Primary	27	22	49	0.3512
Row %	55.1	44.9	100.0	
Col %	45.0	36.6	48.8	
Middle	13	12	25	0.8298
Row %	52.0	48.0	100.0	
Col %	21.6	20.0	20.8	
Secondary	8	11	19	0.4546
Row %	42.1	57.9	100.0	
Col %	13.3	18.3	15.8	
Higher Secondary and above	5	6	11	0.7478
Row %	45.5	54.5	100.0	
Col %	8.3	10.0	9.1	
TOTAL	60	60	120	
Row %	50.0	50.0	100.0	
Col %	100.0	100.0	100.0	
	0	0		

Table-8: Comparison of baseline level of Hb of the patients of the two groups

Level of Hb (in gm%)	Oral Group (n=60)	ntravenous Group (n=60)	t-test (t118)	p-value
Mean±sd	8.47±0.88	8.38±0.83	0.544	0.587
Median	8.45	8.5		
Range	7.1 - 9.9	7.1 - 9.9		