**Comparison Between the Effectiveness of Intravenous Infusion and Oral Iron Treatment of Postpartum Iron Deficiency Anemia**

**Abstract**

**Background:** Postpartum iron deficiency anemia remains a significant public health concern globally, specifically concerning women in low-and middle-income countries. In South Asia, involving Bangladesh and India, the prevalence is frighteningly extreme due to factors such as poor nutritional status, frequent pregnancies, and inadequate access to quality postpartum care. **Aim:** To find out the association between the effectiveness of intravenous infusion and oral iron therapy in the treatment of postpartum iron deficiency anemia. **Methods:** A randomized controlled trial study was conducted at the Department of Obstetrics and Gynecology, BMU, Dhaka, from July 2023 to June 2024. Ninety-two postpartum women with iron deficiency anemia (Hb 7–9.9 g/dL, serum ferritin <30 µg/L) were randomly selected into two groups ( Group I- 46 participants for intervention and group-II: 46 for control). Group I received intravenous ferric carboxymaltose based on body weight and Hb level, and Group II received oral ferrous ascorbate (48 mg) twice daily for six weeks. Hemoglobin and serum ferritin were determined at baseline, 2 weeks, and 6 weeks. Adverse events and compliances were recorded. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26 with *p*<0.05 considered statistically significant. **Results:** The mean age of the participants was 29.18 years, with the majority aged between 20-30 years. Half of the respondents received intravenous iron, and the other half received oral iron. After two weeks of treatment, 53.3% achieved normal hemoglobin levels, which increased to 56.5% by the sixth week. Intravenous iron therapy showed significantly better hemoglobin improvement compared to oral iron at both two and six weeks (*p*=0.044 and *p*=0.003). Common side effects included dysgeusia 13.0% and gastrointestinal issues, though 34.8% reported none. **Conclusion:** This study presents further verification that intravenous iron is more efficient than oral iron in developing hemoglobin levels among women with postpartum iron deficiency anemia. While oral iron remains a feasible selection, mainly in resource-limited settings, intravenous iron should be reflected for women who demand a prompt and effective improvement of anemia, specifically in cases with severe symptoms or intolerance to oral iron.

**Key Words:** Postpartum anemia, iron deficiency, intravenous iron therapy, hemoglobin percentage,

Randomized control trial.

**Introduction:**

Iron deficiency is the indicating cause of anemia in the postpartum time and significantly effects maternal health and retrieval [6, 11]. The condition impairs daily operating, decreases immunity, and may indicate postpartum depression, poor lactation, and fatigue [7, 8, 10].

In Bangladesh, iron deficiency anemia is common among reproductive-aged women, with rural populations being extremely affected [11]. Comparable developments are observed across South Asia, including India, where maternal anemia continues to be a top avoidable cause of maternal morbidity [1, 9, 18]. The World Health Organization (WHO) recognizes iron deficiency as one of the principal contributors to global disease obligation among women of childbearing age [5].

Usually, oral iron therapy has been the first-line treatment due to its affordability and ease of management. Conversely, it is repeatedly related with poor gastrointestinal acceptance and low adherence [2, 16, 17]. Compliance issues, slow hematological reaction, and gastrointestinal side effects control its success [15, 19]. On the other hand, intravenous (IV) iron therapy recommends a quicker replenishment of iron stores with fewer gastrointestinal side effects, making it better in moderate to acute cases [4, 12, 13].

Several studies have assessed oral and IV iron treatments for postpartum anemia. Research in Bangladesh and India reveals that IV iron sucrose therapy results in more speedy hemoglobin recovery than oral iron [1, 3, 4]. International studies support these results, indicating better efficacy, quicker response, and better patient satisfaction with IV iron [12, 19, 20]. However, concerns exist concerning IV iron’s cost, risk of hypersensitivity, and require for qualified personnel for administration [20, 22].

Current studies have also investigated the cost-effectiveness of IV therapy, advocating that despite higher upfront costs, it can be economically beneficial due to decreased hospital visits and quicker recovery [21]. Furthermore, some designs like ferric carboxymaltose recommend a better protection profile and accept single high-dose administration, increasing compliance [13].

Universally, guides from WHO and NICE advice tailored methods based on the seriousness of anemia, patient tolerance, and urgency of correction [5, 14]. In Bangladesh, incorporation of such regulations remains not consistent, managing to vary clinical practices across institutions [11].

**Methods:**

A randomized controlled trial study was conducted at BMU, Dhaka, from July 2023 to June 2024. Ninety-two postpartum women with IDA (Hb 7-9.9 g/dL, ferritin <30 µg/L) were randomly assigned (1:1) to receive either intravenous ferric carboxymaltose (n=46) or oral iron supplements (n=46). Randomization used a lottery method. The primary outcome was the change in hemoglobin levels in 2 and 6 weeks. Secondary outcomes included changes in serum ferritin and the incidence of side effects. Intravenous FCM dosage was weight and Hb-adjusted. Oral iron was two tablets daily (ferrous ascorbate 48mg, folic acid 0.5mg, zinc sulfate 22.5mg). Hemoglobin and ferritin were measured at baseline, 2, and 6 weeks. Data were analyzed using SPSS V.26 with Chi-square, and Fisher’s exact tests (p<0.05 significant). Ethical approval was obtained from the IRB of BMU, and all participants provided written informed consent.

**Results:**

A total of 92 postpartum women with iron deficiency anemia participated in the study. The socio-demographic profile of the respondents, treatment distribution, hemoglobin changes, and reported side effects. Nearly 60% were multiparous, and income distribution was predominantly within the BDT 20,000–50,000 range.

Iron treatment was evenly divided between intravenous and oral routes. Significant associations were observed between the type of treatment and both the rate and extent of hemoglobin improvement.

Side effects were reported by approximately two-thirds of participants, with most symptoms being mild in nature.

Table 1: Socio-Demographic Characteristics of the Respondents.

|  |  |  |
| --- | --- | --- |
| **Age category** | **Frequency** | **Percent** |
| 20-30 | 48 | 52.2 |
| 30+ | 44 | 47.8 |
| Mean±SD | 29.18±5.804 |
| **Monthly family income (BDT)** |
| <30,000 | 35 | 38.0 |
| 20,000–50,000 | 38 | 41.3 |
| >50,000 | 19 | 20.7 |
| Parity |
| Primipara  | 37 | 40.2 |
| Multipara  | 55 | 59.8 |
| **Total** | **92** | **100.0** |

Table 1 summarizes the socio-demographic profile of the respondents. The mean age was 29.18 years (SD ± 5.80), with 52.2% aged 20–30 years and 47.8% over 30. Regarding monthly family income, 41.3% reported earning BDT 20,000–50,000, followed by 38.0% earning less than BDT 30,000, and 20.7% earning above BDT 50,000. In terms of parity, 59.8% were multiparous, while 40.2% were primiparous.

**Figure 1:** Hemoglobin Status of Respondents Before and After Iron Treatment

Figure 1 shows the progression of hemoglobin status among respondents over the treatment period. Before treatment, 82.6% had moderate anemia and 17.4% had mild anemia. After two weeks of iron therapy, 53.3% achieved normal hemoglobin levels, while 46.7% remained anemic. By the sixth week, normal levels were observed in 56.5% of participants, with anemia persisting in 43.5%, indicating gradual improvement with continued treatment.

**Table 2:** Respondents Iron Treatment and Associated Side Effects

|  |  |  |
| --- | --- | --- |
| **Type of iron treatment** | **Frequency** | **Percent** |
| Intravenous Iron  | 46 | 50.0 |
| Oral Iron Tablets | 46 | 50.0 |
| **Type of side effects** |
| Urticaria (skin rash) | 04 | 4.3 |
| Constipation | 10 | 10.9 |
| Nausea | 06 | 6.5 |
| Gastrointestinal (GI) pain | 10 | 10.9 |
| Muscle cramps | 10 | 10.9 |
| Dysgeusia (altered taste) | 12 | 13.0 |
| Headache | 08 | 8.7 |
| None of the above | 32 | 34.8 |
| **Severity of side effects** |
| Mild | 44 | 47.8 |
| Moderate | 25 | 27.2 |
| Severe | 07 | 07.6 |
| None | 16 | 17.4 |
| **Total** | **92** | **100.0** |

Table 2 presents the treatment modalities and side effects experienced by the respondents. Half of the participants received intravenous iron, while the other half were treated with oral iron tablets. Dysgeusia 13.0% was the most frequently reported side effect, followed by gastrointestinal pain 10.9%, constipation 10.9%, and muscle cramps 10.9%. Less common side effects included headache 8.7%, nausea 6.5%, and urticaria 4.3%. Notably, 34.8% of respondents reported no side effects. In terms of severity, 47.8% experienced mild symptoms, 27.2% moderate, 7.6% severe, and 17.4% reported none.

**Table 3:** Association Between Type of Treatment and Hemoglobin Level Achievement

|  |  |  |
| --- | --- | --- |
| **Type of treatment** | Achieving the target hemoglobin level | ***p*-value** |
| Yes | No |
| Intravenous Iron  | 24 | 22 | .000 |
| Oral Iron Tablets | 46 | 00 |
| **Total** | **70** | **22** | **92** |

\* Fisher's Exact Test

Table 3 shows that there was significant association between type of treatment and hemoglobin level achievement (*p*=0.000)

**Table 4:** Association Between Type of Treatment and Duration of Hemoglobin Improvement.

|  |  |  |
| --- | --- | --- |
| **Type of treatment** | **After 2 weeks** | ***p*-value** |
| **Anemia** | **Normal** |
| Intravenous Iron  | 22 | 24 | 0.044 |
| Oral Iron Tablets | 21 | 25 |
|  | **After 6 weeks** | 0.003 |
| Intravenous Iron  | 18 | 28 |
| Oral Iron Tablets | 22 | 24 |
| **Total** | **40** | **52** | **92** |

Table 4 reveals that there was a significant association between type of treatment and hemoglobin level achievement after 2 weeks and 6 weeks of treatment (*p*=0.044 and 0.003) respectively.

**Discussion:**

The study results emphasize the persistent challenge of postpartum iron deficiency anemia, with a substantial proportion of women remaining anemic at both the 2-week and 6-week follow-up, despite treatment [5, 6]. The mean age of the participants in this study was 29.18 years, supporting with the standard age range of women throughout the postpartum period when PIDA is usually observed [12]. A significant proportion of the women in this study had a monthly family income of BDT 20,000-50,000, which may reproduce the socioeconomic situations in the study area and its possible inspiration on access to satisfactory nutrition and healthcare, issues known to contribute to PIDA [10, 11]. The prevalence of multiparity 59.8% in this study is also noteworthy, as multiparity is often associated with an increased risk of iron deficiency due to multiple pregnancies and deliveries [9].

The progression of hemoglobin levels subsequent iron therapy, as shown in Figure 1, shows a steady recovery in anemia over the treatment period. Still, the fact that a substantial percentage 43.5% of participants continued anemic even at the 6-week mark emphasizes the need for more efficient involvements and longer-term follow-up [8, 12].

The side effects associated with iron treatment, as detailed in Table 2, are coherent with prior research. Dysgeusia, gastrointestinal pain, constipation, and muscle cramps are generally described adverse effects of both oral and intravenous iron therapies [15, 22]. Even though a significant proportion 34.8% of respondents informed no side effects, a significant number suffered mild to moderate symptoms, which can impact treatment adherence and quality of life. The seriousness of side effects should be carefully considered when deciding a suitable iron replacement therapy [2, 19].

Table 3 exhibits a significant association between the type of treatment and hemoglobin level achievement (*p*=0.000), pointing out that the treatment mode significantly affects the outcome. This achievement is also supported by Table 4, which shows a significant association between the type of treatment and hemoglobin level improvement at both 2 weeks (*p*=0.044) and 6 weeks (*p*=0.003). These findings advocate that intravenous iron is more efficient than oral iron in recovering hemoglobin levels in postpartum women. This is coherent with other studies that have explained IV iron to have a more rapid and operational response in improving iron deficiency anemia. [1, 3, 4]

The outcomes of this study are also proven by a systematic review and meta-analysis conducted by Sultan et al. (2019), which determined that intravenous iron therapy is more effective than oral iron therapy for postpartum anemia. [19] This may be qualified to the faster and more complete replenishment of iron stores with intravenous administration, bypassing the limitations of oral iron concentration and developing hematological parameters more efficiently. [13, 14]

Besides, the findings of this study should be considered in the context of the cost-effectiveness of several treatment options. While intravenous iron may be more helpful, it is habitually more pricey than oral iron therapy. [24] Hence, healthcare contributors need to weigh the clinical benefits of intravenous iron against the expenses when requiring treatment decisions for women with postpartum iron deficiency anemia.

**Conclusion:**

Intravenous iron therapy proved significantly more effective than oral iron in improving hemoglobin levels among postpartum women with iron deficiency anemia. Its rapid correction of anemia makes it especially beneficial for women with moderate to severe symptoms or poor tolerance to oral iron. In resource-limited settings like Bangladesh and India, prioritizing intravenous iron for high-risk cases could improve maternal recovery and overall outcomes, provided cost and accessibility are carefully considered.

**Conflict of Interest:**

The authors have no conflicts of interest to disclose related to this study.

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