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COMPARATIVE ASSESSMENT OF CLINICAL OUTCOMES AND SAFETY PROFILE OF FERRIC CARBOXYMALTOSE VERSUS INTRAVENOUS IRON SUCROSE IN THE MANAGEMENT OF IRON DEFICIENCY ANEMIA

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ABSTRACT

Background: Iron deficiency anemia (IDA) is one of the most prevalent nutritional conditions globally and is associated with considerable morbidity and also worsening quality of life. Intravenous iron therapy is advised when oral therapy is ineffective or rapid iron replenishment is necessary. This study compared the safety profile and clinical outcomes of ferric carboxymaltose (FCM) and intravenous iron sucrose (IS) in the correction of IDA.

Methods: A prospective, comparative study was performed among 132 IDA patients at Karpagam Faculty of Medical Sciences and Research (KFMSR), Coimbatore, Tamil Nadu, India. Patients were assigned in a 1:1 ratio and prescribed either FCM or IS. Hemoglobin, serum ferritin, serum iron, and transferrin saturation levels were recorded at baseline, week 2, and week 4. Functional Assessment of Chronic Illness Therapy – Fatigue (FACIT-Fatigue) scale was used to measure the quality of life. Adverse drug reactions (ADRs) were documented throughout the research.

Results: Hematological and iron profile metrics improved in both treatment groups from baseline to week 4 ($p < 0.001$). Patients receiving FCM documented a higher increase in hemoglobin level, serum iron, serum ferritin, and also transferrin saturation level ($p < 0.001$). Both group's FACIT-Fatigue scores significantly increased, but the FCM group's improvement was notably greater. Adverse events were mild; eleven patients receiving IS documented nausea and vomitting, and three patients had constipation, whereas two patients receiving FCM documented infusion-site pain. There were no serious adverse events documented.

Conclusion: Intravenous ferric carboxymaltose was found to be superior in terms of efficacy and safety to iron sucrose in the correction of IDA, with improved clinical outcomes, better quality of life, and fewer treatment visits.

KEYWORDS: Adverse reactions, Clinical efficacy, Ferric carboxymaltose, Intravenous infusion, Iron deficiencies, Quality of life.

1. INTRODUCTION

Iron deficiency anemia refers to a widely occurring hematological condition that has depleted iron stores and has less adequate level of iron supply to the tissues [1]. IDA was the most prominent anemia worldwide, comprising over all anemia diagnoses [2]. The WHO (World Health Organization) indicates that anemia impacts around 1.8 billion people globally, representing nearly 24.8% of the world's population [3]. As per the 2013 report, 1.2 billion individuals were affected by IDA, and 1,83,000 deaths occurred [4]. IDA primarily affects individuals with prolonged iron imbalance, women of reproductive age, children, pregnant women, and patients with chronic disease and blood loss [5]. It may arise from an improper supply of iron, which may disrupt hemoglobin synthesis and result in a low level of hemoglobin [6]. Iron is a fundamental element that is necessary for human body cellular function [7], and is essential for oxygen delivery as a primary component of hemoglobin [8,9]. For IDA, an iron replacement therapy is the main form of treatment, which could be delivered intravenously or in the form of oral iron [10]. Patients with moderate to severe anemia have an inadequate response to oral iron in terms of hemoglobin, whereas with intravenous iron, the hemoglobin level is elevated more significantly than with oral iron [11]. In severe conditions, a blood transfusion may also be considered depending on the severity and condition of the patients [12]. Laboratory markers to detect IDA include iron status (serum ferritin, serum iron, and transferrin saturation %), and complete blood count. As per these parameters, the treatment should be initiated [13]. Other than that, bone marrow examination was performed to detect IDA for the absence of stainable iron [14].

Iron sucrose has been shown to be a highly significant therapeutic agent for the treatment of iron deficiency anemia [15]. Because of its high absorption and comparatively low risk of anaphylactic reaction, its efficacy and safety profile have been thoroughly established [16]. However, in order to obtain the intended therapeutic effect, iron sucrose must be administered in repeated doses, which may decrease patient comfort and compliance [17]. FCM is a non-dextran intravenous iron preparation designed for the management of IDA in high doses for fast administration [18,19]. FCM was

produced by American Reagent under the license of Vifor Pharma Limited in Switzerland [20]. FCM is a complex of stable type 1 polynuclear iron (III)-hydroxide carbohydrates [21]. FCM has low immunogenic potential, and therefore it carries minimal risk of anaphylactic reaction [22, 23]. It is a third-generation parenteral iron composition that is designed to address the drawbacks of previous parenteral formulations [24]. A previous study reported that ferric carboxymaltose has been proven to be effective in correcting iron deficiency anemia with notable improvement in hemoglobin [25].

In our study, we assess the efficacy and safety profile of intravenous IS with intravenous FCM in IDA patients. In this regard, we evaluate the desired values of indicators such as hemoglobin, serum ferritin, serum iron, and transferrin saturation %. We detect and prevent any possible adverse drug reaction after administering FCM and IS. Also, we evaluate the patient's quality of life using the FACIT - Fatigue scale.

2. MATERIALS AND METHODS

2.1. Study design and setting

This was a prospective, comparative study conducted at the KFMSR, Coimbatore, Tamil Nadu, a tertiary care teaching healthcare facility. The timeline of this research was five months (February 2026 to June 2026) in the Department of General Medicine.

2.2. Ethical approval

Before commencement of the study, the Institutional Human Ethics Committee (IHEC) of KFMSR (Certificate no. IHEC/527/KAHE/02/2026, dated 11.02.2026) approved this study. The research was conducted in compliance with the Declaration of Helsinki. Before screening and enrollment, all patients gave their voluntary informed written consent.

2.3. Inclusion and exclusion criteria

Patients presented in General Medicine inpatient departments were assessed for enrollment. Adult patients over 18 years of age, having a moderate-to-severe IDA, were included in our study period. The trial excluded patients documented with a history of hypersensitivity to intravenous iron or dextran-containing iron preparations; who were of hepatic significant impairment; or who had received parenteral iron within the previous 30 days of screening.

2.4. Sample size justification

The sample size was computed using a pooled standard deviation of 1.4 g/dL and a clinically significant rise in mean hemoglobin of 1.0g/dL between two treatment options at week 4. Assuming a two-sided significant level of $\alpha = 0.05$, a statistical power of 80% ($\beta = 0.20$), the obtained sample size was 120 patients per group. By considering a 10% dropout rate, the overall recruitment was 132 patients (n = 66 patients per group). The proposed methodology is shown in Figure 1.

2.5. Interventions and dosing protocols

Prior to medication, individual patient's iron deficit was calculated using the Ganzoni equation to make sure adequate baseline demands;

Total iron deficit = Body weight (kg) × (target hemoglobin – actual hemoglobin) × 2.4 + iron deposit (500mg)

Eligible patients were assigned in a 1:1 ratio to receive either intravenous FCM (Group A) or intravenous IS (Group B). FCM was administered as a gradual infusion over 30 minutes at the maximal single dose of 1000 milligram diluted in 250 mL NS 0.9%, under intensive medical care. For IS, a maximum single dose of 300 mg was administered as a gradual infusion over 15-20 minutes in 200 mL of 0.9% NS twice weekly and should not exceed 600mg per week, until the overall calculated Ganzoni iron deficit was fully supplied.

2.6. Clinical and laboratory monitoring

Systematic data were collected using a predesigned form of case records, such as demographic information, medical and obstetric history, nutritional habits, clinical examination results, and laboratory investigations, done at baseline and follow-up. Before inclusion, all the participants were given an informed consent form after being made aware of the study's objectives and methodology. The baseline laboratory tests (pre-infusion), including hemoglobin level, transferrin saturation %, serum ferritin, and serum iron levels, were evaluated. After the infusions, second-week and fourth-week follow-up visits were scheduled for both groups. Clinical biomarkers were re-examined by doing laboratory tests. Adverse events were carefully documented, and the participants were instructed to visit an emergency facility in case they had any allergic reactions, gastrointestinal problems, or dizziness. The mean change in hemoglobin levels at baseline and the fourth week of treatment was the primary goal, and secondary endpoints were changes in serum ferritin, serum iron, and transferrin saturation level.

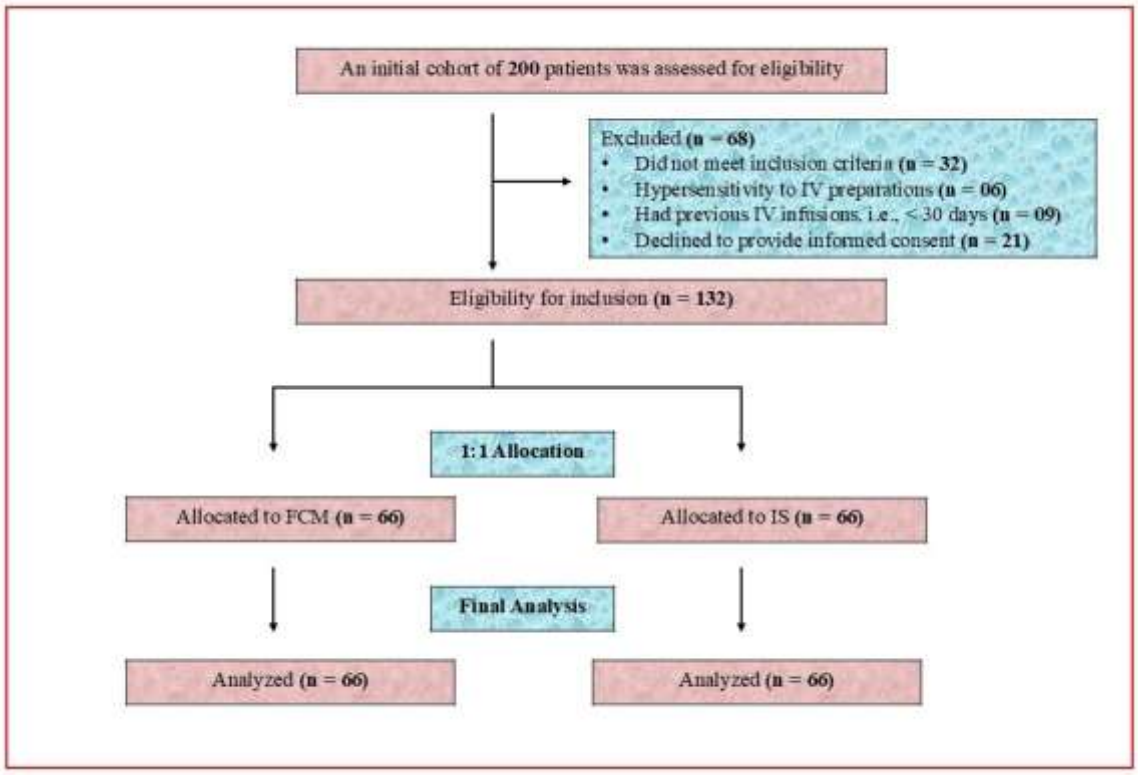

Figure 1. Proposed methodology

2.7. FACIT-Fatigue Measurement

Functional Assessment of Chronic Illness Therapy-Fatigue (FACIT-Fatigue) is a standardized patient-reported outcome assessment comprising 13 items that can typically take five minutes to complete. The instrument considers five items to evaluate the severity of tiredness and eight more to evaluate fatigue-related functional impairments. The items are in the form of self-reported statements (such as I feel tired) and rated using the five-point Likert scale, 0 (not at all) to 4 (very lot). The scoring is made by reversing the item scores of the whole list, with the exception of two, summing the item scores and multiplying them by 13, and dividing them by the number of completed items. The total sum is 0 to 52; the higher the score, the less exhausted and a better quality of life.

2.8. Statistical analysis

All entered data were analyzed using R Software (version 4.6.0). Mean ± SD was used to express continuous variables, whereas frequency and percentage were used to express categorical variables. The baseline, 2nd week, and 4th week results were compared between treatment arms. A two-way repeated measures Analysis of Variance (RM-ANOVA) was used to assess the therapeutic efficacy over time and identify interaction differences between treatment arms over the various timelines (baseline, 2nd week, and 4th week). Post-hoc pairwise evaluations were performed with Bonferroni correction. Also, the FACIT-Fatigue scale score was compared between the two intravenous groups. A p-value < 0.05 was considered significant.

3. RESULTS

3.1. Patient demographics

For each FCM and IS group, 66 patients were given advice on an enriched iron diet and were recruited. Table 1 lists the demographics and clinical features of 132 patients. The demographic details, such as gender, age, body weight, body mass index, pulse, blood pressure, and comorbidities, were collected between the two groups.

Table 1. Baseline Demographic and Clinical Characteristics of Patients in the FCM and IS Groups

Parameters	**FCM (N = 66)**	**IS (N = 66)**
Gender		
Male	13 (19.7)	11 (16.7)
Female	53 (80.3)	55 (83.3)
Age group		
18-30 years	20 (30.3)	24 (36.4)
31-40 years	10 (15.2)	6 (9.1)
41-50 years	11 (16.7)	15 (22.7)
51-60 years	11 (16.7)	13 (19.7)
> 60 years	14 (21.2)	8 (12.1)
Body weight (in kg)	58.69 ± 5.84	58.47 ± 6.02

Body mass index (kg/m^2)	23.29 ± 2.86	23.12 ± 2.44
Pulse (beats/ min)	80.93 ± 5.21	79.23 ± 3.98
Blood pressure (mmHg)		
Systolic	118.69 ± 7.71	116.98 ± 6.58
Diastolic	78.54 ± 4.87	78.79 ± 5.02
Comorbidities		
Urinary tract infection	11 (16.7)	10 (15.2)
Chronic kidney disease	14 (21.2)	11 (16.7)
Diabetes mellitus	9 (13.6)	13 (19.7)
Hypertension	11 (16.7)	7 (10.6)
Thyroid disorder	7 (10.6)	5 (7.6)
Others	4 (6.1)	9 (13.6)

3.2. Post-hoc comparison

At the time of recruitment, the group's clinical, laboratory, and FACIT-Fatigue scores were similar. There was a substantial increase in laboratory values at week 2 and week 4, within the group as well as between the two groups (Table 2). Overall, therapy with FCM produced noticeably larger improvements in hematological and iron-status outcomes from the second week onward compared with IS. Additionally, FCM was linked to considerably higher FACIT scores at follow-up, suggesting that functional well-being had improved more in FCM group.

Table 2. Comparison of Hematological Parameters and Quality of Life Scores Between the FCM and IS Groups Over Time (Post-hoc comparison)

Parameters	FCM (n = 66)	IS (n = 66)	Difference in mean (95% CI)	t ratio	p-value
Hemoglobin (g/dL)					
Baseline	8.33 ± 0.94	8.55 ± 0.96	-0.22 (-0.55, 0.11)	-1.29	0.199
2nd week	9.56 ± 1.00	9.13 ± 1.04	0.43 (0.08, 0.78)	2.47	0.015*
4th week	10.73 ± 1.08	9.85 ± 0.99	0.88 (0.52, 1.24)	5.07	< 0.001*
Transferrin saturation (%)					
Baseline	9.63 ± 3.22	10.25 ± 3.30	-0.62 (-1.74, 0.50)	-1.00	0.317
2nd week	19.40 ± 3.77	15.95 ± 3.63	3.45 (2.18, 4.72)	5.56	< 0.001*
4th week	27.59 ± 3.70	23.34 ± 3.71	4.25 (2.97, 5.53)	6.85	< 0.001*
Serum iron (µg/dL)					
Baseline	34.32 ± 9.66	33.45 ± 10.42	0.87 (-2.59, 4.33)	0.29	0.769
2nd week	67.61 ± 16.98	49.34 ± 16.29	18.27 (12.54, 24.00)	6.25	< 0.001*
4th week	85.13 ± 24.37	55.69 ± 18.51	29.44 (21.98, 36.90)	10.07	< 0.001*
Serum ferritin (ng/mL)					
Baseline	15.17 ± 7.20	15.06 ± 6.21	0.11 (-2.21, 2.43)	0.07	0.941
2nd week	84.61 ± 9.24	34.62 ± 8.44	49.99 (46.94, 53.04)	33.37	< 0.001*
4th week	99.73 ± 11.92	53.66 ± 7.43	46.07 (42.64, 49.50)	30.75	< 0.001*
FACIT score					
Baseline	23.11 ± 7.42	20.14 ± 7.08	2.97 (0.47, 5.47)	2.20	0.029*
2nd week	29.67 ± 8.37	23.18 ± 7.22	6.49 (3.80, 9.18)	5.22	< 0.001*
4th week	33.24 ± 7.99	25.30 ± 8.33	7.94 (5.13, 10.75)	6.39	< 0.001*

Data are presented as mean ± standard deviation (SD). Mean differences represent pairwise contrasts calculated as FCM - IS at each time point. *Statistically significant at $p < 0.05$.
Abbreviations: CI - Confidence Interval; FACIT - Functional Assessment of Chronic Illness Therapy; FCM - Ferric Carboxymaltose; IS - Iron Sucrose.

3.3. Linear mixed-effects model

The repeated measure model (Table 3) was used to detect the laboratory changes over time, which indicates statistically significant effect of treatment group, time, and group × time interaction for all evaluated outcomes ($p < 0.001$). A differential treatment effect across the follow-up period is supported by the significant group × time interactions for all outcomes, which show that the response outcomes varied between FCM and IS. The results align with the pairwise comparisons, which showed that patients receiving FCM had higher improvements in all parameters and FACIT scores.

Table 3. Linear Mixed-Effects Model Results for Main Effects and Treatment × Time Interactions

Effect	F-value	df	p value
Hemoglobin			
Group	4.54	130	0.035*
Time	1717.28	260	< 0.001*
Group × Time	155.50	260	< 0.001*
Transferrin saturation			

Group	17.99	130	< 0.001*
Time	2127.37	260	< 0.001*
Group × Time	60.20	260	< 0.001*
Serum iron			
Group	52.59	130	< 0.001*
Time	259.80	260	< 0.001*
Group × Time	38.83	260	< 0.001*
Serum ferritin			
Group	634.61	130	< 0.001*
Time	4309.15	260	< 0.001*
Group × Time	819.85	260	< 0.001*
FACIT score			
Group	19.63	130	< 0.001*
Time	364.94	260	< 0.001*
Group × Time	39.83	260	< 0.001*
Main effects of treatment group, time, and their corresponding interaction terms performed using a repeated measures linear mixed-effects framework. Degree of freedom (df) denote the denominator degrees of freedom calculated using the Kenward-Roger approximation. *p < 0.05 considered statistically significant. ***Abbreviations:*** df – Degree of freedom; FACIT - Functional Assessment of Chronic Illness Therapy.			

3.4. Efficacy outcomes

In terms of efficacy metrics, at the fourth week, patients who received intravenous FCM achieved higher laboratory results (hemoglobin level, serum iron, serum ferritin, and also transferrin saturation %) than those who received intravenous IS (Figures 2, 3, 4, and 5).

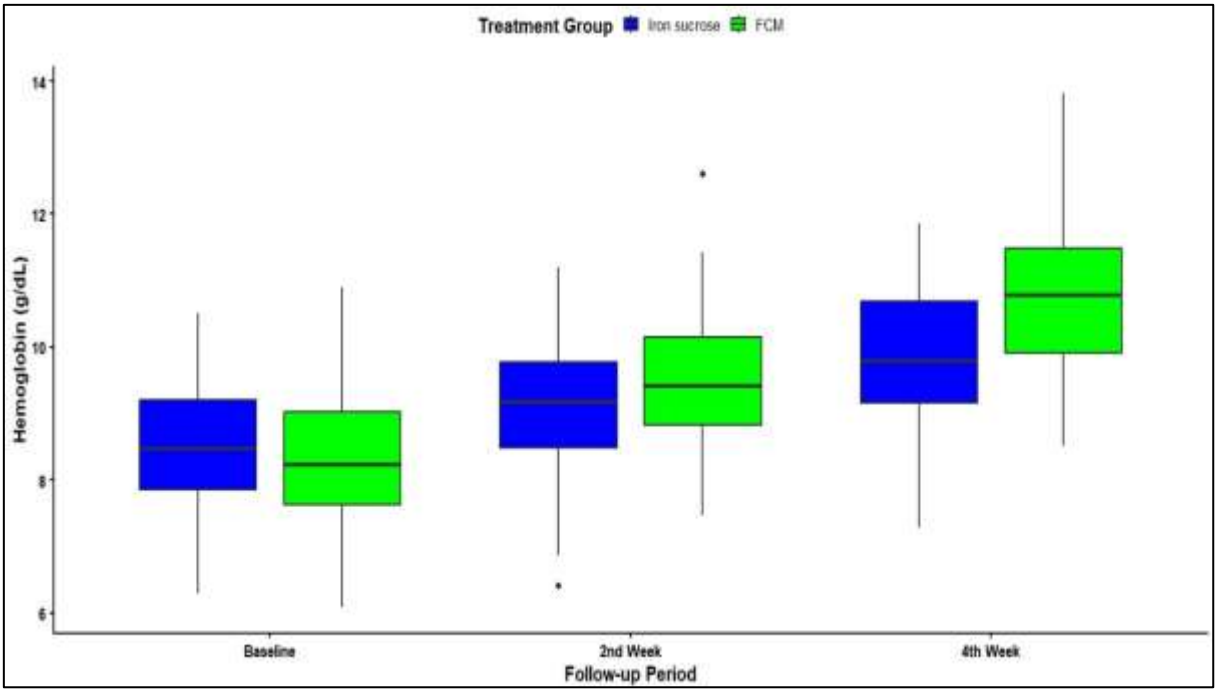

Figure 2. Comparison of hemoglobin level across different follow-up period

In the FCM group, the average hemoglobin level at week 4 was 10.73 ± 1.08 and 9.85 ± 0.99 in the IS cases ($p < 0.001$). According to a substantial group-by-time interaction ($F = 155.50$, $p < 0.001$) revealed that FCM has accelerated and strengthened the process of erythropoiesis, which may have the capacity to deliver more bioavailable iron in a smaller number of infusions. This points out that FCM performs better in IDA management than IS. Transferrin saturation % increase in both IS and FCM, whereas FCM had a better rise in the transferrin saturation level ($p < 0.001$). The time interaction with the significant group ($F = 60.20$, $p < 0.001$) reveals that utilization of iron was much higher with FCM.

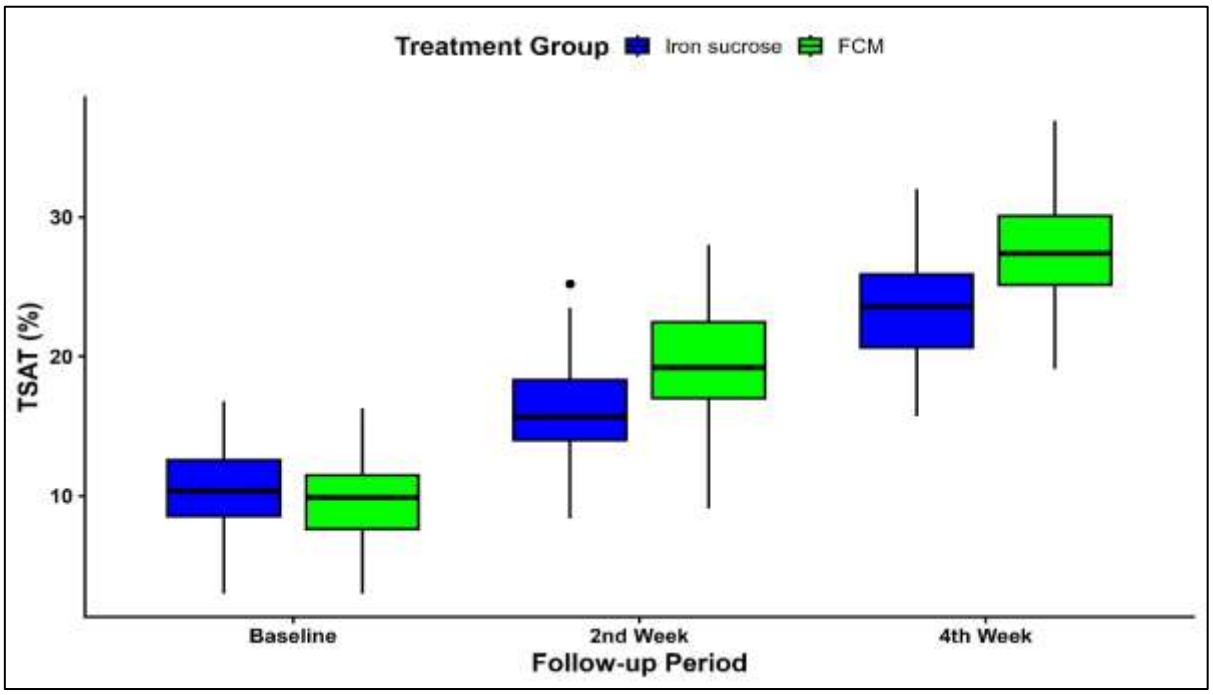

Figure 3. Comparison of TSAT% across different follow-up period

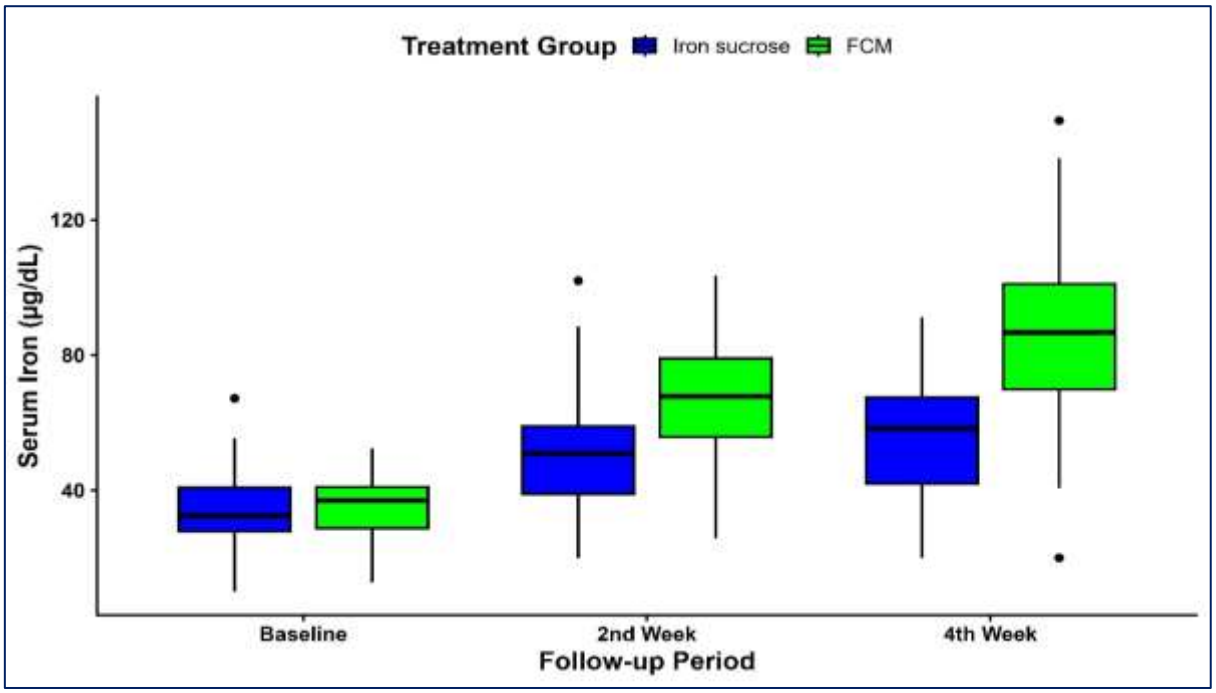

Figure 4. Comparison of serum iron across different follow-up period

Serum iron increased in both the IS and FCM groups, but FCM had a far greater rise in the level ($p < 0.001$). The time interaction with the significant group ($F = 38.83$, $p < 0.001$) indicates that FCM is much more potent in restoring iron reserves and is crucial for maintaining erythropoiesis. Serum ferritin increased in both the IS and FCM groups, but FCM had a far greater increase in the serum ferritin level ($p < 0.001$). In IDA, fatigue is a highly prevalent and worst symptom, which directly affects the quality of life of patients.

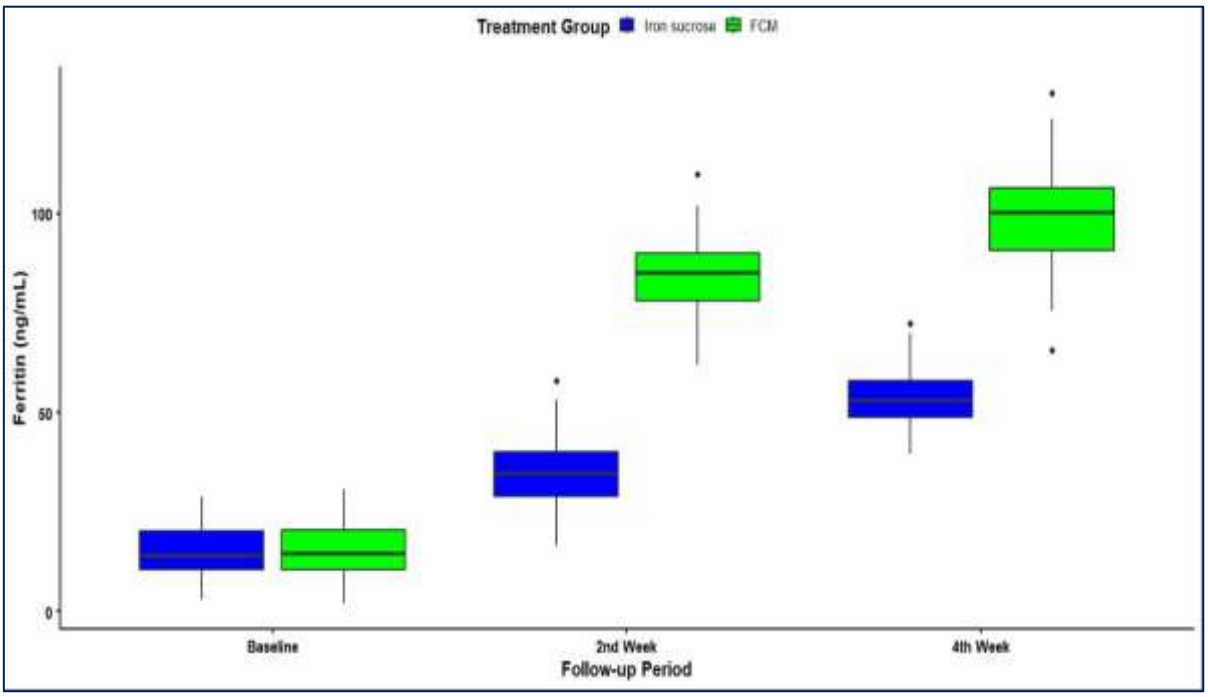

Figure 5. Comparison of serum ferritin level across different follow-up period

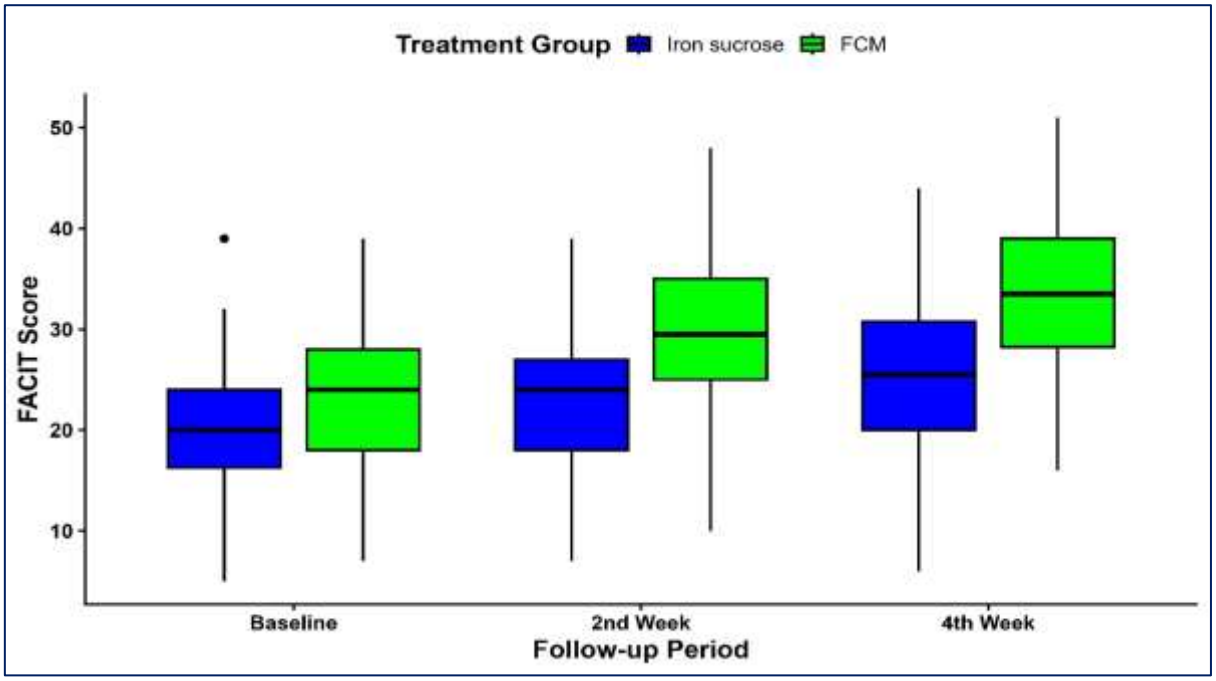

Figure 6. Comparison of FACIT-Fatigue scores across different follow-up period

Figure 6 shows the FACIT-Fatigue scores for the IS and FCM groups at baseline, at the 2nd week, and at the 4th week. After treatment, both intravenous groups experienced an increase in FACIT-Fatigue score; however, patients treated with FCM showed better results than those treated with IS ($p < 0.001$).

3.5. Safety outcomes

Two patients complained of soreness at the infusion site when receiving their second dose of FCM. At the fourth dose of IS, eleven patients experienced nausea and vomitting, while three patients suffered constipation. However, no major adverse reactions were documented in any patients. Patients who received FCM treatment expressed fulfilment and had a better quality of life and less fatigue. Furthermore, patients receiving FCM therapy had low dosage frequency, which reduced the number of hospital appointments and ultimately resulted in minimal usage of hospital resources than IS receiving patients.

4. DISCUSSION

The purpose of the research was to evaluate the efficacy and safety profile of IS and FCM infusions for the correction of IDA. IDA is a serious health problem and a widely recognized type of nutritional deficit globally [26]. IDA is a preventable and treatable illness [27]. Dillon et al. stated that intravenous iron is a helpful treatment for IDA [28]. These intravenous

preparations can also help patients who are insensitive or resistant to oral iron preparations. With encouraging results, intravenous iron preparations have been used to treat IDA, facilitating the avoidance of blood transfusion and unwanted effects of oral iron preparations [29]. Our findings showed that, in comparison to the FCM group, the IS group used noticeably more injections, medication doses, normal saline, and hospital visits. The clinical indicators, such as hemoglobin, serum ferritin, serum iron, and also transferrin saturation %, between FCM and IS showed variations. Treatment-induced changes in efficacy revealed that the changes in hemoglobin, S. iron, S. ferritin, and too transferrin saturation % level in the FCM groups were considerably greater than those in the IS group. Based on the FACIT-Fatigue score, the FCM treatment group showed better quality of life and less fatigue compared to the IS group. Additionally, our study suggests that there were no unacceptable side effects or unintended effects with either treatment, and these are anticipated occurrences that have been documented in earlier searches [30,31].

Naqash et al reported that patients treated with FCM achieved a hemoglobin rise of 3.32 gram/dL at the 2nd week and 4.92 gram/dL at the 4th week ($p < 0.001$) from the initial value [32]. In our study, the average rise in hemoglobin level after FCM therapy was observed as 1.23 g/dL (2 weeks) and 2.4 g/dL (4 weeks). Hong C et al reported that after IS treatment, the mean hemoglobin rise was recorded as 0.33 g/dL in 14 days [33]. In our study, the average rise in hemoglobin level after IS therapy was observed as 0.58 g/dL in 14 days and 1.3 g/dL at week 4 ($p < 0.001$). Onken et al reported a notable rise in serum ferritin and transferrin saturation level favouring FCM treatment after 56 days [34]. We found that the mean rise in transferrin saturation level was 17.96% following FCM treatment and 13.09% following IS treatment after 28 days. Our study supports the prior study as favouring FCM treatment ($p < 0.001$). Naqash et al reported that patients treated with FCM achieved a serum ferritin rise of 18.28 to 119.02 ng/mL at week 4 [32]. Breymann C et al identified changes in ferritin level from 40.00 to 119.02 ng/mL following FCM treatment [35]. Our study findings showed mean changes in serum ferritin level from 15.17 ng/mL to 84.61 ng/mL at 2nd week and 99.73 ng/mL at 4th week following FCM treatment ($p < 0.001$), and mean changes in serum ferritin level from 15.06 ng/mL to 34.62 ng/mL at 2nd week and 53.66 ng/mL at 4th week following IS treatment ($p < 0.001$). These findings support that FCM treatment shows more efficacy than IS treatment.

In a randomized trial, FCM-treated patients showed a mean change of serum iron from a baseline value of 35.94 µg/dL to 114.67 µg/dL at week 2 and 137.95 µg/dL at week 4. IS-treated patients reported a mean change of serum iron from baseline value of 36.17 µg/dL to 92.57 µg/dL at week 2 and 111.03 µg/dL at week 4, as reported by IAR Consortium [36]. In our study, we found the same as mean changes of serum iron from the baseline value of 34.32 microgram/decilitre to 67.61 microgram/decilitre at 2nd week and 85.13 microgram/decilitre at 4th week in FCM group ($p < 0.001$) and mean changes from baseline value of 33.45 microgram/decilitre to 49.34 microgram/decilitre at 2nd week and 55.69 microgram/decilitre at 4th week in IS group ($p < 0.001$). These findings strongly support that FCM had a better treatment efficacy than IS. We also documented the increased score of FACIT-Fatigue following FCM and IS treatment. In the FCM group, the mean score increased from 23.11 (baseline) to 29.67 at the 2nd week and 33.24 at the 4th week ($p < 0.001$). In the IS group, the mean score rose from 20.14 (baseline) to 23.18 at 2nd week and 25.30 at 4th week ($p < 0.001$). These finding supports FCM group had a better quality of life at week 4.

Syed MH et al. reported hypersensitivity and infusion site reaction following FCM therapy [37]. In our study, we documented infusion site reaction in two patients who received FCM treatment. Chawla S et al. reported nausea, vomitting, and constipation following IS therapy [38]. Our study documented that eleven patients had nausea and vomitting, and three patients had a constipation following IS treatment. In our study, adverse events were reported in only 12%. No major adverse reactions were documented in any patients. The study observed that FCM and IS had a comparable safety and tolerability, and that FCM had the benefit of significantly greater iron dosage at once, which reduces the need for repeated administrations and enhances patient comfort. This study had certain limitations, as it was done in a single tertiary centre, its findings may not be as applicable to other institutions. Also, a small number of patients and a short study period may limit its potential to capture the long-term effectiveness, durability of iron store replenishment, or delayed ADRs following intravenous therapy.

5. CONCLUSION

A single intravenous FCM infusion dose of 1000mg is both safe and efficacious for the correction of IDA. FCM restores iron reserves more quickly and raises laboratory biomarkers such as hemoglobin, serum ferritin, serum iron, and transferrin saturation level as compared to IS. FCM results in greater improvement in fatigue scores over the four-week follow-up period compared with IS. The safety profiles of both treatments were favourable, and only minor ADR were documented. Patient convenience is more favourable with FCM than IS, as FCM results in fewer infusions and hospital visits. Overall, FCM is the best choice for treating those with IDA who need to quickly restore their iron levels. Further multicentre research with larger sample sizes and follow-up is necessary to validate these results and assess the long-term therapeutic benefits of FCM treatment.

Author contribution statement

Gowtham Arumugam: Writing original draft, conceptualization, formal analysis. **Chakravarthi Sennimalai:** Writing-review & editing, formal analysis, supervision. **Vijayaraja Sakthivel:** Writing original draft, data curation, methodology. **Gunasekara Guptha Murali**: Data curation, conceptualization, methodology. **Abinath Moorthy**: Writing – review & editing and Conceptualization.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to patient confidentiality and institutional restrictions, and are available from the corresponding author on reasonable request.

Consent for publication
Individual consent for publication was obtained from all participants involved in this study. Participants were informed that the data collected would be used for research and potential publication, ensuring confidentiality and anonymity in the presentation of the research findings.

Funding
This research did not receive any specific grant from funding agencies in the public, commercial, and not-for-profit sectors.

Conflict of interest
The authors declare no conflicts of interest.

Acknowledgement
We wish to acknowledge the management of Karpagam Academy of Higher Education and Karpagam Faculty of Medical Sciences and Research for providing support and facilities for framing this article.

List of abbreviations

Terms	Abbreviations
IDA	Iron Deficiency Anemia
FCM	Ferric carboxymaltose
IS	Iron sucrose
WHO	World Health organization
FACIT- Fatigue	Functional Assessment of Chronic Illness Therapy – Fatigue
ADR	Adverse drug reaction
KFMSR	Karpagam Faculty of Medical Sciences and Research
NS	Normal saline

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