

Research Article

Comparison of the Efficacy of Intravenous Iron and Oral Iron Therapy in Postpartum Anemia

¹Maryam Shafiq, ²Muhammad Asim and ³Iram yousaf

¹House Officer Bahawal Victoria Hospital Bahawalpur

²Medical Officer BHU 1/8R Mian Channu Distt Khanewal

³Woman Medical Office, Nishtar hospital multan

ABSTRACT:

Objective:To compare the efficacy of intravenous iron and oral iron therapy in postpartum anemia.”

Materials & Methods: This randomized controlled was conducted at Department of Obstetrics and Gynecology, Bahawal Victoria Hospital Bahawalpur from January 2017 to June 2017. A total of 82 patients with postpartum anemia, 20 to 35 years of age were included in the study.

Results:The mean age of women in group A was 26.36 ± 4.30 year and in group B was 26.31 ± 4.69 years with majority of the patients 41 (50.0%) were between 20 to 25 years of age. There was rise in hemoglobin levels >3.5 g/dl after 6 weeks of therapy in 36 patients in intravenous iron while in oral iron, it was seen in 27 patients. So, efficacy was 87.80% in group A (intravenous iron) and 65.85% in group B (oral iron) with p-value of 0.018.

Conclusion: This study concluded that intravenous iron therapy is associated with higher efficacy (in terms of increase in hemoglobin) as compared to oral iron therapy in treating postpartum anemia.

Keywords:Iron deficiency anemia, hemoglobin, parenteral iron.

INTRODUCTION:

Anemia is defined as haemoglobin less than 11gm/dl and a haematocrit of less than 33%.¹ Anemia is the most common medical disorder in pregnancy and is responsible indirectly for 40-60% of the maternal deaths in the developing countries.² The prevalence of postpartum anemia was highest among women who had been anemic during pregnancy (49%) and among black women (43% overall, including 48% of those who were 13-14 weeks postpartum). By comparison, 24% of women who had not suffered from prenatal anemia and 21% of white women had postpartum anemia.³ Over the past years, various routine methods like oral iron therapy, intramuscular iron therapy, intravascular iron therapy and blood transfusion were used to treat anemia during pregnancy and in postpartum period.⁴ The first choice in the treatment of iron deficiency anemia for the majority of patients is the oral iron replacement therapy which is easily

available at all peripheral health centers and sub-centers.⁵ Among the various iron salts, ferrous sulfate most commonly is used.⁶ Situations like failure of oral iron therapy or increased demands in spite of regular oral iron therapy often necessitate parenteral iron therapy in anemic pregnant women.⁷ The body can absorb up to 6 mg iron daily from the gastrointestinal tract. In many cases the patient has a deficit of over 1,000 mg of iron which would require several months to replace.⁸ As a result, there is increased interest in parenteral iron therapy, which can provide a greater and more rapid iron supply than oral iron supplementation.⁸

As there was no local study available on this issue so, this study was conducted to compare the efficacy of intravenous iron therapy versus oral iron therapy in postpartum anemia in local population, so that our population might get benefits to its best. Moreover, the results of this

study would provide us with more efficacious regimen among two for managing postpartum anemia and help to establish our routine practice guidelines in order to reduce postpartum morbidity of mothers.

MATERIAL AND METHODS:

This randomized controlled was conducted at Department of Obstetrics and Gynecology, Bahawal Victoria Hospital Bahawalpur from January 2017 to June 2017. A total of 82 patients with postpartum anemia, 20 to 35 years of age were included in the study.

a. Inclusion Criteria:

1. All patients with postpartum anemia as per operational definition.
2. Patients between 20-35 years of age.
3. Parity 1 to 5.

b. Exclusion Criteria:

1. Allergic history or iron intolerance.
2. Indication of blood transfusion.
3. Parenteral iron hypersensitivity.
4. Patients with chronic disease i.e. chronic renal failure, chronic hypertension and chronic liver disease.
5. Patients with folic acid deficiency.
6. Patients with thalassemia.
7. Patients not willing to be included in the study.

Operational definitions:

- 1. Postpartum anemia:** Postpartum anemia was considered as positive if Hb<10g/dl and serum ferritin level <15ng/ml within first 48 hours postpartum.
- 2. Efficacy:** was measured in terms of rise in hemoglobin levels after 6 weeks;
 - a. Efficacy was deemed as yes if there was rise in hemoglobin levels >3.5g/dl after 6 weeks of therapy.
 - b. Efficacy was deemed as no if there was rise in hemoglobin levels <3.5g/dl after 6 weeks of therapy

DATA COLLECTION PROCEDURE:

After approval from local ethical committee, 82 patients admitted in the Department of Obstetrics & Gynaecology, THQ Hospital Jampur fulfilling

the inclusion/exclusion criteria were selected. Informed, written consent was taken after explaining the aims, methods, reasonably anticipated benefits, and potential hazards of the study. Subjects were informed that their participation is voluntary and that they may withdraw consent to participate at any time during the study.

After a patient had given informed consent for participation in the study, all patients were randomly divided into two groups A and B. Base line investigations like complete blood count, random blood sugar, urine complete examination, renal functions tests and ECG (where needed) were done in every patient on admission.

Procedural detail:

Group A received intravenous iron (less than or equal to 1,000 mg over 15 minutes, repeated weekly in 100 ml of 0.9% normal saline) over half an hour. Group B received oral iron (tab. Ferrous sulfate, 325 mg orally thrice daily for 6 weeks). All patients were followed till 6 weeks and efficacy (deemed as yes if there was rise in hemoglobin levels >3.5g/dl after 6 weeks of therapy) was noted by the researcher. This all data was recorded on a specially designed proforma which contained two parts. Part 1st included the patient's bio-data while part 2nd contained the study variables.

STATISTICAL ANALYSIS:

Statistical analysis was performed using SPSS version 16.0. Mean and standard deviation was calculated for quantitative variables i.e. age and hemoglobin levels. Frequency and percentage was calculated for qualitative variables like parity and efficacy (yes/no). The efficacy of the two study groups was compared for difference by Chi Square test and p-value ≤ 0.05 was considered as significant. Effect modifiers like age, parity and hemoglobin levels at baseline were controlled through stratifications and post-stratification chi square was applied to see their effect on outcome and p-value ≤ 0.05 was taken as significant.

RESULTS:

Age range in this study was from 20 to 35 years with mean age of 26.23 ± 4.40 years. The mean age of women in group A was 26.36 ± 4.30 and in group B was 26.31 ± 4.69 years.

In group A, efficacy of treatment was noted in 36 (87.80%) patients and in group B, efficacy rate was 27 (65.85%). Difference of efficacy was significantly ($P = 0.018$) higher in study group A as compared to study group B. (Table 1)

Patients were divided in three age groups i.e. age group 20-25 years, age group 26-30 years and age group 31-35 years. In age group 20-25 years, efficacy of treatment was noted in 18 (90%) and 13 (61.90%) patients respectively. The difference of efficacy rate between both groups was statistically significant with p value 0.036. In age group 26-30 years, treatment was found effective in 11 (84.62%) patients of group A and 7 (63.66%) patients of group B respectively but the

difference was insignificant ($P = 0.237$). In age group 31-35 years, efficacy of treatment was noted in 7 (87.5%) patients of group A and 7 (77.78%) of group B, but the difference of efficacy was statistically insignificant with p value 0.600. (Table 2) As shown in table 3, insignificant difference of efficacy between the both treatment groups in all parities was noticed.

Patients were divided into two groups according to their Hb levels i.e. ≤ 7 mg/dl and Hb levels $>7 - <10$ mg/dl. In ≤ 7 mg/dl Hb level group, efficacy was noted in 18 (81.82%) patients and 10 (55.56%) patients respectively in group and B. But the difference of efficacy between both groups was statistically insignificant with p value 0.071. In $>7 - <10$ mg/dl Hb level group, efficacy of treatment was noted in 18 (94.74%) patients and 17 (73.91%) patients of group A and B, but the difference was statistically insignificant with p value 0.071. (Table 4)

Table 1 Comparison of Efficacy between both Groups.

Group	Efficacy		Total	P value
	Yes (%)	No (%)		
A (Intravenous Iron)	36 (87.80)	5 (12.20)	41	0.018
B (Oral Iron)	27 (65.85)	14 (34.15)	41	

Table 2 Stratification of age groups with respect to Efficacy.

Age of patients (years)	Group A (n=41)		Group B (n=41)		P-value
	Efficacy		Efficacy		
	yes	no	yes	no	
20-25	18 (90.0%)	02 (10.0%)	13 (61.90%)	08 (38.10%)	0.036
26-30	11 (84.62%)	02 (15.38%)	07 (63.66%)	04 (36.36%)	0.237
31-35	07 (87.5%)	01 (12.5%)	07 (77.78%)	02 (22.22%)	0.600

Table 3 Stratification of Parity with respect to Efficacy.

Parity	Group A (n=41)		Group B (n=41)		P-value
	Efficacy		Efficacy		
	yes	no	yes	no	
1	07 (87.5%)	01 (12.5%)	06 (66.67%)	03 (33.33%)	0.312
2	11 (84.62%)	02 (15.38%)	08 (61.54%)	05 (38.46%)	0.185
3	10 (90.91%)	01 (9.09%)	08 (66.67%)	04 (33.33%)	0.159
4	06 (100.0%)	00 (0.0%)	03 (60.0%)	02 (40.0%)	0.087
5	02 (66.67%)	01 (33.33%)	02 (100.0%)	00 (0.0%)	0.361

Table 4 Stratification of Hemoglobin levels with respect to Efficacy.

Hb Levels	Group A (n=41)		Group B (n=41)		P-value
	Efficacy		Efficacy		
	yes	no	yes	no	
≤ 7 mg/dl	18 (81.82%)	04 (18.18%)	10 (55.56%)	08 (44.44%)	0.071
$>7 - <10$ mg/dl	18 (94.74%)	01 (5.26%)	17 (73.91%)	06 (26.09%)	0.071

DISCUSSION:

This randomized controlled study has compared the efficacy of intravenous iron and oral iron therapy in postpartum anemia. In our study, mean age of women in group A (intravenous iron) was 26.36 ± 4.30 years and in group B (oral iron) was 26.31 ± 4.69 years with majority of the patients 41 (50.0%) were between 20 to 25 years of age. These results were very much comparable to studies of Breymann C et al⁹ and Aggarwal RS et al⁹ who had shown a mean age of 27 and 28 years respectively. Bhandal N et al¹⁰ in his study had shown a little higher mean age i.e. 29 years and Halimi S et al¹ reported little lower mean age of 24 years as compared to our study.

In our study, there was rise in hemoglobin levels >3.5 g/dl after 6 weeks of therapy in 87.80% patients in Group A (intravenous iron) while in Group B (oral iron), it was seen in 65.85% patients. But Breymann C et al⁸ reported insignificant difference of efficacy between oral iron group and IV iron group postpartum after 6 weeks of iron therapy.

In another study, Aggarwal RS et al⁹ has found the efficacy of intravenous iron therapy in achieving target hemoglobin in 80% patients as compared to only 40% of patients in oral iron group. There was significant improvement in the various hematological parameters in intravenous iron group as compared to patients in oral iron group. A study by Bayomeu F et al¹¹, compared the intravenous iron sucrose versus oral route showed an increase in haemoglobin from 9.6 ± 0.7 g/dl to 11.11 ± 1.3 g/dl after 4 weeks of treatment ($P < 0.001$). Van Wyck DB et al¹² in their study has shown the efficacy i.e. improvement in targeted hemoglobin levels, of intravenous iron as 90.5% and oral iron therapy as 68.6% in postpartum anemia.

Halimi S et al¹ in their study reported rise in hemoglobin concentration from 9.35 ± 1.62 to 11.20 ± 0.28 gm/dl in oral group and from 9.20 ± 1.69 to 12.65 ± 1.06 gm/dl in intravenous group on day 30. He concluded that intravenous iron therapy is better choice to correct iron deficiency anemia as compared to oral therapy. If

given in time, this will help to reduce the risk of blood transfusion during the peripartum period. Bhandal N et al¹⁰ reported in their study, also reported significant difference of efficacy in oral iron group and IV iron group for the treatment of postpartum anemia.

Breymann C et al⁸ also concluded in their study that intravenous is a safe and effective treatment option for patients with postpartum iron deficiency anemia with advantages over oral iron, including a shorter treatment period, ensured compliance, no gastrointestinal side effects, and replacement of iron stores. Similarly, Dede A et al¹³ compared oral with ferrous sulfate, IV iron therapy with an iron sucrose complex and found significantly increased serum ferritin level within a short time with fewer adverse effects with intravenous iron than oral iron therapy in women with postpartum iron deficiency anemia.

Westad S et al¹⁴ reported 95% compliance with the IV iron sucrose. The compliance with oral treatment was less than 50%. Hashmi Z et al¹⁵ concluded that intravenous iron sucrose is effective in achieving target Hb of 11g/dl in 80% of patients. In another study carried out by Raja KS et al¹⁶ at Rawalpindi on intravenous iron sucrose complex therapy in iron deficiency anemia in pregnant women has shown mean Hb level increased from 7.5 to 11gm/dl.

Seid MH et al¹⁷ in his a multi-center, randomized controlled trials evaluated the efficacy, safety, and tolerability of IV ferric carboxymaltose compared to the oral ferrous sulfate. The response was $Hb > 12$ g/dL by the end of the study was significantly greater in the intravenous iron group when compared to the oral iron group (91.4% versus 66.7%, $p < 0.0001$). Bashiri A et al¹⁸ conducted a study on iron supplementation in anemia during pregnancy and revealed that intravenous iron therapy is safe alternative for the treatment of anemia. On the whole it is concluded that intravenous iron is the preferred route of administration in treating iron deficiency anemia in pregnant women as it is more efficacious in terms of rise in hemoglobin levels.

CONCLUSION:

This study concluded that intravenous iron therapy is associated with higher efficacy (in terms of increase in hemoglobin) as compared to oral iron therapy in treating postpartum anemia. So, we recommend that intravenous iron should be used as a first line therapy in our routine practice for treating postpartum anemia in order to reduce postpartum morbidity and mortality of mothers.

REFERENCES:

1. Halimi S, Halimi SMA, Shoaib M. Oral versus parenteral iron therapy for correction of iron deficiency anaemia in pregnancy. *Gomal J Med Sci.* 2011;9(1):3-5.
2. Kalaivani K. Prevalence & consequences of anaemia in pregnancy. *Indian J Med Res.* 2009;130(5):627-33.
3. Bodnar LM. High prevalence of postpartum anemia among low-income women in the United States. *Am J Obstet Gynecol.* 2001;185(2):438-43.
4. Subhadra S, Saroj S, Kumar SP. A study to compare the efficacy and safety of intravenous iron sucrose and intramuscular iron sorbitol therapy for anemia during pregnancy. *J ObstetGynecol India.* 2013;63(1):18–21.
5. Kharde PS, Bangal VB, Panicker KK. Comparative study of intravenous iron sucrose versus oral iron therapy in iron deficiency anemia during postpartum period. *Int J Biomed Adv Res.* 2012;3(4):238-43.
6. Cogswell ME, Parvanta I, Ickes L, Yip R, Brittenham GM. Iron supplementation during pregnancy, anemia, and birthweight: a randomized controlled trial. *Am J Clin Nutr.* 2003;78:773-81.
7. Koutroubakis IE, Oustamanolakis P, Karakoidas C, Mantzaris GJ, Kouroumalis EA. Safety and efficacy of total-dose infusion of low molecular weight iron dextran for iron deficiency anemia in patients with inflammatory bowel disease. *Dig Dis Sci.* 2010;55(8):2327-31.
8. 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 Gynaecol Obstet.* 2008;101(1):67-73.
9. Aggarwal RS, Mishra VV, Panchal NA, Patel NH, Deshchougule VV, Jasani AF. Comparison of oral iron and iv iron sucrose for treatment of anemia in postpartum indian women. *National J Commun Med.* 2012;3(1):48-54.
10. Bhandal N, Russell R. Intravenous versus oral iron therapy for postpartum anaemia. *Br J Obstet Gynecol.* 2006;113:1248-52.
11. Bayoumeu F, Subiran-Buisset C, Baka NE, Legagneur H, Monnier-Barbarino P, Laxenaire MC. Iron therapy in iron deficiency anemia in pregnancy: Intravenous route versus oral route. *Am J Obstet Gynecol.* 2002;186:518-22.
12. Van Wyck DB, Martens MG, Seid MH, Baker JB, Mangione A. Intravenous ferric carboxymaltose compared with oral iron in the treatment of postpartum anemia: a randomized controlled trial. *Obstet Gynecol.* 2007;110(2 Pt 1):267-78.
13. Dede A, Uygur D, Yilmaz B, Mungan T, Ugur M. Intravenous iron sucrose complex vs. oral ferrous sulfate for postpartum iron deficiency anemia. *Intl J Gynecol Obstet.* 2005;90:238-39.
14. Westad S, Backe B, Salvesen KA. A 12-week randomised study comparing intravenous iron sucrose versus oral ferrous sulphate for treatment of postpartum anemia. *ActaObstetGynecol Scand.* 2008;87:916-23.
15. Hashmi Z, Bashir G, Azeem P, Shah S. Effectiveness of intra-venous iron sucrose complex versus intra-muscular iron sorbitol in iron deficiency anemia. *Ann Pak Inst Med Sci.* 2006;2:188-91.
16. Raja KS, Janjua NB, Khokhar N. Intravenous iron sucrose complex therapy in iron

deficiency anemia in the pregnant women.
Rawal Med J 2003;28:40-3.

17. Seid MH, Derman RJ, Baker JB, Banach W, Goldberg C, Rogers R. Ferric carboxymaltose injection in the treatment of postpartum iron deficiency anemia: a randomized controlled clinical trial. *Am J Obstet Gynecol.* 2008;199:435.e1-435.e7.
18. Bashiri A, Burstein E, Sheiner E, Mazor M. Anemia during pregnancy and treatment with intravenous iron. *Eur J Obstet Gynecol Reprod Biol.* 2003;110:2-7.