THE ROLE OF INTRAVENOUS IRON SUCROSE COMPLEX IN TREATMENT OF IRON DEFICIENCY ANEMIA IN PREGNANT WOMEN

BUSHRA ZULFIQAR[1], RAZIA IFTIKHAR[2]

ABSTRACT

OBJECTIVE: To observe the effect of iron sucrose complex (Inj Venofer) in pregnant women; suffering from iron deficiency anemia.
STUDY DESIGN: Interventional retrospective study
PLACE AND DURATION: The study was conducted at Al Tibri Medical College & Hospital, Isra University Karachi Campus and in Private practice from 1st April 2013 till 30th September 2013.
METHODOLOGY: Study was carried out on 50 pregnant patients with gestational age of 28 – 32 weeks having iron deficiency anemia. The calculated total dose of iron sucrose was given to patient in infusion form to replenish the Haemoglobin status and iron stores. Hb Level, Red cell indices (MCV, MCH & MCHC) and Serum Ferritin level were performed before starting the therapy on which it was diagnosed and then 3 weeks after completion of therapy. Side effects of the therapy were also observed.
RESULT: Among 50 women included in the study; no patient had any severe reaction. Mean duration of therapy was 3 + 0.7 weeks. After completion of iron sucrose infusion therapy the Hb% level rose to mean 11.2 gm/dl, mean MCV 86.6fL, mean MCH 31.6 pg/cell, mean MCHC 35.6 gm/dl and the value of mean Serum Ferritin level was 128.2ng/ml. In all enrolled pregnant women the differences in values were significant.
CONCLUSION: The Intravenous Iron sucrose complex shows a rapid rise in the haemoglobin level and iron stores upto satisfactory levels in pregnancy and lactation.
KEY WORDS: Iron Sucrose Complex, Intravenous, Pregnant Women, Anemia

INTRODUCTION

According to the World Health Organization iron deficiency anemia is defined as depletion of iron stores and sign of a compromised supply of iron to the tissues[1] and biochemically Haemoglobin less than 11gm/dl and a haematocrit of less than 0.33[2]. Therefore this medical disorder in pregnancy is responsible indirectly for 40-60% of the maternal death in developing countries[3]. In developing countries it affects 35-75% of the pregnant women population in-contrast to 18% in developed countries[4,5]. The heavy menstrual loss in women of reproductive age group can lead to anemia if remain uncorrected and if they get pregnant these women have already depleted iron stores. In pregnant women the iron requirement is increased due to growing foetus, the placenta and increase maternal demand of erythrocytes.

During pregnancy and postpartum period there may be insufficient absorption and increase demand of iron leading to iron deficiency anaemia. The mechanism of iron absorption has its own crucial role in prevention of anaemia[6].

In last few years variety of oral, intramuscular and intravenous preparations of Iron and blood transfusions have been introduce to correct iron deficiency anemia in the pregnant women[7-9]. The most common way to prevent anemia is prophylaxis by oral iron therapy. The oral iron programs do not achieve the targeted Hb levels in a short duration when the patient is approaching term[10]. Compliance is another issue with certain patients. On the other hand packed cells/ whole blood transfusion can reliably increase haemoglobin levels in term patients with known complication/dangers like cross reactions and viral infections. The intravenous iron sucrose therapy is reported to be very safe, easily available with good efficacy as compared to I/M or I/V iron – dextran/sorbitol therapy in treatment of iron deficiency anemia[11,12]. To prevent the above undesirable reaction; the intravenous iron infusion have relatively better safety. In November 2000, iron sucrose was approved in the United States. It also had long been used in Europe, and was reported to have a good safety profile[13].

The purpose of study is to observe the role/effect of Intravenous iron sucrose complex in pregnant women having iron deficiency anemia.

1. Assistant Professor
2. Professor
Department of Gynae & Obs
Al Tibri Medical College & Hospital
Isra University, Karachi Campus

Correspondence to:
Bushra Zulfiqar
Assistant Professor of Gynae & OBS Dept
Al-Tibri Medical College & Hospital
Isra University, Karachi Campus
E-mail: drzbtehami@yahoo.com

METHODOLOGY

This Interventional retrospective study was conducted at Department of Gynaecology & Obstetrics, Al Tibri Medical College & Hospital, Isra University Karachi campus and private practice; from 1st April 2013 to 30th September 2013 on 50 pregnant anemic women.

The inclusion criteria were age group from 21-37 years old, weight 42–64 kg, gestational age of 28–32 weeks having iron deficiency anemia. Iron deficiency anemia was diagnosed on haemoglobin (Hb) level between 7-9 gm/dl, microcytosis on peripheral film, red cell indices < normal level and serum iron level <56 ng/ml.

The exclusion criteria were pregnant patients with any medical disorders i.e. Tuberculosis, diabetes, thyroid disease, severe anemia < 7 gm/dl, thalasemia and megaloblastic anemia.

All patients were admitted and a detailed history was taken which includes age, parity, History of worm infestations, menstrual history of menorrhegea, haemorrhoids, socio-economic history, complete general physical examination and per-abdominal examination carried out. The investigation was carried out before the treatment which includes complete blood picture, blood cell indices and serum ferritin.

In all patients the Iron sucrose complex was given according to Ganzoni Equation (Total iron deficit (mg) = body wt (kg)x(target Hb–actual Hb) x 0.24+500) to replenish iron stores. Out of 50 patients 24 patients with Hb 9% and 22 patients with Hb 8% received 6 Amps each and 4 patients with Hb 7% received 8 Amps. Iron sucrose complex was administered as 200 mg (one ampoule being of 100 mg, 2 ampoules) were given in 100 ml 0.9% normal saline over a period of 2 hour every alternate day till the calculated dose is achieved. Every patient received a test dose of 15ml/15 minutes to check allergic reactions and the rest of the infusion continued as usual and the doctor on duty was made responsible to observe the patient till completion of the dose.

Hemoglobin (Hb) Level, Red cell indices and Serum Ferritin level were performed before starting the therapy on which it was diagnosed and then 3 weeks after completion of therapy. Side effects if any were also observed.

RESULT

All women included in the study had the following characteristics mean age of the patients was 30.9 years ranging from 21-37 years, the gestational mean age was 30.2 weeks ranging from 28-32 weeks, with an average weight of 54.7 Kg as depicted in Table - I.

As per Table - II majority of patients i.e. 21 were from the age group 31-35 years followed by 10 each in age groups 26-30 years and 36-40 years while 9 patients belonged to 20-25 years.

Among 50 women included in the study; no patients had any severe reaction. Mean duration of therapy was 3 + 0.7 weeks. Our study shows that after giving the Intravenous Iron Sucrose to the patients all the estimated hematological parameters increased to the required levels. After completion of iron sucrose infusion therapy the Hb% level rose to mean 11.2 + 0.4 gm/dl, mean MCV 86.6 + 4.9fL, mean MCH 31.6 + 2.1 pg/cell, mean MCHC 35.6 + 1.3 gm/dl and the value of mean Serum Ferritin level was 128.2 + 8.9 ng/ml in all patients as shown in Table - III. In all the enrolled pregnant women the differences in values were significant.

TABLE - I: ANALYSIS OF VARIABLES CONSIDERED FOR INCLUSION IN OUR STUDY (n=50)

Variable	Mean	Standard Deviation	Min	Max
Age	30.9	4.8	21	37
Gestational Age (weeks)	30.2	1.4	28	32
Weight (kg)	54.7	7.6	42	64

TABLE – II: FREQUENCY OF VARIOUS AGE GROUPS: (n=50)

Age (years)	No of Patients	Percentage (%)
20 - 25	9	18
26 - 30	10	20
31 - 35	21	42
36 - 40	10	20
Total	50	100

TABLE – III: MEAN BLOOD INDEXES BEFORE AND AFTER TREATMENT OF IRON DEFICIENCY IN PREGNANT PATIENTS (n=50)

Variable	Baseline Mean + SD Before therapy	Three weeks post therapy Mean + SD	Rise in level	p-value
Hemoglobin (g/dl)	8.4 + 0.5	11.2 + 0.4	2.8	< 0.001
MCV (fL)	69.6 + 5.0	86.6 + 4.9	17.0	< 0.001
MCH (pg/cell)	25.9 + 1.7	31.6 + 2.1	5.7	< 0.001
MCHC (gm/dl)	31.8 + 2.4	35.6 + 1.3	3.8	< 0.001
Serrum Ferritin level (ng/ml)	38.4 + 9.2	128.2 + 8.9	89.8	< 0.001

DISCUSSION

In developing countries severe anemia is directly responsible for poor maternal and fetal outcome; preterm births/low birth weight babies, pre-eclampsia, sepsis and postpartum haemorrhage are the known complications. These complications results in higher perinatal morbidity and mortality, and higher infant mortality rate. If the maternal Hb is <8g/dl there is 2-3 fold increase in perinatal mortality. The growth restricted/low birth foetus leads to poor growth in infancy, childhood and adolescence and contribute to low adult height [2].

In this study the safety and efficacy of intravenous iron sucrose complex was found very well to increase Hb% and iron stores. The reason being that iron sucrose consists of poly nuclear iron complex analogous to ferritin with apoferittin component replaced by sucrose which is well tolerated and least antigenic. The calculated dose of iron is administered in hospital setting within few weeks. Moreover this mode supplies adequate iron to correct hemoglobin deficiency and to replenish iron stores without the need for further iron therapy throughout pregnancy. One of the concerns of intravenous iron therapy is anaphylactic reaction. Although our sample size is only 50, but none of the patients had any serious reaction nor did any require discontinuation of therapy. This is in accordance with the paper published by Faich G[14] which is comparable to our study.

Perewusynk et al[15] enroll 400 women in his study who received a total of 2000 ampoules of iron sucrose. The adverse effects including a metallic taste, flushing of the face and burning at the injection site affect only 0.5 percent cases. The slow release of iron from the complex and the low allergenicity of sucrose are responsible for its tolerance. Only one maternal death is reported by Breymann due to iron sucrose complex[16]. The exact cause of death was not known probably due to release of free radicals. The injection should be given within 15-20 min or a dose of 200 mg slowly over 20 minutes.

During pregnancy approximately 1000 mg of iron is required for developing foetus and placenta and red cells. Usually, this iron is mobilized from iron stores. All the women with poor iron reserves become iron deficient during pregnancy. Studies have shown that Hb levels<8 g% (moderate to severe anemia) in pregnancy are associated with higher maternal morbidity[17]. The Haemoglobin level of less than 5g% leads to cardiac decompensation and pulmonary oedema. Postpartum haemorrhage and even 200ml of vaginal loss leads to shock and sudden death in anemic female[18]. The only reliable method for treating anemia is transfusion of blood, but it may cause serious cross reaction or it is high risk for transferring the viral antigens[19].

Breymann etal[16] corrected anemia in 500 antenatal women diagnosed with iron deficiency anemia by iron sucrose injection. In this study also emphasizes on the safety of iron sucrose injection. In the present study, the first dose was given in ward where facilities for emergency care were available. All subsequent doses were given on OPD basis.

Our study proved the effectiveness of I/V iron sucrose to achieve target Hb of 11g/dL in all the patients and corroborated with the findings of earlier reports[20].

Poor antenatal care along with lack of sufficient nutritional supplements in pregnant woman, and overall poor socioeconomic conditions are all responsible for high prevalence of Anemia in our country. With similar socio-economic status like Indonesia and India also report high prevalence of iron deficiency anemia in pregnancy and associated maternal and fetal loss due to same reasons. In our study the Intravenous Iron Sucrose significantly (P<0.001) increase Hb levels within weeks and none of the women experienced any adverse reaction. The women who went through this study, found this treatment very convenient and helpful to achieve the desire results. Related to our study another study conducted in Rawalpindi by Raja et al on intravenous iron sucrose complex therapy in iron deficiency anemia in pregnant women showed a similar results with mean Hb level increased from 7.5 to 11 gm/dl[21]. In our study mean Hb before treatment was 8.4 + 0.5 and after treatment it increased to 11.2 + 0.4 (P<0.001). Our results are consistent with the study of Raja et al (21). It is therefore accepted that intravenous iron sucrose complex therapy is a realistic alternative to blood transfusion in treatment of iron deficiency anaemia.

CONCLUSION

Iron sucrose complex IV therapy is safe and well tolerated in pregnant women in iron deficiency anemia and is able to raise the hemoglobin and iron stores to satisfactory level in pregnancy and lactation.

REFERENCE

1. World Health Organization. Iron deficiency anemia assessment, prevention and control; a guide for program managers. Geneva: World Health Organization; 2001;13.
2. Sharma JB. Nutritional anaemia during pregnancy in non-industrialized countries: Progress in obstetrics and gynaecology, 15th Ed. Churchill Livingstone Spain 2003;103-11.
3. Kalaivani K. Prevalence & consequences of anemia in pregnancy. Indian J Med Res. 2009;130(5):627-33
4. Habib F, Alabdin EH, Alenazy M, Nooh R. Compliance to iron supplementation during pregnancy. J Obstet Gynaecol. 2009;29(6):487-92.
5. Bhutta ZA, Rizvi A, Raza F, Hotwani S, Zaidi S, Moazzam Hossain S, et al. A comparative evaluation of multiple mincronutrient and iron-folic acid supplementation during pregnancy in Pakistan: impact on pregnancy outcomes. Food Nutr bull. 2009;30(4):S496-505.
6. Al RA, Unlubilgin E, Kanderim O, Yalvac S, Cakir L, Haberal A. Intravenous versus oral iron treatment of anemia in pregnancy: a randomized trial. Obst Gynecol. 2005;106:1335-40.
7. Bayoumeu F, Subiran-Buisset C, Baka NE, legagneur H, Monnier-Barbarino P, Laxeniaire MC. Iron therapy in iron deficiency anemia in pregnancy: Intravenous route verses

oral route. Am J Obstet Gynecol. 2002;186:518-22.
8. Auerbach M, Ballard H. Clinical Use of Intravenous Iron: Administration, Efficacy and Safety. Am Soc Hematol Educ Program. 2010;338-47.
9. Khalafallah A, Dennis A, Bates J, Bates G, Robertson I, Smith L, et al. A prospective randomized, controlled trial of intravenous versus oral iron for moderate iron deficiency anemia of pregnancy. J Int Med. 2010;268(3):286-95.
10. Yaqoob N, Abbasi S M. Nutritional iron deficiency in our population. J Coll Physicians Surg Pak. 2002;12:395-7.
11. Giannoulis C, Daniilidis A, Tantanasis T. Intravenous administration of iron sucrose for treating anemia in postpartum women. Hippokratia 2009: 13(1):38-40.
12. Kiran KV, Guru PB, Srinivasa RK, Manavalan R, Manna PK, Mohanta GP, et al. Study of Effect of Intravenous Iron Sucrose in the treatment of Puerperal Anemia. Indian J of Pharmacy 2010;3(4):14-17.
13. Bilqis H, Chaudhri R. Efficacy and safety of iron sucrose complex (Ferotein-S) in the treatment of iron deficiency anaemia in pregnant women at Holy Family Hospital Rawalpindi. J of Soci of Obst Gynaecolo of Pak – JSOGP 2012; 2(3):155-60.
14. Faich G, Strobos J. Sodium ferric gluconate complex in sucrose: safer intravenous iron therapy than iron dextrans. Am J Kidney Dis. 1999; 33:464-70.
15. Perewusnyk G, Huch R, Huch A, Breymann C. Parenteral iron therapy in obstetrics: 8 years experience with iron-sucrose complex. Br J Nutr 2002; 88:3-10.
16. Breymann C. The use of iron sucrose complex for anemia in pregnancy and the postpartum period. Semin Hematol 2006;43:S28-31.
17. Toteja GS, Singh P, Dhillon BS. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull 2006;27: 311-15.
18. Kirplani A, Mahey R, Dash BB,. Intravenous iron sucrose therapy for moderate to severe anemia in pregnancy. Indian J Med Res. 2013;138(1):78-82
19. Naz F, Iqbal K, Afreen N, Javaid A, Khan S, Zareen A. Efficacy of Intravenous Iron Sucrose Therapy in Iron Deficiency Anemia of pregnancy. Pak J of Med Health Sci 2010;4(1):130-3.
20. Nasir A, Yasmin H, Korejo R. Management of iron deficiency anemia in gynaecological patients at Jinnah Postgraduate medical Centre, Karachi. J Pak Med Assoc 2011;61(10):998-1001.
21. 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.