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Original Research Article

Evaluation of intravenous iron sucrose therapy for management of moderate to severe anaemia in pregnancy

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ABSTRACT

Background: Iron deficiency anaemia (IDA) is the most common nutritional deficiency in pregnancy and major contributory factor to maternal morbidity and mortality. Objective of present study was to evaluate the response and effectof parenteral iron sucrose complex therapy in iron deficiency anemia in pregnancy.
Methods: A prospective observational study was conducted at GMERS Medical College, Dharpur-Patan over a period extending from September 2014 to August 2017. A total of 150 Antenatal women, between 26-32 weeks of pregnancy with hemoglobin between 5-9 gm% were selected for study by purposive sampling. They were given intravenous iron sucrose complex in a dose of 200 mg (2 ampules of 5 ml each) in 100 ml normal saline over a period of 15-20 minutes, on alternate day. Repeat CBC was done after a period of 6 weeks.
Results: Age range of the patients was 20 to 34 years. Out of total 150 women, 72 women (48%) were in age group of 20-24 years. 64.6% women had 27-29 weeks of pregnancy. 58 (38.6%) women had <8 gm% of Hb before treatment and 108 (72%) women achieved Hb of 10 gm% after treatment. The mean haemoglobin raised from 7.9±0.92 gm% to 10.3±0.83 gm% (P<0.001) after six weeks of therapy. There was significant rise in MCV levels (from 67.7±5.1 fl to 78.9±6.4fl) (P<0.001). Major side effects or anaphylactic reactions were occurred in none of the women during study period. 93.3% of patients, treated for anemia were delivered at full term, either vaginally (67.3%) or by LSCS (26%). Most of the delivered babies (80%), had birth weight of more than 2.5 kgs.
Conclusions: Parentral iron therapy was effective in increasing haemoglobin and other haematological parameters in pregnant women with moderate to severe anaemia.

Keywords: Anaemia, Iron deficiency, Iron sucrose complex, MCV, Parentral iron therapy

INTRODUCTION

Iron deficiency anaemia (IDA) is the most common nutritional deficiency in pregnancy. According to WHO anaemia is defined as "haemoglobin less than 11gm/dl and a haematocrit of less than 0.33. Most women begin their pregnancy with partially or completely depleted iron reserves. Thus, the severity of the anaemia is inversely related to the amount of iron reserves.[1,2]

In underdeveloped countries, anaemia is a major contributory factor to maternal morbidity and mortality. WHO has estimated prevalence of anemia in developed and developing countries in pregnant women are 14 percent in developed and 51 percent in developing countries and 65-75 percent in India.[3] Prevalence of anemia in all groups is higher in India as compared to other developing countries. As per National Family Health Survey- 4 (NFHS-4) prevalence of Iron deficiency

anaemia (IDA) in pregnant women is 50.3% in India and 51.3% in Gujarat.[4,5]

Various modalities of management of IDA like oral, intramuscular and intravenous preparations of iron have been used in the pregnant patientsbut efficacy of oral iron therapy may be limited in many patients because of dose dependent side-effects, non-compliance, and poor absorption and not possible to achieve the target rise in Hb level in a limited time-period when patient is approaching the term. Iron sucrose complex (ISC) is a relatively new drug, which is used intravenously for the correction of IDA.[3] The drug has been able to raise the Hb to satisfactory level when used in severely anemic iron deficient pregnant women.[6,7]

Recent evidence suggests that iron sucrose can be detected in high levels in liver circulation and marrow within 5 min after intravenous administration.[8] Also, the accumulation of iron sucrose in organic parenchyma is much lower compared with iron-dextrans and iron-gluconate.[9]

Thus, Iron sucrose has revolutionized anemia management in pregnancy. This study was under taken to evaluate the response and effect of parenteral iron sucrose complex therapy in iron deficiency anemia in pregnancy.

METHODS

A prospective observational study was conducted at the department of Obstetrics and Gynaecology, GMERS Medical College, Dharpur-Patan over a period extending from September 2014 to August 2017. A total of 150 Antenatal women, between 26-32 weeks of pregnancy with hemoglobin between 5-9 gm.% were selected for study by purposive sampling. After admission in hospital wards, written informed consent was taken prior to screening enrolment. The procedure, possible complications and chances of failure of the procedure were explained to each patient in detail. Before conducting the study, approval was obtained from institutional ethical committee for human research. Data safety and confidentiality was also given due consideration. The file containing identity related details was kept password protected and the filled Performa were kept in lock with key accessible only to researcher.

After excluding other causes of anaemia e.g. Thalassemia, Haemolytic anaemia, hypersplenism, infection, inflammation, liver or renal disease subjects were administered Parenteral Iron Sucrose (ISC) therapy. All the patients received ISC in infusion form with the aim to correct the iron deficiency as well as to replenish the iron stores. The aim was to bring her Hb level to 10gm%. Formulae were used to calculate the iron requirement of the patient to fulfill the deficit as well as to replenish the iron stores and were calculated as follows: Amount of iron deficit (mg) = Body wt (Kg) × Hb deficit (gm%) × 0.24 + 500

ISC was administered as 200 mg elemental iron in 100 ml 0.9% Normal Saline infusion over 1 hour on alternate days up to the total calculated dose. A test dose of one ml of Iron Sucrose infusion was given and followed by a 15 minutes window period, during which no infusion was given, and patient was observed for any allergic reactions. If no reactions occurred, the rest of the infusion was given. Repeat CBC was done after a period of 6 weeks.

Monitoring during infusion: A set of observations (BP, pulse, temperature) were taken before the start of the infusion, after 15 minutes and at the end of the infusion. Similar clinical observations were taken as and when required during blood transfusion i.e. looking for symptoms or signs of an adverse reaction. The subjects were allowed to go home four hours after the infusion if all observations were stable. Mild allergic reactions were managed by stopping the administration of ISC and giving Injection Chlorpheniramine 10 mg IV slowly. The infusion was then being restarted at a slower rate and the women observed closely. Mean values of Hb and MCV were used to compare pre and post treatment parameters. p value of less than 0.5 was considered to be significant.[3] The data was compiled and standard tests of significance (p- value) were applied.

RESULTS

Age range of the patients was 20 to 34 years. Out of total 150 women, 72 women (48%) were in age group of 20-24 years followed by 40.6% women in the age group of 25-29 years (Table 1).

Table 1: Distribution of women according to their age.

Age (Years)	No. of patients, (%)
20-24	72 (48.0)
25-29	61 (40.6)
30-34	17 (11.4)
Total	150 (100)

Out of total, 64.6% women had 27-29 weeks of pregnancy. Only 4.7% women had 32 weeks of pregnancy (Table 2).

Table 2: Distribution of women according to their gestational weeks (USG maturity).

USG Maturity in weeks	No. of Pts., (%)
26	9 (6.0)
27	33 (22.0)
28	29 (19.3)
29	35 (23.3)
30	17 (11.3)
31	20 (13.3)
32	07 (4.7)
Total	150 (100)

Out of total 150 women, 58 (38.6%) women had <8 gm% of Hb before treatment and 108 (72%) women achieved Hb of 10 gm% after treatment (Table 3).

Table 3: Rise in hemoglobin level of pregnant women.

Pre treatment hemoglobin		Post treatment hemoglobin	
HB (gm%)	**No. of Pts., (%)**	**HB (gm%)**	**No. of Pts., (%)**
6.0-6.9	17 (11.3)	9.0-9.9	42 (28.0)
7.0-7.9	41 (27.3)	10.0-10.9	95 (63.3)
8.0-8.9	92 (61.3)	11.0-11.9	13 (8.7)
Total	150	Total	150

The mean haemoglobin raised from 7.9±0.92 gm% to 10.3±0.83 gm% (P<0.001) after six weeks of therapy (Table 4).

Table 4: Mean rise in hemoglobin of pregnant women before and after treatment.

Mean hemoglobin pre-treatment	Mean hemoglobin post-treatment	Mean rise in hemoglobin
7.9±0.92 gm%	10.3±0.83 gm%	2.4±0.9 gm%

There was significant rise in MCV levels (from 67.7±5.1 fl to 78.9±6.4fl) (P<0.001) (Table 5).

Table 5: Rise in mean corpuscular volume of pregnant women before and after treatment.

Pre-treatment mean corpuscular volume (femtoliters)	Post-treatment mean corpuscular volume (femtoliters)	Rise in mean corpuscular volume (femtoliters)
67.7±5.1 fl	78.9±6.4fl	11.2±1.3fl

Major side effects or anaphylactic reactions were occurred in none of the women during study period. 93.3% of patients, treated for anemia were delivered at full term. Out of total, 26% women delivered at full term through Lowe Segment Cesarian Section (LSCS). Only 6.7% women had preterm deliveries (Table 6).

Table 6: Distribution of women according to their outcome of pregnancy.

Outcome	No. of patients
Full term deliveries	101 (67.3)
Full term deliveries through lower segment cesarian section	39 (26.0)
Preterm deliveries	10 (6.7)
Total	150 (100)

Most of the delivered babies (80%), had birth weight of more than 2.5 kgs. Out of total, 17 (11.3%) women had delivered babies with 2.0-2.4 Kg birth weight. Only 8.7% women had delivered babies with less than 2 Kg birth weight (Table 7).

Table 7: Distribution of women according to birth weight of delivered child.

Birth weight of delivered child (kg.)	No. of women
< 2.05	13 (8.7)
2.0-2.4	17 (11.3)
2.5-2.9	85 (56.7)
> 3.0	35 (23.3)
Total	150 (100)

DISCUSSION

Iron-deficiency anaemia is a major health problem worldwide, but responds well to iron supplementation. New approaches are leading to more effective management of this condition. The introduction of second-generation i.v. iron formulations, including iron sucrose and ferric gluconate, was clearly an improvement over i.v. iron dextran. These formulations proved to be effective in the management of IDA and are not associated with the serious allergic reactions encountered with i.v. iron dextrans.

An important advantage of i.v. iron over oral iron is that it may bypass hepcidin actions by directly loading transferrin and making iron available to macrophages. Iron deficiency is usually suspected in at-risk patients with declining haemoglobin (Hb) levels and then confirmed by measuring serum ferritin levels and transferring saturation. Patients are commonly prescribed oral iron preparations because of convenience and low cost. However, the efficacy of these agents is limited by their reduced absorption rate and gastrointestinal side-effects and compliance.

In present study out of total 150 women, 72 women (48%) were in age group of 20-24 years. Out of total, 64.6% women had 27-29 weeks of pregnancy. Out of total 150 women, 58 (38.6%) women had <8 gm% of Hb before treatment and 108 (72%) women achieved Hb of 10 gm% after treatment. The mean haemoglobin raised from 7.9±0.92 gm% to 10.3±0.83 gm% (P<0.001) after six weeks of therapy. There was significant rise in MCV levels (from 67.7±5.1 fl to 78.9±6.4fl) (P<0.001).

Major side effects or anaphylactic reactions were occurred in none of the women during study period. 93.3% of patients, treated for anemia were delivered at full term, either vaginally (67.3%) or by LSCS (26%). Most of the delivered babies (80%), had birth weight of more than 2.5 kgs.

In Thakor N et al out of total 75 women, Majority of the women (48%) were in age group of 20-24 years.[3] Majority of the women 65.2%) had 27-29 weeks of pregnancy. 40% women had <8 gm% of Hb before treatment. 65.4% women achieved Hb of 10 gm%. The

mean haemoglobin raised from 7.8±0.61gm% to 10.1±0.73 (P<0.001) after six weeks of therapy. There was significant rise in MCV levels (from 67.8±5.0fl to 79.2±2.3fl) (P<0.001).

Major side effects or anaphylactic reactions were occurred in none of the women during study period. 91% of patients, treated for anemia were delivered at full term, either vaginally (65.33%) or by LSCS (25.3%). Most of the delivered babies (80%), had birth weight of more than 2.5 kgs.

In Kriplani Alka et al the mean age of women was 27.8±3.9 (range 21-34) year and mean parity was 1.3; mean period of gestation (PDG) at the time of diagnosis was 25.69±4.82 (14-32) weeks. At the beginning, mean Hb was 7.63±0.61 g%. Thirty two (32%) women had mild anaemia (>8 g%) and 68 per cent had moderate anaemia (5-7.9%). After completion of therapy, mean Hb raised to 11.20±0.73 g%. Of the total women, 67 per cent achieved Hb ≥11 g%.[10]

In Patel S et al intravenous iron sucrose is effective in achieving target Hb of 10g/dl in 80% of patients. It shows that of IV iron sucrose significantly (P<0.001) increase Hb levels within 4 weeks. There were no major adverse reactions.[11] Neeru S et al rise in mean Hb was 2.06 gm%.[12] In Al-Memon AK et al rise in mean Hb was 2.5 gm% and rise in mean MCV was 10 ft.[13] In Kiran KV et al rise in mean Hb was 2.53 gm%.[14] In Raja K et al rise in mean Hb was 3.5gm% andrise in mean MCV was 10ft.[15] Halimi S, et al. the mean haemoglobin raised from 9.2±1.69gm% to 12.65±1.06 after 30 days of therapy.[16]

However, study done in single college of Dharpur-Patan city limits us to generalize the results. There is definitely a need for well-planned, large-scale studies using standardized methodologies to evaluate patient satisfaction and quality of life, impact on costs and hospital stay, impact on blood transfusion frequency and mortality rate and finally to see impact on other factors such as breast feeding behavior and neonatal outcome such as birth weight, prematurity and neonatal iron stores.

CONCLUSION

Parentral iron therapy was effective in increasing haemoglobin and other haematological parameters in pregnant women with moderate to severe anaemia. If used in time, this treatment will certainly help to reduce the risk of maternal and foetal complications as well as it also reduce the risk of blood transfusion during peripartum period. It is safe and well tolerated. In our country with high prevalence of IDA during in pregnancy, this type of treatment may be helpful in management of these patients. Limitations with intravenous iron replacement include the need for medical supervision in the setting of limited healthcare resources; the need for patients to take multiple days off work and the cost of IV iron.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Breymann C. Iron deficiency and anemia in pregnancy: modern aspects of diagnosis and therapy. Blood Cells Mol Dis. 2002;29:506-16.
2. Khan MM. Effects of maternal anemia on fetal parameters. J Ayub Med Coll Abbottabad. 2001;13:38-41.
3. Thakor N, Bhagora S, Asari U, Kharadi A, pandor J, prajapati D. Effect of intravenous iron sucrose therapy for moderate-to-severe anemia in pregnancy: a longitudinal study. Int J Med Sci Public Health. 2015;4:11-14.
4. International institute for population sciences (IIPS) and macro International. 2016. National family health survey (NFHS-4), India, 2015-16: India. Mumbai: IIPS. Available at http://rchiips.org/NFHS/pdf/NFHS4/India.pdf. Accessed on 15 October 2017
5. International institute for population sciences (IIPS) and macro International. 2016. National family health survey (NFHS-4), India, 2015-16: Gujarat. Mumbai: IIPS Available at http://rchiips.org/NFHS/pdf/NFHS4/GJ_FactSheet.pdf Accessed on 15 October 2015
6. Saeed GA. A 52-year-old lady presenting with pregnancy and anemia. Pak Armed Forces Med J. 2002;52:223-4.
7. Ahmed K, Sadiq I, Yousuf AW. Injectable iron therapy: intramuscular Vs intravenous therapy. Biomedica. 2000;16:44-7.
8. Wali A, Mushtaq A, Nilofer. Comparative study: efficacy, safety and compliance of intravenous iron sucrose and intramuscular iron sorbitol in iron deficiency anemia of pregnancy. J Pak Med Assoc. 2002;52:392-5.
9. Giannoulis C, Daniilidis A, Tantanasis T, Dinas K, Tzafettas J. Intravenous administation of iron sucrose for treating anemia in postpartum women. Hippokratia. 2009;13:38-40.
10. Kriplani A, Mahey R. Intravenous iron sucrose therapy for moderate to severe anaemia in pregnancy, Indian J Med Res. 2013;138(1):78-82.
11. Patel S, Goyal A, Shrivastava A, Verma R. Safety and efficacy of parenteral iron sucrose complex therapy in iron deficiency anemia in antenatal and postnatal women. Int J Med Sci Public Health. 2013;2:360-3.
12. Neeru S, Nair NS, Rai L. Iron sucrose versus oral iron therapy in pregnancy anemia. Indian J Community Med. 2012;37:214-8.
13. Al-Memon AK, al-Meshari A, al-Nuaim L, Saddique A, Abotalib Z, Khashogji T et al. Intravenous iron sucrose complex in the treatment of iron deficiency

anemia during pregnancy. Eur J Obstet Gynec. 1996 Nov, 69(2);121-4.
14. KV K, 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 Pharm Pract. 2010 Oct;3(4):14.
15. Raja K, Janjua NB, Khokhar N. Intravenous iron sucrose therapy in iron deficiency anemia in pregnancy. J Pak Med Assoc. 2003;28(2).
16. Halimi S, Halimi SM, Shoaib M. Oral versus parenteral iron therapy for correction of iron deficiency anaemia in pregnancy. Gomal J Med Sci. 2010 Dec 31;9(1):3-5.

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