Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

## ORIGINAL RESEARCH

# A study comparing efficacy and safety of ferric carboxymaltose versus oral iron in postpartum women with anemia

**[1]Dr. Sonika Gupta, [2]Dr. Pooja Gupta, [3]Dr. Deepak kumar**

[1]Medical Officer, [2]Consultant Gynecologist, [3]Consultant pediatrician, District Hospital Udhampur, Jammu and Kashmir, India

**Corresponding author**
Dr. Deepak kumar
Consultant Pediatrician, District Hospital Udhampur, Jammu and Kashmir, India
**Email:** mithssoni@gmail.com

Received: 23 September, 2022 Accepted: 27 October, 2022

**Abstract**

**Background:** Approximately 40 percent of pregnant women worldwide, according to the WHO, have anemia. Postpartum anemia is frequently observed. It normally accounts for 20 to 30 percent cases. However its frequency may be even high in women who had (30 % to 60%) third or fourth degree tears of vagina, removal of placenta manually and instrumental delivery. Oral medication is insufficient to treat PPA in moderate and severe cases. Parenteral treatment can prevent the requirement for blood transfusions throughout pregnancy and after delivery in these individuals and offers a better compliance.

**Aim:** To compare efficacy and safety of ferric carboxymaltose versus oral iron in postpartum women with anemia

**Methods and Materials**: In this study 162 pregnant woman were included. 12 were lost to follow up.8 were of oral iron group and 4 were of FCM group .Finally 150 women were followed. They were divided into two groups. Group A (oral iron group) included 75 patients .They were given 100 mg of iron tablets bid for 4 weeks. Group B (FCM group) included 75 patients. They were given 1000 mg of injection FCM.FCM was given by 1000 mg of injection in 250ml of normal saline over 15 minutes. Complete hemogram and serum ferritin were repeated after 2 weeks from the last dose of iron and injection of FCM. The adverse effects of drug administration in the two groups were also recorded

**Results**: On comparing both the groups using independent t test we found that increase in Hb concentration and serum ferritin in FCM group is found to be statistically significant over oral iron group (p value .0001 and .0001).Our study also documented safety of FCM .There were minimal side effects of this drug and that too were minor ones as burning sensation over injection site, headache, itching etc. No major side effects were seen. Women in the two groups had comparable demographic profile. (P value >0.05).Mean post transfusion Hb in oral iron and FCM group was 9.81g/dl and 10.73g/dl respectively, which is statistically significant (p value =0.0001). Mean ferritin after treatment with oral iron and FCM was 149.35 and 208.90ng/dl respectively which is also statistically significant (p value=0.0001). Mean increase in Hb and serum ferritin in oral iron and FCM groups was 1.228, 2.63g% and 105.93 and 160.53ng/dl, respectively.

**Conclusion**: Ferric carboxymaltose is very effective in correcting iron deficiency anemia among patients with postpartum anemia. The added benefits of FCM over oral iron included significant rapid correction of iron deficiency anemia, fast replenishment of iron stores with better patient compliance.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

**Keywords:** Ferric carboxymaltose, Oral Iron, Iron deficiency anemia, postpartum women with anemia

## Introduction

The most typical type of anemia that affects both developed and emerging countries is iron deficiency anemia (IDA). 30% of women in the reproductive age range are thought to be anemic. Hemoglobin below 10 gm% is what the WHO as well as ACOG consider to be postpartum anemia. Approximately 40 percent of pregnant women worldwide, according to the WHO, have anemia.[1-3] Anemia after giving birth is frequently observed. It normally accounts for 20 to 30 percent cases. However, it is more pronounced in case of procedures like third or fourth degree tear of vagina, removal of placenta manually and instrumental delivery accounting 35 percent to 60 percent cases.[4]

In India, anemia during pregnancy is the cause of 20 percent of the overall of the primary causes and 50 percent of the contributing factors of maternal morbidity and mortality. Premature births, increased perinatal death rates, vulnerability to infections, iugr, are vital complications of moderate to severe anemia during pregnancy. Anemia also increases the hospital stay because of associated morbidities, decreased breast feeding; increased incidence of mood disorders is seen in these women. Anemia can have a variety of causes, including inadequate dietary intake, a strict vegetarian diet, multiple pregnancies, pregnant women who don't take additional prescription drugs, chronic blood loss from diseases like hookworm infestation, hemorrhoids, or causes like, renal disease, malignancies, chronic infections , autoimmune disorders, trauma, or malabsorption, or an unknown cause.[5-6]

Clinical signs of anemia include easy fatigability, dyspnea, palpitations, giddiness, lack of focus, depression, poor physical function, and poor cognitive function, as well as pallor of the skin and mucous membranes. Together with a reduced Hb content, low ferritin levels are regarded as the gold standard for the diagnosis of moderate to severe iron deficiencyanemia.[5-6]Oral medication is insufficient to treat post partum anemia. Parenteral treatment can prevent the requirement for blood transfusions throughout pregnancy and after delivery in these individuals and offers a better response.[7-8]

Intravenous infusion iron therapy is used to treat persistent blood loss, gastrointestinal issues, and reduced iron absorption because it is more effective, compliant, tolerable, and quickly replenishes iron storage.[9, 10]. In November 2000, the FDA approved iron sucrose (FeS), which forms an iron alkaline sucrose complex with a molecular mass of 34,000–60,000 Da in liquid.[11]. Ferric carboxymaltose (FCM), a new non-dextran , is infused intravenously at rates of 500 mg in 100 ml of normal saline over six minutes and 1000–1500 mg in 250 ml of normal saline over fifteen minutes [12.] It offers a wider therapeutic index, higher compliance, and tolerance while having a faster regulated delivery, boosting Hb and replacing iron stores in a shorter amount of time with low toxicity. The effectiveness and safety of oral iron have been used extensively to treat anemia, although it has significant drawbacks. The drawbacks of the current IV iron agents can be overcome by FCM because it can be given in high dosages over a brief duration of time with fewer adverse effects.

The purpose of the current study is to compare the safety and effectiveness of intravenous ferric carboxymaltose with oral iron in postpartum women with iron deficiency anemia.

## Methods and Materials

It was a prospective study over a period of one year from March 2019 to feb 2020 in a district hospital of north India.

### Inclusion criteria

Postpartum women with Hb of 7- 10 gm. % were included in the study.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

**Exclusion criteria**
Patients with anemia other than iron deficiency anemia,
Patients with history of allergy to oral or IV iron and patients who received blood transfusion recently were excluded from the study.
In this study total 150 pregnant women were included. They were divided into two groups.

**[Group A]**
75 patients were given 100 mg of iron tablets bid for 4 weeks. (Oral group)

**[Group B]**
75 patients were given 1000 mg of injection FCM. (FCM group)

**Methodology**
Iron tablets of ferrous sulphate containing 100 mg of iron were given bid for 4 weeks. FCM was given by 1000 mg of FCM in 250ml of normal saline over 15 minutes. Complete hemogram and serum ferritin were repeated after 2 weeks from the last dose of iron and FCM. The adverse effects of drug administration in the two groups were recorded.

**Statistical Analysis**
Firstly, descriptive statistics was used to calculate the mean ± SD. To compare the means of parameters of both the groups, paired and unpaired t test were applied. A P value of less than 0.05 was considered significant

**Results**
162 patients were randomized to receive iron, 12 were lost to follow up, 8 were of oral iron group and 4 were of FCM group. Finally 150 patients were followed.
Women in the two groups had comparable demographic profile. (P value >0.05). (Table 1).Mean post transfusion Hb in oral and FCM group was 9.81 and 10.73g/dl respectively, which is statistically significant (p value =0.0001) (table 2). Mean ferritin after treatment with oral iron and FCM **was** 149.35 and 208.90ng/dl respectively which is also statistically significant (p value=0.0001) (table 2).
Mean increase in Hb and serum ferritin in oral iron and FCM groups was 1.228, 2.63g% and 105.93 and 160.53ng/dl, respectively .On comparing both groups using independent student t test, it was statistically significant over oral iron group(p value 0.001 and 0.0078 respectively) (table 3). Adverse reactions were minimal in both the groups (p value>0.005).

**Table 1: Demographic and baseline data(p value >0.05)**

| Parameters | Group A (oral iron) | Group B (FCM) | P value |
|---|---|---|---|
| Age | 28.62 ±4.62 | 27.52 ±5.30 | .2221 |
| Parity | 2.09 ±0.71 | 2.12 ±1.05 | .1352 |
| Postpartum hemorrhage | 2.94% | 4% | |
| Mean Hb | 8.50 ±1.26 | 8.1±0.91 | .097 |
| Mode of delivery[lscs] | 26.2% | 25.2% | |
| Mean ferritin | 44.42 ±33.21 | 48.4 ±32.86 | 0.85 |
| Antenatal anemia | 65% | 63.3% | |

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

**Table 2: Comparison of mean Hb and ferritin pre- and post-treatment with oral iron and ferric carboxymaltose injection.**

| | Pre-treatment mean Hb (g%) | Post treatment mean Hb (g %) | P value | Pre-treatment Mean Ferritin (ng/dl | Post-treatment Ferritin (ng/dl) | P value |
|---|---|---|---|---|---|---|
| Group A (oral) | 8.50 ± 1.26 | 9.81 ± 0.64 | .0001 | 44.42 ±33.2 | 149.35±39.21 | .0001 |
| Group B (FCM) | 8.1 ± 0.91 | 10.73 ± 0.82 | .0001 | 43.4±32.86 | 208.90±30.2 | .0001 |

**Table 3: Comparison of mean increase in Hb and ferritin after treatment.**

| Parameter` | Group A | Group B | P value |
|---|---|---|---|
| Mean difference in increase in Hb (g %) | 1.228 ± .361 | 2.63±.543 | .0001 |
| Mean difference in increase in ferritin(ng/ml) | 105.93±28.2 | 160.53±33.45 | .0078 |

**Table 4: Comparison of mean Hb and ferritin after treatment.**

| Table 4 | Group A | Group B | P value |
|---|---|---|---|
| Post treatment mean Hb | 9.81±0.64 | 10.73 ± 0.82 | 0.0001 |
| Post treatment mean ferritin | 149.35 ± 39.21 | 208.90 ± 30.2 | 0.0001 |

Adverse reactions in both the groups

It was found that GI disorders are the most common adverse effects with oral iron .In this study 40% (30) women had GI side effects whereas no such side effects were reported in the FCM group .In FCM group pain and burning over the injection site was seen in 4 patients.

Rash and itching was seen in two women. Dizziness was seen in 1 woman. Headache a seen in 4 women. However no major adverse effects like hypotension ,hypertension, or severe anaphylaxis was seen in FCM group.

## Discussion

FCM is non dextran complex that consists of a ferric hydroxide core stabilized by a carbohydrate shell. The design of macromolecular ferric hydroxide carbohydrate complex permits guarded delivery of iron to the cells of the reticuloendothelial system and subsequent delivery to the iron binding proteins ferritin and transferrin with negligible risk of large amount of iron being released into the serum. Being a non-dextran molecule and having a very low immunogenic potential, it is not predisposed to high risk of anaphylactic reaction.[13-14]

These properties allow the administration of large doses (15mg/kg, max1000mg) infusion in a single and rapid session, without the requirement of a test dose thus makes it suitable as first choice for treatment of iron deficiency anemia.

In this study we compared efficacy and safety of FCM and oral iron. Both are effective in improving postpartum anemia and both have a good safety profile. On comparing both the groups using independent t test we found that increase in Hb concentration and serum ferritin in FCM group is found to be statistically significant over oral iron group (p value .0001 and .0001).Our study also documented safety of FCM .There were minimal side effects of this

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

drug and that too were minor ones as burning sensation over injection site, headache, itching etc. No major side effects were seen. Women in the two groups had comparable demographic profile. (P value >0.05).Mean post treatment Hb in oral iron and FCM group was 9.81 and 10.73g/dl respectively, which is statistically significant (p value =0.0001) . Mean ferritin after treatment with oral iron and FCM was 149.35 and 208.90ng/dl respectively which is also statistically significant (p value=0.0001).

Oral iron as well as blood transfusion treatments are commonly medical linked to a variety of negative outcomes and reactions.[15-16]. The study compared intravenous ferric carboxymaltose, a more recent medication licenced for use in IDA throughout the second and third trimesters, to oral iron.Iron tablets of ferrous sulphate containing 100mg of iron were given bid for 4 weeks.FCM was given by 1000 mg of FCM in 250ml of normal saline over 15 minutes Complete hemogram and serum ferritin were repeated after 2 weeks from the last dose of iron and FCM. The adverse effects of drug administration in the two groups were recorded.

This study's findings are in line with those of other other studies that have been carried out around the world, including those by Christoph et al.,Mahajan A et al Froessler et al., Maheshwari et al.Patel J et al., Garg R et al., Boughton S et al, Metgud MC et al and Joshi SD et al.Retrospective research by Christoph et al. on 206 pregnant females (103 with FCM and 103 with IS) revealed increases in haemoglobin of 15.4% in the FCM group and 11.7% in the oral iron group. FCM was proven to be safer and more effective than oral iron. 8 Similar to this, 65 anaemic pregnant women who got FCM participated in a prospective observational trial by Froessler et al. in Australia. The results showed a significant increase in baseline haemoglobin levels.[12-24]

Lower birth weight, intra - uterine retardation (IUGR), intrauterine foetal death (IUFD), foetal distress, a low Apgar score, and elevated perinatal mortality are all linked to IDA during pregnancy. These significantly happen in pregnant women with modest maternal anaemia, rise by 2 to 3 folds with moderate maternal anaemia, and increase by 8 to 10 times with Hb less than 5 g%. Poor mental efficiency or aberrant behaviour can result from lower iron storage in the IDA. The mean birth weight of infants born to anaemic moms and non-anemic mothers differs significantly.[3, 13] Anemia in the second trimester that increases by five times in cases of iron - deficiency anemia and by two times in cases of anaemia from other causes is linked to premature birth. Thus, parenteral therapy to correct iron deficiency anaemia during pregnancy contributes to better neonatal outcomes and lower perinatal mortality.[5, 10]

Due to its excellent efficacy, safety, and compliance, ferric carboxymaltose appears to be superior to existing parenteral iron formulations,as well as oral iron preparations revolutionising the therapy of iron deficiency anemia during pregnancy and postpartum .[13, 17]the drawback of ferric carboxymaltose is that it is more expensive than other iron preparations, although this is compensated by fewer hospital visits and shorter hospital stays and a good compliance. As a result, it might be suggested as a first-line medication to lessen the impact and prevalence of IDA during pregnancy and postpartum.[14, 15]

## Conclusion

Ferric carboxymaltose is very effective in correcting IDA among patients with postpartum anemia. The added benefits of FCM over oral iron included significant rapid correction of IDA, fast replenishment of iron stores and reduced hospital visits with better patient compliance with no GI side effects.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

**References**


1. World Health Organization. Micronutrient deficiencies: prevention and control guidelines. Geneva: World Health Organization, 2015. Available at; https://www.who.int/nutrition/publications/ WHO_WFP_UNICEF statement. pdf. (Accessed on December 2018).
2. FOGSI General Clinical Practice Recommendations. Management of iron deficiency anaemia in pregnancy. 2016; Available at; (http://www.fogsi.org/wp-content/uploads/2016/ 05/The- evidence-base_IDA-Pregnancy-24-May2016-Clean.pdf. (Accessed on December 2018).
3. Indian council of medical research evaluation of nutritional anaemia prophylaxis program task force study New Delhi; 1989. Available at; https://www.icmr.nic.in/sites/default/files/icmr_bulle tins/bufeb00.pdf. (Accessed on December 2018).
4. Centre for disease control (CDC), criteria for anaemia in children and child bearing age women MMWR. 1989;38:400-4; Available at; https://www.cdc.gov/MMWR/preview/mmwrhtml/0 0051880.htm. (Accessed on November 2018).
5. FOGSI General Clinical Practice Recommendations. Management of Iron Deficiency Anemia in Pregnancy. Available at; www.fogsi.org/wpcontent/uploads/2017/07/gcpr-recommendationida.pdf. (Accessed on January 2018).
6. Guidelines for Prevention of Maternal Anaemia. Available at; http://www.nrhmtn.gov.in/ guideline/RGPMA.pdf. (Accessed on December 2018).
7. Christoph P, Schuller C, Studer H, Irion O, De Tejada BM, Surbek D. Intravenous iron treatment in pregnancy: comparison of highdose ferric carboxymaltose vs. iron sucrose. J Perinatal Med. 2012;40(5):469-74.
8. Froessler B, Collingwood J, Hodyl NA, Dekker G. Intravenous ferric carboxymaltose for anaemia in pregnancy. BMC pregnancy and Childbirth. 2014;14:115.
9. Friedrisch JR, Cancado RD. Intravenous ferric carboxymaltose for the treatment of iron deficiency anaemia. Braz J Hem Hemother. 2015;37(6):400-5.
10. Zeba D. Intravenous iron treatment in pregnancy: ferric carboxymaltose for correction of iron deficiency anaemia Faridpur. Med Coll J. 2017;12(2):54-7.
11. Singh S, Dhama V, Chaudhary R, Singh P. Comparing the safety and efficacy of intravenous iron sucrose and intravenous ferric carboxymaltose in treating postpartum anemia. Int J Reprod Contracept Obstet Gynecol. 2016;5:1451-6.
12. Joshi SD, Chikkagowdra S, Kumar VCM. Comparativestudy of efficacy and safety of intravenous ferric carboxy maltose versus iron sucrose in treatment of postpartum iron deficiency anemia. Int J Reprod Contracept Obstet Gynecol. 2016;5.
13. Anand T, Rahi M, Sharma P, Ingle GK. Issuesin prevention of iron deficiency anemia in India. Nutrition2014;30(7-8):764-70.
14. Institute of Medicine, Committee on Nutritional Status During Pregnancy and Lactation. Washington DC: National Academy press. 1990;272:98.
15. Lone FW, Qureshi RN, Emanuel F. Maternal anaemia and its impact on perinatal outcome in a tertiary care hospital in Pakistan. Eastern Mediterr Health J. 2004;10:801-7.
16. VanWyck DB, Martens MG, Seid MH, Baker JB, Mangione A. Intravenous ferric carboxymaltose compared with oral iron in the treatment of postpartum anaemia: a randomized controlled trial. Obstet Gynecol. 2007;110:267-78.
17. Breymann C, Gliga F, Bejenariu C, Strizhova N. Comparative efficacy and safety of intravenous ferric carboxymaltose in the treatment of postpartum iron deficiency anemia. Int J GynaccolObstct. 2008;101:67-73.

ISSN: 0975-3583,0976-2833 VOL13, ISSUE 08, 2022

18. Pavord S, Myers B, Robinson S, Allard S, Strong J. UK guidelines on the management of iron deficiency in pregnancy. Br J Haematol. 2012;156:588-600.
19. Crosby WH. The rationale for treating iron deficiency anaemia. Arch Int Med. 1984;144:471-2.
20. Bhandal N, Russel R. Intravenous versus oral iron therapy for postpartum anaemia. BJOG. 2006;113(11):1248-52.
21. Bayoumeu F, Subiran-Buisset C, Baka NE, Legagneur H, Monnier-Barbarino P, Laxenaire MC. Iron therapy in iron deficiency anaemia in pregnancy: intravenous route versus oral route. Am J Obstet Gynaecol. 2002;186:518-22.
22. Breymann C, Honegger C, Holzgreve W, Surbek D. Diagnosis and treatment of iron-deficiency anaemia during pregnancy and postpartum. Arch Gynecol Obstet. 2010;282:577-80.
23. Garg R, Nigam A, AgrawalP, Nigam A, AgrawalR. Iron carboxymaltose: A safe and effective molecule to combat anaemia in pregnancy. Int J Cur Res Aca Rev. 2016;4(2):124-30.
24. Agrawal D, Masand DL. A study for efficacy and safety of ferric carboxymaltose versus iron sucrose in iron deficiency anemia among pregnant women in tertiary care hospital. Int J Reprod Contracept Obstet Gynecol 2019;8:2280-5.