

Intravenous Iron Saccharate Infusion for Treatment of Iron Deficiency Anemia before Labor

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Abstract:

Objectives: This study designed to treat iron deficiency anemia before labor using intravenous Iron Saccharate.

Materials and Methods: One hundred and twenty-one (121) pregnant women, with hemoglobin level between 8-10 gm/dl due to iron deficiency anemia, who cannot tolerate oral iron preparations included in this comparative prospective study, and treated with intravenous Iron Saccharate infusion for correction of iron deficiency anemia before labor.

Treatment efficacy checked by comparing pre-medication values of; hemoglobin, reticulocytes, serum ferritin, mean corpuscular volume (MCV), and mean corpuscular hemoglobin (MCH) by the 60 days' post-medication values.

Results: The mean premedication hemoglobin significantly increased from 8.7 ± 2.66 to 11.8 ± 2.02 gm/dl 60 days' after Iron Saccharate infusion ($P=0.001$ (95% CI; -3.71, -3.1, -2.48)), and the mean premedication ferritin level significantly increased from 10.7 ± 5.1 to 123.5 ± 3.9 ug/l 60 days' after Iron Saccharate infusion ($P=0.002$ (95% CI; -113.9, -112.8, -111.6)).

In addition; the mean premedication RBCs MCV significantly increased from 73.2 ± 6.1 to 93.5 ± 4.7 FL 60 days' after Iron Saccharate infusion ($P=0.002$ (95% CI; -21.70, -20.3, -18.8)), and the mean premedication RBCs MCH significantly increased from 24.6 ± 8.1 to 25.9 ± 5.7 pg 60 days' after Iron Saccharate infusion ($P=0.0001$ (95% CI; -3.1, -1.3, 0.51)).

While, the mean premedication reticulocytes count significantly decreased from 3.6 ± 4.2 to 0.9 ± 3.3 106/mm³ 60 days' after Iron Saccharate infusion ($P=0.005$ (95% CI; 1.72, 2.7, 3.67)).

Conclusion: Iron Saccharate infusion is an effective option for correction of iron deficiency before labor in women who cannot tolerate oral iron preparations; it increases the hemoglobin, replaces the depleted iron store, and reduces the need for blood transfusion.

Keywords: Iron, Saccharate, deficiency, anemia, labor.

1. INTRODUCTION

The World Health Organization defines hemoglobin below 11 gm/dl as anemia. Anemia is a public health problem, and a direct cause of disability.[1]

Fifty two percent of pregnant women in developing countries suffering from anemia compared to 23% in developed countries.

The causes of anemia includes; iron deficiencies, poor nutrition, schistosomiasis, hookworm infestation, human immune deficiency (HIV) infection, and hemoglobinopathies.[1,2]

Maternal anemia is a leading cause of perinatal morbidity and mortality. Maternal anemia is responsible for adverse outcome in obstetrics, and increases risk of blood transfusion during the peripartum period. Iron therapy before delivery may reduce the blood transfusion rate for iron deficient women. [3-5]

This study designed to treat iron deficiency anemia before labor using intravenous Iron Saccharate.

2. MATERIALS AND METHODS

This comparative study carried out over one year, after approval of the Ahmadi hospital ethical committee. One hundred and twenty-one (121) pregnant women, with hemoglobin level between 8-10 gm/dl due to iron deficiency anemia, who cannot tolerate oral iron preparations included in this

comparative prospective study, and treated with intravenous Iron Saccharate infusion for correction of iron deficiency anemia before labor after informed consent.

Pregnant women >18 years old, between 24-30 weeks` gestation, who cannot tolerate oral iron preparations with hemoglobin level between 8-10 gm/dl due to iron deficiency anemia, included in this study.

Diagnosis of iron deficiency anemia during pregnancy confirmed by; hemoglobin concentration (gm/dl), serum ferritin (ug/l), MCV and MCH.

Pregnant women with anemia due to other causes not related to iron deficiency excluded from this study. In addition, pregnant women received blood transfusion during current pregnancy excluded from this study. Three pregnant women excluded from this study due to parasitic infestation, and three women did not continue the treatment because of travelling and preterm delivery, so the study completed with one hundred and fifteen women (115).

The intravenous iron dose calculated according to the formula; total iron needed in mg = $2.4 \times \text{pre-pregnancy weight in kg} \times (\text{target hemoglobin concentration} - \text{actual hemoglobin concentration}) \text{ gm/dl} + 500 \text{ mg}$.

Twelve (12) gm/dl was the target hemoglobin concentration, and 2.4 is a correction factor, while the 500 is the amount of stored iron in adult pregnant women.[4,5]

The calculated total intravenous iron dose was given over many sessions (6-8 sessions), in each session 200 mg of Iron Saccharate Complex (Spimaco, Al-Qassim Pharma, Saudi Arabia) diluted in normal saline, given by an intravenous infusion over one hour every other day, and the patients were monitored during the first 15 minutes for signs of intolerance, hypotension, tachycardia or anaphylaxis. [4,5]

Iron sucrose (Iron Saccharate Complex) is stable, cleared from serum within 5-6 hours and used immediately for erythropoiesis.[6-8]

Participants were asked to record any side effects following iron infusion (palpitation, arthralgia, chest or abdominal pain, headache, vertigo and skin eruptions). Oral folic acid given with intravenous iron to avoid folic deficiency.[9]

Participants asked at each visit for any side effects related to intravenous iron. Treatment efficacy checked by comparing pre-medication values of; hemoglobin, reticulocytes, serum ferritin, MCV and MCH by the 60 days` post-medication values.

SAMPLE SIZE AND STATISTICAL ANALYSIS

G* Power software used for calculation of the studied sample size, statistical package for social sciences (SPSS 20) used for analysis of the results, and Student`s t-test used for quantitative data analysis.

3. RESULTS

One hundred and twenty-one pregnant women, with hemoglobin level between 8-10 gm/dl due to iron deficiency anemia, who cannot tolerate oral iron preparations included in this study, and treated with intravenous Iron Saccharate infusion for correction of iron deficiency anemia before labor.

Three pregnant women excluded from this study due to parasitic infestation and three women did not continue the treatment because of travelling and preterm delivery, so the study completed with one hundred and fifteen women (115).

Mean age of the participants was 26.2 ± 6.7 , the mean parity was 1.5 ± 1.6 , the mean weight was 74.3 ± 9.7 , and mean gestational age was 29.2 ± 1.3 gestations.

The mean premedication hemoglobin significantly increased from 8.7 ± 2.66 to 11.8 ± 2.02 gm/dl 60 days` after Iron Saccharate infusion ($P=0.001$ (95% CI; -3.71, -3.1, -2.48)), and the mean premedication ferritin level significantly increased from 10.7 ± 5.1 to 123.5 ± 3.9 ug/l 60 days` after Iron Saccharate infusion ($P=0.002$ (95% CI; -113.9, -112.8, -111.6)). Table 1

In addition; the mean premedication RBCs MCV significantly increased from 73.2 ± 6.1 to 93.5 ± 4.7 FL 60 days` after Iron Saccharate infusion ($P=0.002$ (95% CI; -21.70, -20.3, -18.8)), and the mean premedication RBCs MCH significantly increased from 24.6 ± 8.1 to 25.9 ± 5.7 pg 60 days` after Iron Saccharate infusion ($P=0.0001$ (95% CI; -3.1, -1.3, 0.51)). Table 1

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While, the mean premedication reticulocytes count significantly decreased from 3.6 ± 4.2 to 0.9 ± 3.3 106/mm³ 60 days' after Iron Saccharate infusion ($P=0.005$ (95% CI; 1.72, 2.7, 3.67)). Table 1

Table1. Premedication hemoglobin, reticulocytes count, ferritin level, MCV and MCH parameters compared to 60 days' post-medication parameters

Variables	Pre-medication value Mean \pm SD	60 Post- medication value Mean \pm SD	P value (95% CI) Significance
Hemoglobin (gm/dl)	8.7 \pm 2.66	11.8 \pm 2.02	0.001* (-3.71, -3.1, -2.48) Significant
Reticulocytes count (106/mm ³)	3.6 \pm 4.2	0.9 \pm 3.3	0.005* (1.72, 2.7, 3.67) Significant
Ferritin level (ug/l)	10.7 \pm 5.1	123.5 \pm 3.9	0.002* (-113.9, -112.8, -111.6) Significant
RBCs MCV (FL)	73.2 \pm 6.1	93.5 \pm 4.7	0.002* (-21.70, -20.3, -18.8) Significant
RBCs MCH (pg)	24.6 \pm 8.1	25.9 \pm 5.7	0.0001* (-3.1, -1.3, 0.51) Significant

*= t test used for statistical analysis

CI = Confidence interval

MCHC = Mean corpuscular hemoglobin

MCV = Mean corpuscular volume

RBCS = Red blood cells

4. DISCUSSION

Iron deficiency anemia during pregnancy deserves special attention because of its potential health hazardous. [5]

Some pathologic conditions increase the risk of maternal hemorrhage, aggravate maternal anemia, and increase the need for blood transfusion. [5]

One hundred and twenty-one pregnant women, with hemoglobin level between 8-10 gm/dl due to iron deficiency anemia, who cannot tolerate oral iron preparations included in this study and treated with intravenous Iron Saccharate infusion for correction of iron deficiency anemia before labor, and finally the study completed with one hundred and fifteen women (115).

The mean premedication hemoglobin significantly increased from 8.7 ± 2.66 to 11.8 ± 2.02 gm/dl 60 days' after Iron Saccharate infusion, and the mean premedication ferritin level significantly increased from 10.7 ± 5.1 to 123.5 ± 3.9 ug/l 60 days' after Iron Saccharate infusion.

In addition, the mean premedication RBCs MCV significantly increased from 73.2 ± 6.1 to 93.5 ± 4.7 FL 60 days' after Iron Saccharate infusion, and the mean premedication RBCs MCH significantly increased from 24.6 ± 8.1 to 25.9 ± 5.7 pg 60 days after Iron Saccharate infusion.

While, the mean premedication reticulocytes count significantly decreased from 3.6 ± 4.2 to 0.9 ± 3.3 106/mm³ 60 days' after Iron Saccharate infusion.

Al Momen et al, found that the intravenous iron sucrose achieved significant increase in the hemoglobin levels compared to oral iron preparations (12.85 ± 6.6 versus 11.14 ± 12.4 gm/dl; respectively). [10]

In This study; the only side effect recorded was metallic taste during iron infusion in 3 women (0.026%), no other side effects recorded, and the participants' compliance during iron infusion was excellent.

No major adverse effects recorded by *Al Momen et al*, with iron sucrose infusion, while 4 (6%) of the oral group could not tolerate oral iron, 18 (30 %) developed gastrointestinal disturbance, and they concluded that iron sucrose infusion is an effective in treatment of iron deficiency anemia than oral preparations. [10]

Abhilashini et al, concluded that there were no recorded gastrointestinal adverse effects with intravenous iron, while gastrointestinal disturbance was recorded in 44% of women received oral iron. [11]

Mishra *et al*, concluded that iron infusion is recommended for treatment of iron deficiency due to malabsorption, has a wide safety profile, and is an alternative for correction of depleted iron stores.[12]

Shafi *et al*, found that the iron stores restored, and the hemoglobin level increased with iron sucrose infusion during pregnancy. [4]

Although, Bencaivo *et al*, compared oral iron with intravenous iron infusion, and concluded that there was no difference between the studied groups regarding the post-therapy hemoglobin.[13] Bayoumeu *et al*, found that the hemoglobin level significantly increased in iron infusion group (from 9.6 ± 0.79 to 11.11 ± 1.3 gm/dl) compared to oral group (from 9.7 ± 0.5 to 11 ± 1.25 gm/dl), and serum ferritin significantly increased with iron infusion compared to oral group 30 days after iron therapy.[14]

In addition, Al RA *et al*, found that the hemoglobin level significantly increased 14th and 28th, and the serum ferritin significantly increased 4 weeks after intravenous iron sucrose infusion compared to oral preparations (28 ± 26 ug/l versus 11 ± 11 ug/l; respectively).[15]

Iron Saccharate Complex seems to be treatment of choice for correction of iron deficiency anemia before labor, and to avoid blood transfusion hazardous.

More studies needed in the future to evaluate the effect of Iron infusion on the fetal outcome.

Conclusion: Iron Saccharate infusion is an effective option for correction of iron deficiency before labor in women who cannot tolerate oral iron preparations; it increases the hemoglobin, replaces the depleted iron store, and reduces the need for blood transfusion.

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REFERENCES

- [1] Candio F, Hofmeyr GJ. Treatments for iron deficiency anemia in pregnancy: RHL commentary. The WHO Reproductive Health Library. Geneva: World Health Organization. 2007.
- [2] UNICEF/UNO/WHO. Iron deficiency anemia: assessment, prevention, and control. Geneva: World Health Organization. 2001.
- [3] Kalaivani K. Prevalence and consequences of anemia in pregnancy. *Indian J Med Res.* 2009; 130(5):627-633.[PubMed]
- [4] Shafi D, Purandare SV, Sathe AV. Iron Deficiency Anemia in Pregnancy: Intravenous Versus Oral Route. *J Obstet Gynaecol India.* 2012;62(3):317-321. doi: 10.1007/s13224-012-0222-0.[PubMed]
- [5] Abdelazim IA, Abu-Faza M, Sanchez VJ. Iron Therapy in Treatment of Iron Deficiency Anemia Before Delivery: Intravenous Versus Oral Route. *J Gynecol Obstet Med.* 2014; 1(1):1-7. doi: 10.13140/RG.2.1.4678.8644.
- [6] Danielson BG, Salmonson T, Derendorf H, Geisser P. Pharmacokinetics of iron (III) hydroxide sucrose complex after a single intravenous dose in healthy volunteers. *Arzneimittelforschung.* 1996; 46 (6):615–621.[PubMed].
- [7] Beshara S, Lundqvist H, Sundin J, Lubberink M, Tolmachev V, Valind S, et al. Pharmacokinetics and red cell utilization of iron(III) hydroxide-sucrose complex in anaemic patients: a study using positron emission tomography. *Br J Haematol.* 1999; 104 (2):296-302.[PubMed].
- [8] Yee J, Besarab A. Iron sucrose: the oldest iron therapy becomes new. *Am J Kidney Dis.* 2002; 40(6):1111-1121.[PubMed].
- [9] Teucher B, Olivares M, Cori H. Enhancers of iron absorption: ascorbic acid and other organic acids. *Int J Vitam Nutr Res.* 2004; 74:403-419. doi: 10.1024/0300-9831.74.6.403.[PubMed].
- [10] al-Momen AK, al-Meshari A, al-Nuaim L, et al. Intravenous iron sucrose complex in the treatment of iron deficiency anemia during pregnancy. *Eur J Obstet Gynecol Reprod Biol.* 1996; 69:121-124. doi: 10.1016/0301-2115(95)02538-3.[PubMed].
- [11] Abhilashini GD, Sagili H, Reddi R. Intravenous iron sucrose and oral iron for the treatment of iron deficiency anaemia in pregnancy. *J Clin Diagn Res.* 2014; 8(5):OC04-OC07. doi: 10.7860/JCDR/2014/6568.4382.[PubMed].

- [12] Mishra A, Dave N, Viradiya K. Fatal anaphylactic reaction to iron sucrose in pregnancy. *Indian J Pharmacol* 2013; 45:93-4.
- [13] Bencaiova G, Mandach U, Zimmermann R. Iron prophylaxis in pregnancy: intravenous route versus oral route. *Eur J Obstet Gynecol Reprod Biol.* 2009; 144(2):135-139. doi: 10.1016/j.ejogrb.2009.03.006. [PubMed].
- [14] 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(3):518–522. doi: 10.1067/mob.2002.121894. [PubMed].
- [15] Al RA, Unlubilgin E, Kandemir O, Yalvac S, Cakir L, Haberal A. Intravenous versus oral iron for treatment of anemia in pregnancy: a randomized trial. doi: 10.1097/01.AOG.0000185260.82466.b4. [PubMed].