

■ *Original Article*

Study of efficacy of intravenous iron sucrose therapy in iron deficiency anaemia of pregnancy

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Abstract

Background: Anaemia is the most common medical disorder in pregnancy and is responsible for higher of the maternal deaths in the developing countries. **Objective:** To determine the efficacy of intravenous iron sucrose, in anemic pregnant women, presenting at Mamata General Hospital, Khammam. **Methods:** Fifty patients with proved iron deficiency anemia having haemoglobin between 8-10gm% were included in the study. Total iron deficit was calculated by standard formula. Target haemoglobin to be achieved was 11gm%. Iron sucrose was administered by intravenous infusion in divided doses. Haemoglobin was repeated 3 weeks after the last dose of intravenous iron sucrose. Gestational Age, Socio economic class distribution was calculated in percentage, Pre and post treatment Hb% was calculated by mean and standard deviation and P-value was Assessed. **Results:** Majority of the patients i.e. 60% had gestational age between 32-34 weeks, 30% were in between 29-31 weeks of gestational age while 10% were between 26-28 weeks gestation. The Mean gestational age was 32.4 ± 2.7 . Distribution of cases by socio economic status showed, 40% belonged to lower class, 32% belonged to middle class and 28% were from upper class. Intravenous iron sucrose therapy was effective in 90% of the patients without any side effects. There were no allergic reactions. **Conclusion:** This study showed a significant improvement in the haemoglobin of the patients who received iron sucrose infusion. Patients achieved the target of 11 gram % haemoglobin. It was safe and well tolerated.

Keywords: iron sucrose, iron deficiency anaemia, antenatal women.

Introduction

According to WHO anaemia is defined as haemoglobin less than 11gm/dl and a haematocrit of less than 0.33.¹ Anaemia is the most common medical disorder in pregnancy and is responsible indirectly for 40-60% of the maternal deaths in the developing countries.² It affects about 18% of pregnant women in developed and 35-75% of pregnant women in developing countries.³ Iron deficiency is the most common cause of anaemia in pregnancy worldwide.⁴ According to WHO about

50 per cent of women of fertile age group have iron deficiency anaemia.⁵

Severe anaemia in pregnancy results in relatively poor maternal and fetal outcome. Maternal effects being preterm labour, pre-eclampsia, sepsis and postpartum haemorrhage and increase need of blood transfusion.⁶ Maternal anaemia is associated with intrauterine growth retardation and increased risk of preterm births and low birth weight babies. This in turn results in higher perinatal morbidity and mortality, and higher infant mortality rate. A doubling of low birth weight rate and 2 to 3 fold increase in the perinatal mortality rates is seen when the Hb is <8 g/dl. Intrauterine growth retardation and low birth

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weight inevitably lead to poor growth in infancy, childhood and adolescence.² Maternal weight is one of the determinants of intrauterine growth and birth weight.¹

Intravenous iron sucrose is effective in achieving target Hb of 11g/dl in 80% of patients.⁷ In iron deficient patients, intravenous iron is incorporated into haemoglobin within 3 to 4 weeks by erythropoiesis.⁸ Intravenous iron corrects iron deficiency anaemia of pregnancy and restores iron stores faster and more effectively than oral iron, with no serious adverse reactions.⁹ Intravenous iron therapy is safe, convenient and more effective than intramuscular iron therapy in treatment of iron deficiency anaemia during pregnancy.⁹

Methods

It was a prospective study carried out at Mamata General Hospital, Khammam in the Department of Obstetrics/Gynaecology, from January 2012 to June 2012. Fifty cases fulfilling inclusion and exclusion criteria were considered in this study. Fifty consecutive patients coming to the antenatal OPD, within the age of 20 to 38 years, having singleton fetus with gestational age of 26 to 34 weeks on ultrasound, with confirmed diagnosis of hypochromic microcytic anaemia on blood examination by peripheral smear and serum ferritin levels, and women who were intolerant to oral iron were included in the study.

The patients with other causes of anaemia like thalassemia, megaloblastic anaemia etc, having liver, kidney or cardiovascular disease, or having history of iron therapy by any route or blood transfusion during present pregnancy were excluded in the study. Demographic information including name, age and gestational age was taken from the patients. The beneficial effects as well as side effects of iron sucrose were explained to each eligible patient or her relatives and informed consent was taken from each patient. Total iron deficit was calculated by a standard formula. $0.3 \times W (100 - \text{Hb}\%)$ mg of elemental Iron. W means Patients weight in pounds. Hb% is observed Hb concentration in % and Additional 50% was added for replenishing iron stores. Target Hb was 11gm/dl.

Iron sucrose was given by intravenous injection in divided doses on alternate day according to the iron deficit calculated for each individual patient, 200mg elemental iron diluted in 200ml of 0.9% normal saline infusion, initially first 50ml was given at 8-12 drops/min for 15-30 minutes and patient was monitored for any symptoms and signs of allergic reaction. Later rest of infusion was given at 36 drops/minute. Haemoglobin was repeated 3 weeks after the last dose of intravenous iron and reticulocyte count was monitored. Gestational age, socio economic class distribution was calculated in percentage and pre and post treatment Hb% was calculated by mean and standard deviation and P-value was assessed.

Results

Regarding age distribution, majority of the patients i.e., 48.5% were between 26-30 years while minimum patients 10% were > 35 years of age with mean age of 32.3 ± 3.1 years.

Most of the patients 30 (60%) had gestational age between 32-34 weeks, 15 patients (30%) had 29-30 weeks of gestational age while 5 patients (10%) were between 26-28 weeks of gestation (Table 1).

Table 1: Distribution of patients by duration of pregnancy (N=50)

Gestational age (weeks)	No. of patients	%
26-28	5	10%
29-31	15	30%
32-34	30	60%
Total	50	100%

Distribution of cases by socio economic status shows 20 patients (40%) belonged to lower class (monthly income < Rs.5000), 16 patients (32%) belonged to middle class (monthly income Rs.5000-10000) and 14 patients (28%) were of upper class (monthly income Rs.>10000) (Table 2).

Table 2: Distribution by socio economic status

Socio Economic Status	No. of Patients	%
Upper class	14	28%
Middle class	16	32%
Lower class	20	40%
Total	50	100%

Therapy was effective in 45 patients (90%) while in 5 patients (10%) therapy was ineffective. Mean Hb level before iron sucrose therapy was 8.5 ± 1.2 while it was increased up to 11.2 ± 1.8 after the therapy (Table 3) and was found significant ($p < 0.001$).

Table 3: Comparison of pre-treatment and post-treatment haemoglobin level

Hb level (g/dl)	Mean	SD
Before therapy	8.5	± 1.2
After therapy	11.2	± 1.8

P value: $P < 0.001$ (significant)

Discussion

Maternal iron deficiency is very common in India causes being poverty, poor literacy rate, early marriage, increased parity, less use of contraception and hence poor spacing of births so they are potentially associated with maternal malnutrition and intrauterine growth retardation. Anaemia is estimated to affect nearly two third of pregnant women in the developing countries.⁴ Iron deficiency is responsible for 95% of anaemia during pregnancy.¹⁰ The responsible factors producing iron deficiency anaemia generally precedes the pregnancy, including diet poor in iron content coupled with menstrual losses and a rapid succession of pregnancies in which supplemental iron was not provided. 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.¹⁰

During pregnancy, there is a great demand for iron to meet the requirement of red cell mass expansion in the mother, fetal and placental blood and blood loss at delivery.¹¹ In pregnancy, iron deficiency is exaggerated because of the ability of fetus to extract its requirement even from iron deficient mother.¹¹ This is aggravated by poor absorption of iron due to adverse effect of pregnancy on the gastrointestinal tract which includes nausea and vomiting, motility disorder with reflux esophagitis and indigestion. In underdeveloped countries, anaemia is a major contributory factor to maternal morbidity and mortality.¹² Inadequate antenatal care along with lack of knowledge of dietary needs of pregnant woman, and overall poor socioeconomic conditions are all

responsible for increased maternal mortality rates in our country.¹³

Other Asian countries like Indonesia also report high prevalence of iron deficiency anaemia in pregnancy and associated maternal and fetal loss. It is also associated with high perinatal mortality rate.¹⁴ In the developed world it has long been documented that intravenous iron supplementation is highly effective in treating iron deficiency anaemia in a variety of settings, including pregnancy. There is irrefutable evidence that compared to oral iron, intra venous iron sucrose results in a much more rapid resolution of iron deficiency anaemia⁶, has minimal side-effects, and since it is administered intravenously, it circumvents the problems of compliance. Unlike intravenous iron dextran, anaphylactic reactions are virtually unknown with iron sucrose.⁷

Present study showed that intra venous iron sucrose significantly ($P < 0.001$) increase Hb levels within 4 weeks. There were no major complications, and none of women experienced any adverse reaction. All women stated that they found the treatment acceptable to them. A random, prospective, open study conducted in France by Bayomeu et al, involving 50 patients at 6 month of gestation to compare 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 with intra venous iron sucrose ($P < 0.001$).⁶ These results are comparable to current study. In a study conducted at Aga Khan Hospital for women and children in Karachi on 60 pregnant women at 12-34 weeks gestation with iron deficiency anaemia. Intra venous iron sucrose was compared to iron sorbital. Mean increase of 2.6g/dl Hb was seen in iron sucrose group.¹⁵

In another study carried out by Raja et al on intravenous iron sucrose complex therapy in iron deficiency anaemia in pregnant women. Fifty pregnant women between 16-32 weeks of gestation with haemoglobin of 8gm/dl were included. Results showed mean Hb level increased from 7.5 to 11gm/dl.⁸ In the present study mean Hb before therapy was 8.5 ± 1.2 and after therapy 11.2 ± 1.8 ($P < 0.001$) which was significant. Our results were consistent with the study of Raja et al.¹⁶ Like most of the other

studies there were no major adverse reactions noted in any patient in our study.

Conclusion

Iron sucrose complex has been able to raise the haemoglobin to satisfactory level when used in severely anemic iron deficient pregnant women. It is safe and well tolerated. We would like to recommend total dose infusions of iron sucrose in divided doses prophylactically in the midtrimester to avoid untoward catastrophes that can happen to the mother and the fetus due to iron deficiency anaemia.

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