

EVALUATION OF INTRAVENOUS IRON THERAPY RESPONSE TO MANAGE ANEMIA IN PREGNANCY

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Abstract:

Background: Iron deficiency anaemia is a common problem in antenatal patient especially in primigravida in developing world. The study was conducted to evaluate the efficacy of intravenous iron sucrose in antenatal primigravida anaemic cases.

Aims and Objectives: The study was conducted to evaluate the response of intravenous iron therapy in anaemic antenatal primigravida patients. The rise of hemoglobin level was predicted after therapy.

Materials and Methods: A prospective cross-sectional study was done in the antenatal clinic of Popular Medical College Hospital from January 2016 to December 2016. Primigravida women of 18 years with iron deficiency anaemia were included in this study. Pretreatment hemoglobin level was measured. After total dose of calculated iron, intravenous iron sucrose was infused to achieve the target hemoglobin. After completion of therapy hemoglobin was measured 2 weeks and 4 weeks after last dose of iron treatment. Mean, percentage, Chi-square test was done and P value <0.05 was considered significant.

Results: Among the 63 primigravida anaemic patients mean age of the study subjects were 23.98 years with mean gestational age were 23.54 weeks. Their pretreatment hemoglobin level was 5.42 gm/dl. After total dose infusion of iron sucrose, the mean rise of hemoglobin after 2 weeks was 8.87 gm/dl and after 4 weeks was 10.87 gm/dl respectively. This findings were statistically significant (P<0.001). Attainment of target hemoglobin at the range of 9.1-11.0 gm/dl was 50.79% and 65.08% after 2 weeks and 4 weeks respectively.

Conclusion: Parenteral iron therapy in the form of iron sucrose proved to be better choice to correct iron deficiency anaemia in primigravida anaemic patients.

Key words: Intravenous iron, anaemia, primigravida.

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Introduction:

In underdeveloped countries, anaemia is a major contributory factor to maternal morbidity.¹ According to WHO about 50 percent of women of fertile age have iron deficiency anaemia.² According to WHO³ anaemia is defined as “hemoglobin less than 11gm/dl and a hematocrit of less than 0.33”. Most women begin their pregnancy with partially or completely depleted of iron reserves. Thus the severity of the anaemia is inversely related to the amount of iron reserves.⁴

Anaemia has an estimated global prevalence of 42% average pregnant women. It is estimated that anaemia causes more than 115000 maternal and 591000 perinatal death globally per year.⁵ The base line measure of hemoglobin concentration that categorizes anaemia is less than 7.0gm/dl severe anaemia, 7.0-9.9 gm/dl moderate and 10.0-11.9gm/dl for mild anaemia.⁶

Various studies have assessed the association between severe anaemia and maternal mortality. Brabin et. al. in a review used cross-

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sectional, longitudinal and case-control studies and found a strong association between severe anaemia and maternal mortality. However, the association was not as strong for mild or moderate anaemia.⁷ Harrison found that both maternal and fetal mortality rises sharply in cases of severe anaemia. The causes of maternal death were due to anaemic heart failure, fulminating bacterial infection and shock from even a small loss of blood at delivery or abortion.^[8] Severe anaemia was associated with a four folds increase in risk of death in a study by Fullerson and Turner.⁹

Women often become anaemic during pregnancy because of increase in demand for iron and other vitamins in the body. It is estimated that the blood volume increased approximately 50 percent during pregnancy, although the plasma amount is disproportionately greater. This causes dilution of the blood, making the hemoglobin concentration fall, with hemoglobin concentration of its lowest between weeks 25 and 30. 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. Patients are commonly prescribed oral iron preparation because of convenience and low cost. However, the efficiency of these agents is limited by their reduced absorption rate and gastrointestinal side effects and compliance.

We therefore evaluated the efficiency and safety of intravenous iron sucrose for the treatment of iron deficiency anaemia in pregnant women.

Materials and Methods:

This was a perspective cross sectional study carried out in the Gynaecology outpatient department (GOPD) of Popular Medical College Hospital during the period of January 2016 to December 2016. After ethical clearance, the antenatal women attending the GOPD and antenatal clinic were included in the study with following inclusion and exclusion criteria.

Inclusion criteria:

1. Pregnant women aged e" 18years
2. Gestational age between 16 to 32 weeks

3. Willing to give confirm consent form for the study
4. IDA (iron deficiency anaemia) defined as Hb concentration <8 gm/dl
5. All primigravida females of above criteria

Exclusion criteria:

1. Gestational age <16 or > 32 weeks
2. Having Hb concentration >8gm/dl
3. H/O allergic reactions to previous iron therapy
4. Anaemia due to causes other than iron deficiency
5. Other inter current diseases
6. Other iron supplementation taken previously (oral iron, packed RBC, blood transfusion)

All the women who met the inclusion criteria was given intravenous a total dose of iron sucrose. Iron sucrose was given by intravenous injection on alternate day according to the iron deficit calculated for each individual patient. 200gm elemental iron diluted in 100ml of 0.9% normal saline infusion over 30 minutes upto the total calculated dose.

Total iron required = Body weight (kg) x [targeted Hb (gm/dl) - Actual Hb (gm/dl) x 0.24 + 500mg. The targeted Hb was taken as 12 gm/dl because of physiological Hemoglobin during pregnancy. Actual Hemoglobin was the Hb at the time of infusion. 0.24 was the correction factor and 500 gm was average stored iron in adults. Treatment was stopped either after administration of the calculated dose or once the Hemoglobin level had reached 10gm/dl. Hemoglobin level was measured 2 weeks and 4 weeks after the last dose of intravenous iron therapy.

Statistical Analysis:

Descriptive statistics in the form of mean and standard deviation for interval variables and frequency and percentage for categorical variables were calculated. P value less than 0.05 has been considered statistical significance level. SPSS version 16.0 was used for the analysis.

Results:

On inclusion, all the primigravida patients of gestational age between 16 to 32 weeks were

documented and pretreatment or baseline hemoglobin level was measured. Table-1 showed the age distribution of study subjects with age range of 19 to 36 years and the mean age was 25.98 years. The mean gestational age of the study subjects were 23.54 weeks (Table-2). Pretreatment or baseline hemoglobin level of the subjects showed 12 (19.05%) had ≤ 4.0 gm/dl. Most of the cases had their hemoglobin level between 4.1-6.0 gm/dl (n=33, 52.38%). Remaining 18 (28.57%) had hemoglobin level 6.1-8.0 gm/dl (Table-3). Table-4 showed the hemoglobin level after total dose of infusion of iron sucrose after 2 weeks and 4 weeks. After 2 weeks of treatment completion maximum 32(50.79%) showed hemoglobin level attainment in range of 9.1-11.0 gm/dl. After 4 weeks, 41(65.08%) showed attainment of hemoglobin level of 9.1-11.0 gm/dl range. The mean increment of hemoglobin after 2 weeks and after 4 weeks was 8.87 gm/dl and 10.07 gm/dl respectively. This finding is statistically significant. ($P < 0.001$).

Table-I*Age distribution of study subjects.*

Age	Number	Percentage
19-24 years	28	44.44%
25-30 years	23	36.51%
31-36 years	12	19.05%
Total	63	100.00%

Mean age- 25.98 years

Table -II*Distribution of subjects according to gestational age.*

Gestational age	Number	Percentage
16-20 weeks	13	20.63%
21-24 weeks	27	42.86%
25-28 weeks	15	23.81%
29-32 weeks	8	17.70%
Total	63	100.00%

Mean = 23.54 week

Table-III*Hemoglobin level of study subjects before treatment*

Hb level	Number	Percentage
≤ 4.0 gm/dl	12	19.05%
4.1-6.0 gm/dl	33	52.38%
6.1-8.0 gm/dl	18	28.57%
Total	63	100.00%

Mean Hb level 5.42 gm/dl

Table-IV*Hemoglobin level 2 weeks and 4 weeks after completion of therapy.*

Hb level (gm/dl)	After 2 weeks		After 4 weeks	
	Number	Percentage	Number	Percentage
5.1-7.0	9	14.29%	-	-
7.1-9.0	20	31.75%	7	11.11%
9.1-11.0	32	50.79%	41	65.08%
≥ 11.1	2	3.17%	15	23.81%
Total	63	100.00%	65	100.00%
Mean	8.87 gm/dl		10.07 gm/dl	

 $\chi^2=26.3$, $df=3$, $P < 0.001$ **Discussion:**

Iron deficiency anemia is a major health problem worldwide but responds well to iron supplementation. Iron deficiency anemia during pregnancy is common and deserves special attention because of its potential consequences. The current study was undertaken to evaluate the efficiency of intravenous iron sucrose therapy for treating anemia during pregnancy.

The mean hemoglobin of the study subjects were 5.42 gm/dl at booking time. After completion of total iron dose of iron sucrose therapy the mean rise was 8.87 gm/dl after 2 weeks and 10.07 gm/dl after 4 weeks. The rise was 3.4 gm/dl after 2 weeks and 4.65 gm/dl after 4 weeks. The rise in hemoglobin level was 2.6 gm/dl showed by Hashemi et. al.¹⁰ and 2.8 gm/dl by Waili et. al.¹¹ after 3 weeks of intravenous iron sucrose therapy was similar to the present study.

Study done by Lomte DB et. al.¹² showed mean age of the subjects were 36.46 years with mean

gestational age was 24.48 weeks which was similar to the present study. They also showed that the mean pretreatment hemoglobin was 6.49 gm/dl and after therapy the hemoglobin rise was 2.33 gm/dl after 2 weeks and 3.52 gm/dl after 4 weeks of treatment completion. The present study also showed similar rise of hemoglobin after 2 weeks and 4 weeks of treatment completion.

In the present study we gave iron sucrose in primigravida anemic patients. There was significant rise of hemoglobin after 2 weeks and 4 weeks of completion of total dose iron therapy. This was statistically significant ($P < 0.001$). Highly significant rise of hemoglobin concentration was also reported by Francoise B et. al.¹³

The present study showed that targeted hemoglobin concentration was achieved 53.96% after 2 weeks of therapy and 88.89% after 4 weeks of therapy. Similar finding was showed by Lomte DB et. al.¹³ and Hashemi Z et.al. [10] study. The increment was statistically significant. The result of our study showed that the mean hemoglobin level achieved was significantly higher and achievement of targeted hemoglobin also higher. So the intravenous iron sucrose therapy could be a modality of treatment in anemia in pregnancy specifically in primigravida.

Conclusion

Parenteral iron therapy in the form of iron sucrose proved better choice to correct iron deficiency anemia in pregnancy. If given in time, this will help to reduce the risk of blood transfusion during the peripartum period.

Conflict of Interest: None

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References:

1. Perewusuy KG, Huck R, Huck A, Breyman C. Parenteral iron-sucrose complex. *Br J Nutr* 2002;88:3-10.
2. Nisar N, white F. Factors affecting utilization of antenatal care among reproductive age group women (15-49 years) in an urban squatter settlement of Karachi. *J Pak Med Assoc* 2003;53:47-53.
3. Breyman C. Iron deficiency and anemia in pregnancy: Modern aspects of diagnosis and therapy. *Blood cells Mol Dis* 2002;29:506-16.
4. Khan MM. Effects of maternal anemia on fetal parameters. *J Ayub Med Coll Abbottabad* 2001;13:38-41.
5. Y. Balaranjan, V. Ramakrishnan, E. özaltin, A. H. Shankar and S. V. Subramanian. "Anemia in low income and middle income countries." *Lancet* 2011;378(9809):2123-2135.
6. E. M. Demaeyer, P. Dallman, J. M. Gurney, L. Hallberg, S.K. Sood and Srikanta. "Preventing and controlling iron deficiency anemia through primary healthcare: a guide for health administrators and programme managers." World Health Organization, Geneva, Switzerland 1989.
7. B. J. Brabin, M. Hakimi, D. Pelletier. "Iron deficiency anemia: reexamining the nature and magnitude of public health problem." *Journal of Nutrition* 2001;131:6045-6155.
8. K. A. Harrison. "Blood transfusion in severe anemia in pregnancy." In: *Proceeding of the international seminar on Maternal Mortality, Family Planning and Biology of Reproduction*. B. N. Purandare and C. L. Jhaveri eds. pp-67-70. Federation of obstetric and gynaecological society of India, Bombay, India, March 1969.
9. W. T. Fullerton, A. G. Turner. Exchange transfusion in the treatment of severe anemia in pregnancy. *The Lancet* 1962;279(7220):75-78.
10. Hashimi Z, Bushir G, Azzem P. Effectiveness of intravenous iron sucrose complex versus intramuscular iron sorbitol in iron deficiency anemia. *Ann Pak Inst. Med Sci* 2006;2:188-91.
11. Waili A, Mushtaq A. 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;53:392-95.
12. Lomte DB, Bhosale RS, Jambdade V, Gore PR. Comparative study on efficacy and safety of intravenous iron sucrose versus intramuscular iron sorbitol therapy in anemia during pregnancy. *Int Med Res Health Sei* 2013; 2(4):719-723.
13. Francoise B, Carole SB, Nour-Eddine B, Henryse L, Patricia MB, Marie CL. Iron therapy in iron deficiency anemia in pregnancy: Intravenous route versus oral route. *Ann J Obstet Gynecol* 2002;186:518-22.