SJIF Impact Factor: 5.464

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 7.
Issue: 4.
Page N. 66-71
Year: 2023

Original Article www.wjahr.com

A COMPARATIVE STUDY OF INTRAVENOUS IRON SUCROSE VS BLOOD TRANSFUSION IN TREATMENT OF POST-PARTUM ANEMIA

***[1]Ataa Abd Al Jawad Murad, [2]Nada Moaide Ragheb and [3]Dr. Qabas Al-Jassim**

[1]AL Emamian Al-Kadymiain Hospital. Baghdad, Iraq.
[2]Department of Obstetrics & Gynecology Imamein Khadhimein Medical City.
[3]AL Emamian Al-Kadymiain Hospital. Baghdad, Iraq.

Received date: 31 January 2023 **Revised date:** 20 February 2023 **Accepted date:** 11 March 2023

***Corresponding Author: Dr. Ataa Abd Al Jawad Murad**

AL Emamian Al-Kadymiain Hospital. Baghdad, Iraq.

ABSTRACT

Background: Anemia is a common condition in pregnancy. The prevalence of anemia during pregnancy ranges from 5.4% in the United States to more than 80% in developing countries. **Aim of the study:** To compare intravenous iron sucrose Versus blood transfusion in treatment of post-partum anemia. **Patients and Method:** A prospective non randomize clinical trial, conducted at the department of Obstetrics and Gynecology at Al-Imamin Al-Khadimain medical city, from August 2018 to the end of December 2019. Post-partum anemic women (n=200) were divided into two groups: group A (n=100) who treated with IV Iron sucrose and group B (n=100) who treated with blood transfusion were enrolled in this study. **Results:** The difference in Hb mean in-IV sucrose group after 4 weeks were reach to (4.15±0.57) g/dl and (2.77±0.34) g/dl in blood transfusion group with highly significant difference (P<0.001). The difference in S. Ferritin mean in-group treated by IV Iron sucrose after 4 weeks were reach to (124.95±22.04) ng/ml and (19.59±4.21) ng/ml in group B that treated by blood transfusion with highly significant difference (P<0.001). The difference in mean corpuscular volume mean in-group A after 4 weeks the difference in mean corpuscular volume mean were reach to (21.68±3.74) FI in group treated by intravenous Iron sucrose and (10.38±9.3) g/dl in group B that treated by blood transfusion with highly significant difference (P<0.001). **Conclusion:** From the above simple study we concluded that Parantral iron sucrose were significantly increase hemoglobin, ferritin and mean corpuscular volume than blood transfusion in treatment of post-partum anemia.

KEYWORDS: iron sucrose, blood transfusion, postpartum anemia.

INTRODUCTION

Pregnancy anaemia is a frequent problem. Anemia during pregnancy affects between 5.4% of women in the United States and more than 80% of women in poorer nations.[1,2] A hemoglobin (Hb) level of two standard deviations below the mean for a healthy, age-matched group is considered anaemic. There isn't a lot of agreement on what is typical throughout pregnancy, however. In order to account for the significant growth in plasma volume at this point, the British Society of Haematology (BSH) and the US Centers for Disease Control and Prevention (CDC) utilise a value of less than 110g/L in the first trimester but less than 105g/L in the second and third trimesters. Hb less than 100 g/L is the definition of postpartum anaemia.[3] Hemoglobin levels below 110 g/l at one week after delivery and 120 g/l at eight weeks after delivery should be considered postpartum anaemia.[4] Normal physiological changes that occur during pregnancy contribute to a decrease in the Hb levels to some extent. During pregnancy, the plasma volume rises by around 50%. Beginning at 6 weeks' gestation, the alterations in plasma volume expansion gradually increase until they reach their peak at 32 weeks' gestation.[5] Decreased Hb and hematocrit levels are caused by the disproportionate rise in plasma volume to RBC mass, which is especially pronounced from the second trimester until delivery.[6] Prematurity, low birth weight, and unfavourable pregnancy outcomes have all been linked to anaemia during pregnancy.[7] Anemia during the postpartum period is linked to higher rates of fatigue, dyspnea, palpitations, and infections, especially in the urinary system.[8] Since iron deficiency is so frequent, especially during pregnancy, the WHO selected reducing anaemia in women of reproductive age by 50% by 2025 as one of its Global Nutritional Goals in

2012.[9] The prevalence of anaemia in this group has dropped by 12% between 1995 and 2011, according to WHO data, indicating that further improvements are likely if the right steps are implemented at the national and international levels. Due to the negative consequences of iron deficiency on the mother, the foetus, and the pregnancy itself, it is crucial to replace iron in this patient group.[9] Without risk factors, postpartum haemorrhage is typical. To decrease third-stage labour, frequently manage it. Oxytocin following anterior shoulder delivery is the most beneficial part of this treatment. Oxytocin prevents and treats uterine atony better than misoprostol with fewer side effects. Postpartum haemorrhage affects 3%–5% of obstetric patients. These avoidable events cause 25% of maternal fatalities globally.[10] The American Academy of Obstetricians and Gynecologists defines early postpartum haemorrhage as at least 1,000 mL total blood loss or blood loss with hypovolemia within 24 hours after foetal birth or intra-partum loss. Primary postpartum bleeding may occur before placenta delivery and up to 24 hours following foetal birth.[11] PPH may be modest (500-1000ml) without clinical evidence of shock or large (more than 1000ml) with clinical signs of shock (tachycardia, hypotension, tachypnea, oliguria, or delay peripheral capillary filling) and a lesser estimated loss. Massive transfusion is a transfusion of 10 or more units of packed red blood cells within 24 hours, 4 units within 1 hour when additional blood is expected, or a full blood volume replacement.[12] In blood-banked settings, postpartum haemorrhage therapy should include massive transfusion techniques. Obstetric patients have relied on consensus opinion for blood product replacement treatment and transfusion timing and trauma literature procedures.[13]

Aim of the study

To compare intravenous iron sucrose Vs blood transfusion in treatment of post-partum anemia.

Method

A prospective non randomized clinical trial, conducted at the department of Obstetrics and Gynecology at Al-Imamin Al-Khadimain medical city Baghdad, Iraq. from August 2018 to the end of December 2019. The samples were collected from the patients who admitted to the hospital for labor. Two hundred women with symptomatic postpartum anemia were collect from postnatal word within 24-48hr of delivery. Patients were assigned to two groups. Group A received iron sucrose and group B received blood transfusion.

Exclusion criteria

- Patients refused blood transfusion or iron infusion.
- Known hematological malignancy
- Known hemoglobinopathies require regular transfusion.
- Patients suffering from chronic illness like renal, cardiac, hepatic or immunological disorders.

After inclusion in study detailed history of each patient was taken including age, medical history, obstetric history, menstrual history, drug history & family history.

Followed by general examination included

1. Sign of anemia (paler of skin and mucous membrane, Shortness of breath
2. Review of vital signs (Blood Pressure, Pulse rate, Respiratory rate, temperature)
3. Investigations were send included HB, MCV, S. ferritin

The assigned treatment was started 24-48 hr. after delivery on the postnatal ward.

Group I received blood transfusion. Blood transfusion was carried out on the postnatal ward. Packed RBC's were given in patient with

1. Postpartum anemia hemodynamic unstable (hypotension, tachycardia)
2. Patient with ongoing bleeding
3. Patient refused iron sucrose infusion
4. Patient has history of allergy to iron sucrose

On average women received 1-4 units of blood. Each unit was given over two hours. Blood pressure, pulse and temperature were measured half hourly during the transfusion. Hb will be checked after each unit and given to achieve a Hb of at least 10.0 -10.5g/dL. Group II received total dose of intravenous iron sucrose. Statistical analysis utilised SPSS version 23 to input patient data. (Mean ± SD) and percentages for descriptive statistics. Numerous contingency tables and relevant statistical tests were done, including Chi-square for categorical variables (Fishers exact test for expected variables less than 20% of total) and t-test to compare two means. One-way ANOVA to compare multiple means. All statistical analyses have a p value < 0.05 and are provided in tables and graphs. Community medicine experts performed statistical analysis.

RESULTS

A total of 200 pregnant women were enrolled in the current study and divided into two groups; group A those who received iron sucrose and group B represented patients who received blood transfusion. Table 1 show that age mean of group A was (30.02±4.89) years while for group B was (30.45±4.99) years, with no significant difference (P=0.533). Weight mean of group A was (75.54±7.75) kg and (76.53±5.9) kg for group B with no significant difference (P=0.308). Mean of the parity in-group A was (2.91±1.40) and for group B was (2.99±1.33) with no significant difference (P=0.680).

Table (1): Comparison of age, weight and parity between iron group and blood transfusion group by unpaired t-test.

Parameter	Group A (Iron Sucrose) N=100 Mean±SD	Group B (Blood transfusion) N=100 Mean±SD	P value
Age (yr)	30.02±4.89	30.45±4.99	**0.533**
Weight (kg)	75.54±7.75	76.53±5.9	**0.308**
Parity	2.91±1.40	2.99±1.33	**0.680**

Regarding to the adverse effect, the local adverse effect was found in (8.0%) of patients in group A while it's found in (25.0%) in group B with significant difference (P=0.002). Systemic adverse effect found in only (3.0%) in group A while (13.0%) of patients in group B with significant difference (P=0.017) (table 2)

Table (2): Comparison of adverse effects (local and systemic) between iron group and blood transfusion group by Fisher exact test.

Adverse effects		Group A (Iron Sucrose) N=100 N (%)	Group B (Blood transfusion) N=100 N (%)	P value
Local	No	92 (92.0)	75 (75.0)	**0.002**
	Yes	8 (8.0)	25 (25.0)	
Systemic	No	97 (97.0)	87 (87.0)	**0.017**
	Yes	3 (3.0)	13 (13.0)	

Table 3 show that mean hemoglobin level before treatment in-group A was (8.26±0.76) g/dl and (8.26±0.78) g/dl for group B but with no significant difference (P=0.971). 7 days after treatment the mean Hb were increase to (11.27±0.8) g/dl and in group B it increases to (10.03±0.68) g/dl with highly significant difference (P<0.001). 4 weeks after treatment the mean Hb were increase to (12.4±0.83) g/dl and in-group B it increase to (11.03±0.68) g/dl with highly significant difference (P<0.001). The difference in Hb mean in-group A after this 7 day was (3.02±0.4) g/dl, while it was (2.06±0.12) g/dl in-group B with highly significant difference (P=0.002). After 4 weeks the difference in Hb mean were reach to (4.15±0.57) g/dl in group A and (2.77±0.34) g/dl in group B with highly significant difference (P=0.001)

Table (3): Comparison of hemoglobin before and 7 days and 4 weeks post treatment between iron group and blood transfusion group by unpaired t-test.

Hb (g/dl)	Iron Sucrose N=100 Mean±SD	Blood transfusion N=100 Mean±SD	P value
Before Rx	8.26±0.76	8.26±0.78	**0.971**
7 days after Rx	11.27±0.8	10.32±0.77	**<0.001**
4 weeks after Rx	12.4±0.83	11.03±0.68	**<0.001**
7-day difference	3.02±0.4	2.06±0.12	**0.002**
4-week difference	4.15±0.57	2.77±0.34	**0.001**

Table 4 show that mean S. Ferritin level before treatment in-group A was (8.87±1.49) ng/ml and (8.94±1.47) g/dl for group B but with no significant difference (P=0.745). 7 days after treatment the mean S. Ferritin were increase to (54.51±4.71) ng/ml and in group B it increases to (16.68±2.1) ng/ml with highly significant difference (P<0.001). 4 weeks after treatment the mean S. Ferritin were increase to (133.82±22.5) ng/ml and in-group B it increase to (28.53±4.31) ng/ml with highly significant difference (P<0.001). The difference in S. Ferritin mean in-group A after this 7 day was (45.64±4.87) ng/ml, while it was (7.75±1.52) ng/ml in-group B with highly significant difference (P<0.001). After 4 weeks the difference in S. Ferritin mean were reach to (124.95±22.04) ng/ml in group A and (19.59±4.21) ng/ml in group B with highly significant difference (P<0.001).

Table (4): Comparison of serum ferritin before and 7 days and 4 weeks post treatment between iron group and blood transfusion group by unpaired t-test.

S. Ferritin (ng/ml)	Iron Sucrose N=100 Mean±SD	Blood transfusion N=100 Mean±SD	P value
Before Rx	8.87±1.49	8.94±1.47	**0.745**
7 days after Rx	54.51±4.71	16.68±2.1	**<0.001**
4 weeks after Rx	133.82±22.5	28.53±4.31	**<0.001**
7-day difference	45.64±4.87	7.75±1.52	**<0.001**
4-week difference	124.95±22.04	19.59±4.21	**<0.001**

Table 5 show that mean MCV level before treatment in-group A was (72.22±3.37) fI and (74.83±7.65) FI for group B with significant difference (P=0.002). 7 days after treatment the mean MCV were increase to (85.93±2.82) FI and in group B it increases to (87.24±5.95) FI with significant difference (P<0.048). 4 weeks after treatment the mean MCV were increase to (93.9±1.5) FI and in-group B it decreases to (85.2±4.32) FI with highly significant difference (P<0.001). The difference in MCV mean in-group A after this 7 day was (13.71±3.51) FI, while it was (12.41±4.33) FI in-group B with significant difference (P<0.021). After 4 weeks the difference in MCV mean were reach to (21.68±3.74) FI in group A and (10.38±9.3) g/dl in group B with highly significant difference (P<0.001)

Table (5): Comparison of mean corpuscular volume before and 7 days and 4 weeks post treatment between iron group and blood transfusion group by unpaired t-test.

MCV (fl)	Iron Sucrose N=100 Mean±SD	Blood transfusion N=100 Mean±SD	P value
Before Rx	72.22±3.37	74.83±7.65	**0.002**
7 days after Rx	85.93±2.82	87.24±5.95	**0.048**
4 weeks after Rx	93.9±1.5	85.2±4.32	**<0.001**
7-day difference	13.71±3.51	12.41±4.33	**0.021**
4-week difference	21.68±3.74	10.38±9.3	**<0.001**

DISCUSSION

Obstetric hemorrhage remains a major cause of maternal morbidity and mortality. The highest percentages of maternal deaths occur in the immediate postpartum period. Oral iron, parenteral iron and erythropoietin are all treatments that have been used in postpartum iron deficiency anemia. The use of oral iron is limited by its side effects, poor compliance and the fact that it takes a long time to correct low Hb and iron stores. It is generally accepted that intravenous iron induces a similar or slightly more rapid erythropoietic response than oral iron. However, this statement applies to iron dextran, sorbitol and gluconate treatment but may not be generalized to iron sucrose. Parenteral iron sucrose seems to be effective within few days of administration. This is due to its rapid removal from plasma and incorporation into the bone marrow for erythropoiesis. Therefore, when a rapid effect is required parenteral iron is indicated, and iron sucrose seems to be the most appropriate.[14] Moreover, significant rise in the mean Hb level in the injectable iron group after treatment, which is same that found in Ashrof R et al, that's revealed significant increase in Hb mean levels in IV iron than other groups.[15] Regarding to the adverse effect (local and systemic), the adverse effect was more in blood transfusion with significant difference than that in IV iron. Bailie G, et al, mentioned that intravenous administration of excessive dose of iron might cause significant adverse effect. The presence of iron sucrose in the plasma circulation is associated with absence of any undesirable effect to the patients. This absence of side effects is partly due to the lower allergenic effect of the sucrose complex because of the very slow release of elementary iron from the complex. Also, the accumulation of iron-sucrose in organic pa-renchyma is much lower compared to iron-dextrans and iron-gluconate.[16] Adverse reactions rather than clinical benefit have been found when transfusing to patients with mild to moderate anemia.[17] The present study revealed that Hb were significantly increased in IV sucrose than that in blood transfusion which is not in agreement with that found in a previous study carried by Broche D et al, in France, that mentioned the blood transfusion were significantly increased in comparison with IV iron.[18] This may be due to difference in sample size collection. As well as in a study carried by Westad S et al, found that the increase in Hb in blood transfusion were at least 2 mg/dl after four weeks and significantly higher hemoglobin in the involvement group after eight and 12 weeks.[19] Serum ferritin in the present study were significantly increase in IV iron group, and significantly increase more than ferritin in blood transfusion group which is in agreement with Wågström E et al, study that found highly significant increase in ferritin in both groups and the concentration increased from day 0 to day

3 ($p<0.001$) after which it decreased but was still higher than at randomization ($p<0.001$) with highly significant difference.[20] Moreover, it is in agreement with that found by Giannoulis C et al, as for ferritin levels the mean values after the first week of treatment were 19 µg/l and after the fourth week 78 µg/l when treated by IV sucrose.[21] MCV were significantly increase in IV iron than in patients treated by blood transfusion, this is in agreement with Helmy M et al that revealed MCV were increased more than other groups of treatment but with no significant difference.[22] Bangal et al shows intravenous iron sucrose can be used as safe and effective alternative to blood transfusion and oral iron therapy in the treatment of iron deficiency anemia in the postpartum period this is agree with our study.[23] Chua et al. s demonstrated, intravenous iron may become the preferred treatment for women with acute post-partum anaemia to minimise transfusion reactions and costs and this agree with present study.[24]

CONCLUSION

From the above simple study, we concluded that Parantral iron sucrose were significantly increase Hb, ferritin and MCV than blood transfusion in treatment of post-partum anemia.

REFERENCES

1. Bencaiova G, Burkhardt T, Breymann C. Anemia—prevalence and risk factors in pregnancy. Eur J Intern Med., 2012; 23: 529–533.
2. Bora R, Sable C, Wolfson J, et al. Prevalence of anemia in pregnant women and its effect on neonatal outcomes in Northeast India. J Matern Fetal Neonatal Med., 2014; 27: 887–891.
3. Davis S. and Pavord S., Haematological Problems in Pregnancy, Edmonds DK, Dewhurst's textbook of obstetrics and gynecology for, 9th edition, Willey-Blackwell publishing, chapter, 2018; 12: 147-160.
4. Milman N. Postpartum anemia II: prevention and treatment. Annals of hematology, 2012 Feb 1; 91(2): 143-54.
5. Blackburn S. Chapter 8. Hematologic and hemostatic systems. In: Maternal, Fetal, & Neonatal Physiology. 4th ed. London, United Kingdom: Elsevier, 2013: 216–246.
6. Sun D, McLeod A, Gandhi S, Malinowski AK, et al. Anemia in pregnancy: a pragmatic approach. Obstetrical & gynecological survey, 2017 Dec 1; 72(12): 730-7.
7. Tunkyi K, Moodley J. Anemia and pregnancy outcomes: a longitudinal study. J Matern Fetal Neonatal Med., 2017; 11: 1–5.
8. Milman N. Postpartum anemia I: definition, prevalence, causes, and consequences. Annals of hematology, 2011 Nov 1; 90(11): 1247.
9. Msemo OA, Bygbjerg IC, Møller SL, et al. Prevalence and risk factors of preconception anemia: A community based cross sectional study of rural women of reproductive age in northeastern Tanzania. PLoS One, 2018 Dec 18; 13(12): e0208413.
10. Evensen A, Anderson JM, Fontaine P. Postpartum hemorrhage: prevention and treatment. American family physician, 2017 Apr 1; 95(7): 442-9.
11. Evensen A, Anderson J. Chapter J. Postpartum hemorrhage: third stage pregnancy. In: Leeman L, Quinlan J, Dresang LT, eds. *Advanced Life Support in Obstetrics: Provider Syllabus*. 5th ed. Leawood, Kan.: American Academy of Family Physicians, 2014.
12. Patil V, Shetmahajan M. Massive transfusion and massive transfusion protocol. Indian J Anaesth, 2014; 58: 590–5.
13. Gutierrez MC, Goodnough LT, Druzin M, et al. Postpartum hemorrhage treated with a massive transfusion protocol at a tertiary obstetric center: a retrospective study. Int J Obstet Anesth, 2012; 21: 230–5.
14. Khamaiseh K, Tahat Y, Shreideh Z, et al. Intravenous Iron Sucrose vs. Blood Transfusion in the Management of Symptomatic Post Partum Iron Deficiency Anaemia. Journal of the Royal Medical Services, 2011 Mar; 18(1): 15-9.
15. Ashrof R, Sankaran PK, Mail ID. Comparative study of intravenous iron-sucrose and oral iron therapy in iron deficiency anaemia during pregnancy. Health, 2014 Oct; 2(4).
16. Bailie G, Clark J, Lane CE, et al. Hypersensitivity reactions and deaths associated with intravenous iron preparations. Nephrol Dial Transplant, 2005; 20: 1443–1449.
17. Carson JL, Stanworth SJ, Roubinian N, et al. Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion. Cochrane database of systematic reviews, 2016; (10).
18. Broche DE, Gay C, Armand-Branger S, et al. Acute postpartum anaemia. Clinical practice and interest of intravenous iron. Gynecologie, Obstetrique & Fertilite, 2004 Jul 1; 32(7-8): 613-9.
19. Westad S, Backe B, Salvesen KÅ, et al. A 12-week randomised study comparing intravenous iron sucrose versus oral ferrous sulphate for treatment of postpartum anemia. Acta obstetricia et gynecologica Scandinavica, 2008 Jan 1; 87(9): 916-23.
20. Wågström E, Åkesson A, Van Rooijen M, et al. Erythropoietin and intravenous iron therapy in postpartum anaemia. Acta obstetricia et gynecologica Scandinavica, 2007 Jan 1; 86(8): 957-62.
21. Giannoulis C, Daniilidis A, Tantanasis T, et al. Intravenous administration of iron sucrose for treating anemia in postpartum women. Hippokratia, 2009 Jan; 13(1): 38.
22. Helmy ME, Al Halaby AE, El Khouly NI, et al. A comparative study of intravenous iron versus oral iron supplementation for postpartum anemia. Menoufia Medical Journal, 2018 Jan 1; 31(1): 23.

23. 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.
24. Villanueva C, Colomo A, Bosch A, et al. Transfusion strategies for acute upper gastrointestinal bleeding. New England Journal of Medicine, 2013; 368(1): 11-21.