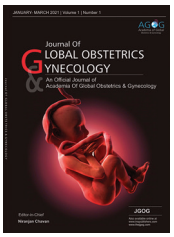
AGOG Academia of Global Obstetrics & Gynecology

Original Article



A Prospective Observational Study on the Efficacy and Safety of Ferric Carboxymaltose in Iron Deficiency Anemia in Antenatal and Postnatal Women

Niranjan Chavan[1], Sonam Simpatwar[2], Komal N. Chavan[1]

[1]*Medical Director, Consultant, Chavan Maternity and Nursing Home, Andheri West, Mumbai, India,*
[2]*Lokmanya Tilak Medical Municipal College, Sion, Mumbai, India*

ABSTRACT

Background: Anemia in pregnancy is one of the most important factors related to maternal morbidity and mortality. It reduces a woman's ability to tolerate intra- or post-partum blood loss. New World Health Organization/World Health Statistics data suggest that worldwide, 36.5% of pregnant women were anemic in 2019. India is the leading country with the highest number of maternal deaths in South Asia. In India, the prevalence of anemia in pregnancy has decreased from 58% in the National Family Health Survey-2005–2006 (NFHS-3) to 50% in the NFHS-survey (2015–2016). The most common cause of anemia in pregnancy is nutritional. The Indian Council of Medical Research considers a hemoglobin (Hb) level of <10.9 g/dl to be anemia during pregnancy. **Materials and Methods:** A prospective observational study was conducted at Chavan Maternity and Nursing Home, Mumbai. This study includes antenatal and postnatal women with documented iron deficiency anemia (IDA) who were admitted for anemia correction and received an intravenous ferric carboxymaltose (FCM) infusion. The study period includes November 2020 and October 2021. A total of 100 women were included in this study with documented baseline Hb and serum ferritin levels done pre-infusion and 4 weeks after FCM infusion. The rise in their levels was observed. **Result:** Hundred women (antenatal and postnatal) were included in this study and divided into groups according to the severity of anemia. About 88% women had moderate anemia and 12% had severe anemia. Hb was increased by 1.138g%, and serum ferritin levels were increased by 101.684 ng/ml after 4 weeks following the Inj. FCM infusion. Six out of 100 women (6%) had minor adverse reactions. No major adverse reactions were noted. **Conclusion:** FCM treatment was effective and well-tolerated by antenatal and postnatal women with iron deficiency at a hospital clinic, and its dosage should be adjusted to improve iron deficiency management in clinical practice.

Key words: Ferric carboxy maltose, Iron deficiency anemia, Efficacy, Anemia

INTRODUCTION

Anemia in pregnancy is a major risk factor for maternal morbidity and mortality. Hemodilution occurs throughout the first and second trimesters when plasma volume rises disproportionately to red cell mass, causing "physiologic anemia." According to the World Health Organization (WHO), anemia is defined as a blood hemoglobin (Hb) concentration below 11 g/dl. Anemia is defined by the Centers for Disease Control and Prevention (CDC) as pregnant Hb <11 g/dl (Hematocrit [Hct] 33%) in the first and third trimesters and <10.5 g/dl (Hct 32%) in the second trimester.[1] The Indian Council of Medical Research considers a Hb level of <10.9 g/dl to be anemia during pregnancy.[2] World Health Statistics data by the WHO showed that 36.5% of pregnant women worldwide had anemia in 2019. Anemia causes about half of all maternal fatalities in poor countries, with India accounting for around 80% of anemia-related maternal mortality in South Asia. In India, the prevalence of anemia in pregnancy has decreased from 58% in the (National Family Health Survey-2005–2006 [NFHS-3]) to 50% in the NFHS-survey (2015–2016).[3] Iron deficiency is the most frequent cause of anemia in women. Due to increased demand for iron by the growing fetus and placenta, increased red blood cell (RBC) mass (with larger maternal blood volume in the third trimester), and low access to antenatal care and supplements, iron deficiency anemia (IDA) is frequent during pregnancy.[3] IDA causes substantial maternal, fetal, and newborn

Corresponding Author:
Dr. Sonam Simpatwar, MBBS, DGO, MS 3rd Year Resident,
Lokmanya Tilak Medical Municipal College, Sion, Mumbai, India.
Email: sonamsimpatwar@gmail.com
Received: 04-10-2021
Accepted: 14-10-2021
DOI: 10.15713/ins.jgog.13

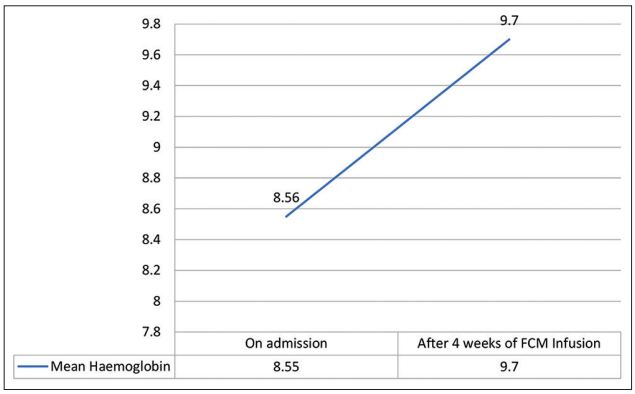


Figure 1: Increase in hemoglobin levels after 4 weeks of ferric carboxymaltose infusion

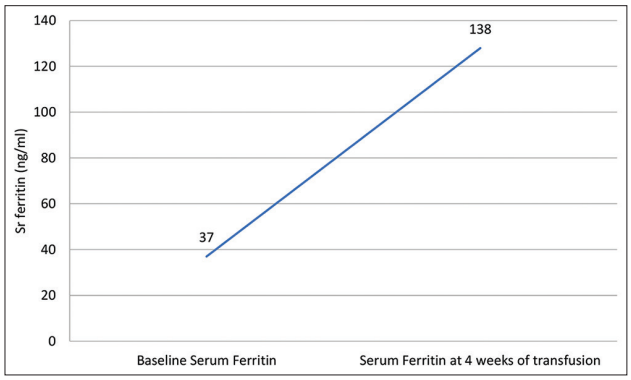


Figure 2: Increase in serum ferritin levels after 4 weeks of ferric carboxymaltose infusion

morbidity. Unfavorable consequences for the fetus and baby include premature delivery and fetal development limitation. The increased need for iron during pregnancy, necessary to sustain maternal Hb mass growth as well as the developing fetus and placenta, is typical. This is exacerbated by blood loss after delivery. The risk of peripartum blood transfusion, chronic IDA, and iron reserve depletion increases with caesarean section and vaginal births requiring instrumentation or intervention.

Effective management methods that enable women to replenish iron reserves antenatally or during delivery certainly improve maternal and neonatal health. Oral iron and RBC transfusions have been the primary therapies for IDA for decades. As a consequence of severe adverse effects, many patients do not comply with oral iron supplements and RBC transfusion has well-defined hazards that should be avoided. Intravenous iron formulations are an option for intolerance or non-adherence to oral iron and malabsorption. Due to its better safety profile and faster delivery time, dextran-free parenteral iron should be regarded as a standard therapy for moderate-to-severe IDA.

Ferric carboxymaltose (FCM) is a novel dextran-free iron formulation with a near neutral pH, physiological osmolarity, and improved bioavailability. In terms of risk, effectiveness, patient comfort and convenience, and staff and institutional resource usage, FCM is a better choice than iron sucrose.

MATERIALS AND METHODS

The prospective observational study was conducted at Chavan Maternity and Nursing Home. Antenatal and postnatal women with documented IDA (Hb 10g%) who received FCM infusions are included in this study between November 2020 and September 2021. The primary objective of our study was to evaluate the efficacy of FCM in correcting IDA in antenatal and postnatal women. Our secondary objective was to evaluate safety of FCM in antenatal and postnatal women. A total of 100 women were included in this study after taking informed consent. Anemia unrelated to iron deficiency, blood transfusions, and a known allergy to parenteral iron therapy were all exclusion criteria. Reports of blood samples noted include complete hemogram, peripheral smear, Hb, and serum ferritin at admission and after 4 weeks of FCM infusion. Available pre-infusion, post-infusion Hb, and ferritin levels were compared. A total of 100 patients were included in the study. All patients received 500 mg of intravenous FCM infusion in 250 ml of normal saline over 15 min. Strict monitoring was done during and after the infusion. Vitals, including pulse, blood pressure, oxygen saturation, respiratory rate, and temperature were recorded. Nausea, vomiting, hypotension, headache, fever, soreness, tingling sensation, or itching are some of the adverse side effects obtained from medical records.

OBSERVATIONS AND RESULTS

A total of 100 women received a FCM infusion for IDA, with pre-infusion Hb and serum ferritin levels and post-FCM infusion Hb and serum ferritin levels available for 100 women. They were divided into categories of severity of anemia according to the ICMR on the basis of hemoglobin levels. Mild: 10–10.9 g%, moderate: 7–9.9 g%, and severe: 4–6.9 g%

The characteristics of the women receiving FCM for IDA are outlined in Table 1.

The mean Hb of 100 women at admission was 8.562g% and 4 weeks after Inj FCM infusion was 9.7g%. Of the 100 women entered into the study, 12 (12%) women were defined as having severe anemia (Hb <7 mg/dl), while 88 women (88%) were defined as having moderate anemia.

After giving Inj FCM, Hb levels increased from 8.56 to 9.7 g%, [Figure 1] the rise was by 1.138 g%. Hb is the primary variable to measure severity of anemia.

Serum ferritin levels at admission and after 4 weeks of Inj FCM infusion were obtained from records. The mean serum ferritin level of all 100 women was 37.23 ng/ml at admission. It increased significantly to 138.91 ng/ml [Figure 2]. All women showed increase in serum ferritin levels.

The mean serum ferritin levels after Inj. FCM transfusion increased by 101.684 ng/ml. Tables 2 and 3 shows the baseline Hb and Serim ferritin levels at admission and after 4 weeks of Inj FCM infusion.

Table 4 shows the no. of women with documented minor reactions were 6 out of 100 (6%) and major adverse events following infusion with FCM were zero. Minor reactions included headache, fever, nausea, vomiting, diarrhea, and pain/burning at

Table 1: Demographic information of women included in the study

Mean age	24.6 years
Weight	52.8 kg
Mode of delivery	
• LSCS	77 (77%)
• Normal delivery	21 (21%)
• Instrumental delivery	2 (2%) (Forceps)

Table 2: Mean hemoglobin concentration levels at admission and after 4 weeks of FCM infusion

Mean hemoglobin concentration at admission	8.562 g%
Mean hemoglobin concentration after 4 weeks of FCM infusion	9.7 g%

Table 3: Mean serum ferritin levels at admission and after 4 weeks of FCM infusion

Mean serum ferritin at admission	37.233 ng/ml
Mean serum ferritin after 4 weeks of FCM infusion	138.917 ng/ml

Table 4: Adverse drug reactions following Inj FCM Infusion

Adverse reaction	Number of patients
Headache	1
Nausea, vomiting, and diarrhea	2
Rigor	0
Fever	1
Pain/burning at injection site	2
Hypotension/hypertension	0
Tingling sensation at injection site	0
Itching at injection site	0
Severe anaphylactic reaction	0

injection site. It was managed conservatively. No evidence of any major adverse even was documented.

DISCUSSION

This is a prospective observational study of FCM infusion during pregnancy. The primary conclusion of our study is that FCM infusion dramatically raises Hb levels and serum ferritin levels, as well as improved iron reserves, in women who present with IDA late in pregnancy. Furthermore, we report that FCM appears to be a safe and effective treatment strategy for IDA correction, with no significant adverse events and only a few minor ones reported.

During pregnancy, many women suffer from iron deficiency, which can have significant maternal and fetal consequences. In most cases, this diagnosis should prompt the start of iron supplementation. Oral iron supplementation is sufficient for the most women to maintain adequate iron reserves. Intravenous iron delivery may be a more successful treatment option for moderate-to-severe IDA despite oral iron supplementation or due to medication intolerance, non-adherence, or pre-disposing diseases such as malabsorption or inflammatory bowel problems.

In comparison to existing IV iron formulations with modest dosage limits, such as iron sucrose, the quick delivery option of a high single dose of intravenous FCM offers a viable therapeutic approach for pregnant women with iron deficiency and anemia.[4] FCM characteristics may potentially help patients and the health-care system by reducing their burden.[4] Alhossain *et al.* found that a single intravenous infusion of FCM versus single intravenous iron polymaltose or daily oral ferrous sulfate in the treatment of IDA in pregnancy was more convenient than other routes of iron supplementation in a prospective randomized controlled experiment.[5] Another study done by Ayami *et al.* suggested that a single dose of intravenous injection of FCM improves the Hb level, a significant consideration in anemic pregnant women.

In comparison to traditional IV iron formulations with dosage constraints, such as iron sucrose, the quick delivery option of a high single dose of FCM presents a possible therapy strategy for women who require iron deficiency and anemia correction for pregnant women.[6] The characteristics of FCM may also lower the patient's and health-care system's load.[7]

RBC transfusions account for 3–4% of all transfusion episodes in obstetrics, with most of them occurring after a post-partum hemorrhage (PPH). With a prevalence of 13.1%, PPH is the greatest cause of maternal death in obstetrics.[7] RBC transfusion, while its vast therapeutic utility, is a therapy with well-documented side effects and hazards that should be avoided wherever possible.[7] Furthermore, blood is becoming increasingly expensive and scarce. After a severe PPH, only three people in the present sample needed RBC transfusion.[7] A large retrospective investigation found that women with clinical PPH have a substantially higher risk of blood transfusions, at 7.5%.[8] The present evidence implies that improving Hb levels, even late in the third trimester, may have protected some mothers in our group against allogeneic transfusion hazards. This not only saves money, but it also improves women's health before and after pregnancy, as well as during post-partum period. This prospective study's findings are in accordance with earlier prospective evidence that FCM treatment during pregnancy and postpartum is likely to be safe and effective. The findings of this prospective study support previous prospective evidence that FCM treatment in pregnancy and postpartum is likely to be safe and effective. It helps protect all women from developing severe postpartum anemia. Despite moderate-to-severe anemia at presentation, peripartum blood loss was well tolerated, resulting in low rates of blood transfusion. There were no severe side effects reported. The majority of women felt better after receiving the infusion.

REFERENCES

1. Tandon R, Jain A, Malhotra P. Management of iron deficiency anemia in pregnancy in India. Indian J Hematol Blood Transfus 2018;34:204-15.
2. Indian National Heath Portal. Available from: https://www.

bn.nhp.gov.in. [Last accessd on 2021 Nov 25].
3. Sridhar D, Jairaj S. A study on epidemiological factors associated with anaemia in pregnancy. Indian J Forensic Commun Med 2020;7:11-4.
4. Nalini S, Thiek JL, Das R, Singh AS. A prospective study on the efficacy and safety of ferric carboxymaltose in correcting anaemia in patients with heavy menstrual bleeding. Obstet Gynecol Int J 2018;9:363-6.
5. Khalafallah AA, Hyppa A, Chuang A, Hanna F, Wilson E, Kwok C, *et al*. A prospective randomised controlled trial of a single intravenous infusion of ferric carboxymaltose vs single intravenous iron polymaltose or daily oral ferrous sulphate in the treatment of iron deficiency anaemia in pregnancy. Semin Hematol 2018;55:223-34.
6. Gandotra N, Zargar S, Mahajan N. Intravenous ferric carboxymaltose for anaemia in pregnancy. Int J Res Med Sci 2020;8:3539-42. Available from: https://www.msjonline.org/index.php/ijrms/article/view/8627 [Last accessed on 2020 Jan 13].
7. Froessler B, Collingwood J, Hodyl NA, Dekker G. Intravenous ferric carboxymaltose for anaemia in pregnancy. BMC Pregnancy Childbirth 2014;14:115.
8. Beard JL, Hendricks MK, Perez EM, Murray-Kolb LE, Berg A, Vernon-Feagans L, *et al*. Maternal iron deficiency anemia affects postpartum emotions and cognition. J Nutr 2005;135:267-72.

How to cite this article: Chavan N, Simpatwar S, Chavan KN. A Prospective Observational Study on the Efficacy and Safety of Ferric Carboxymaltose in Iron Deficiency Anemia in Antenatal and Postnatal Women. J Glob Obstet Gynecol 2021;1(2):56-59

Source of support: Nil, **Conflict of Interest:** Nil.