Original Research Article

A Hospital Based Prospective Study to Compare the Assessment of Administration of Iron by Different Routes among Deficient Antenatal Women

Suresh Chand Garg

Associate Professor, Department of Obstetrics & Gynaecology, Government Medical College & Associate Groups of RBM Hospital, Bharatpur, Rajasthan, India

Received: 21-05-2021 / Revised: 18-06-2021 / Accepted: 05-08-2021

Abstract:

Background: Anemia is a common medical disorder that contributes significantly to maternal morbidity and mortality, intrauterine growth retardation, preterm delivery, and perinatal morbidity and mortality. The present study was conducted to compare the assessment of administration of iron by different routes among deficient antenatal women. **Materials and Methods:** The present study was conducted to compare the assessment of administration of iron by different routes among deficient antenatal women. The subjects were 200 pregnant women. 100 women were enrolled in each group. A detailed history was taken from all the women, and a complete physical examination and an obstetric examination were performed at the time of recruitment. The recorded data was compiled, and data analysis was done. **Results:** In the present study a total sample size was 200 and divided into 2 groups. one group is oral iron route and another is parenteral iron route. in oral rout mean age was 25 yrs and in parenteral route mean age was 24yrs old. In oral route 65 women had parity more than or equal to 2 and in parenteral route 61 women had parity more than or equal to 2. 16 percent of the women in the oral iron group and 28 % of the women in the parenteral iron group achieved a hemoglobin concentration 110 g/L. **Conclusion:** The present study concluded that the intramuscular administration of 3 doses of 250 mg Fe at monthly intervals appears to have good compliance and efficacy and may be used in women who cannot tolerate oral administration of iron.

Keywords: Oral Iron Route, Parenteral Iron Route, Parity, Hemoglobin Concentration.

Introduction

Iron deficiency anaemia (IDA) is the most common nutritional deficiency in pregnant women. According to WHO, the prevalence of IDA is about 18 per cent in developed countries and 35-75 per cent (average 56%) in developing countries [1]. Globally, the prevalence of anaemia is 55.9 per cent with variations between developed and developing countries. In India, prevalence ranges between 33-89 per cent[2]. According to the World Health Organization (WHO), anemia affects approximately 1.5 billion people worldwide. The prevalence is very high in Africa, Asia, India, Latin America, Eastern Europe, and China; however, it is also high in developed countries[3,4]. WHO defines anaemia as haemoglobin (Hb) <11 g %. In India, the ICMR classification of iron deficiency anaemia is: 8-11 g% as mild, 5-8 g % as moderate and <5 g% as severe anaemia. In absence of interfering factors, serum ferritin <12-15 µg/l is considered as iron deficiency[5]. The prevalence of ID is approximately 7% in 1st trimester, 14–40% in 2nd trimester, and 30–62% in 3rd trimester[6,7].Prevalence of IDA is approximately 2% in 1st trimester, 8% in 2nd trimester and, 27% in 3rd trimester[8,9].The present study was conducted to compare the assessment of administration of iron by different routes among deficient antenatal women.

**Correspondence*

Dr. Suresh Chand Garg

Associate Professor, Department of Obstetrics & Gynaecology, Government Medical College & Associate Groups of RBM Hospital, Bharatpur, Rajasthan, India.

E-mail: me.rishabhgarg@gmail.com

Materials and methods

The present study was conducted to compare the assessment of administration of iron by different routes among deficient antenatal women. Before the commencement of the study ethical approval was taken from the Ethical Committee of the institute and written consent was taken from the patient after explaining the study. The subjects were 200 pregnant women who had moderate anemia (hemoglobin concentration by cyanomethemoglobin method between 80 and 109 g/L) and singleton pregnancies between 16 and 24 wk of gestation. The inclusion criteria were as follows: age between 18 and 40 y, gestation between 16 and 24 wk, and willingness to participate. The exclusion criteria were as follows: multifetal pregnancy, hemoglobin concentration <80 or >110 g/L, preexisting illness of mother, history of late miscarriage or stillbirth, unwillingness to participate in the study, and intolerance to intramuscular administration of iron at the first 0.5-mL test dose (for the parenteral iron group). 100 women were enrolled in each group. The women in the oral iron group were given daily oral doses of 100 mg elemental Fe (ferrous sulfate) and 500 µg folic acid (Folifer; Ministry of Health, Government of India, New Delhi). Tablets were provided every month, and the women were asked to take 100 such tablets during the entire pregnancy. They had to bring back empty packs and were also asked about the intake of their tablets and the color of their stools to ensure that they had consumed the tablets. The women in the parenteral iron group were given 3 intramuscular injections of 250 mg elemental Fe as iron dextran in an injection volume of 5 mL (Imferon; Rallis India Ltd, Mumbai, India) at 1-mo intervals. Initially, 0.5 mL (25 mg) of a test dose was given; if no adverse reaction to the test dose was documented, then a full dose was given after 0.5 h. Precautions consisted of having injectable adrenaline and hydrocortisone, intravenous fluids, and inhalant oxygen at the ready in the eventuality

of any anaphylactic reaction. The injection was given in the gluteal region via a deep intramuscular route and use of the Z-technique. All the women in the parenteral iron group were prescribed an oral dosage of 5 mg folic acid twice weekly. A detailed history was taken from all the women, and a complete physical examination and an obstetric examination were performed at the time of recruitment. All the women were followed up routinely in the prenatal clinic until delivery. All the tests were repeated at term (37–41 wk) or during labor if patients went into preterm labor. The recorded data was compiled, and data analysis was done using SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). P-value less than 0.05 was considered statistically significant.

Results

In the present study a total sample size was 200 and divided into 2 groups. one group is oral iron route and another is parenteral iron route. in oral rout mean age was 25 yrs and in parenteral route mean age was 24yrs old. In oral route 65 women had parity more than or equal to 2 and in parenteral route 61 women had parity more than or equal to 2. 16 percent of the women in the oral iron group and 28 % of the women in the parenteral iron group achieved a hemoglobin concentration 110 g/L.

Table 1: Characteristics of the women in the 2 groups

Characteristics	Oral iron Route	Parenteral iron route
Age (yrs)	25.3±3.5	24.2±2.4
Parity (%)		
1	35	39
≥2	65	61

Table 2: Distribution of mean hemoglobin concentrations in the 2 groups before and after treatment

Hemoglobin	Oral iron Route		Parenteral iron route	
	before treatment (%)	after treatment (%)	before treatment (%)	after treatment (%)
<90 g/L	27	15	37	9
90–99 g/L	40	27	19	12
100–109 g/L	33	42	44	51
≥110 g/L	0	16	0	28

Discussion

The total requirement of iron during pregnancy is approximately 1000 mg (500 mg for developing foetus and placenta and similar amount for red cell increment)[11]. Usually, this iron is mobilized from iron stores. However, women with poor iron stores become iron deficient during pregnancy. Studies have shown that Hb levels <8 g% (moderate to severe anaemia) in pregnancy are associated with higher maternal morbidity[10-12].In the present study a total sample size was 200 and divided into 2 groups. one group is oral iron route and another is parenteral iron route. in oral rout mean age was 25 yrs and in parenteral route mean age was 24yrs old. In oral route 65 women had parity more than or equal to 2 and in parenteral route 61 women had parity more than or equal to 2. 16 percent of the women in the oral iron group and 28 % of the women in the parenteral iron group achieved a hemoglobin concentration 110 g/L.Kriplani A et al undertaken a study to evaluate the response and effect of intravenous iron sucrose complex (ISC) given to pregnant women with IDA. The mean haemoglobin raised from 7.63± 0.61 to 11.20± 0.73 g% (*P* <0.001) after eight wk of therapy. There was significant rise in serum ferritin levels(from 11.2 ± 4.7 to 69 ± 23.1 µg/l) (*P*<0.001).

Reticulocyte count increased significantly after two wk of starting therapy (from 1.5±0.6 to 4.6±0.8%). Other parameters including serum iron levels and red cell indices were also improved significantly. Only one woman was lost to follow up. No major side effects or anaphylactic reactions were noted during study period. study concluded that Parentral iron therapy was effective in increasing haemoglobin, serum ferritin and other haematological parameters in pregnant women with moderate anaemia[13].

In a study to compare the clinical efficacy and safety of intravenous iron sucrose with intramuscular iron sorbitol citrate, it was found that rise of Hb was more in intravenous group[17]. This study emphasized the superiority of iv iron therapy to intramuscular therapy in terms of rise of Hb and also safety profile[14].

Sood et al observed a greater increase in hemoglobin concentration with intramuscular administration of iron than with oral or intravenous administration. They observed 2 delayed, severe allergic reactions with intramuscular administration of iron[15].

Sharma JB et al compared the safety and efficacy in treating pregnancy anemia of 3 intramuscular doses of iron given at monthly intervals with those of daily oral iron supplementation. Hemoglobin and iron indicators improved significantly with both treatments. The increase in serum ferritin concentration after parenteral iron treatment was significantly higher than that after oral iron treatment. No significant differences between the 2 groups in pregnancy outcomes and birth weight were observed. Systemic side effects were more common in the parenteral iron group, whereas gastrointestinal side effects were more common in the oral iron group[16].

Conclusion

The present study concluded that the intramuscular administration of 3 doses of 250 mg Fe at monthly intervals appears to have good compliance and efficacy and may be used in women who cannot tolerate oral administration of iron.

References

1. Dutta Dc. Textbook of obstetrics including perinatology & contraception. 6th ed. Calcutta: New Central Book Agency (P) Ltd; 2004. Anaemia in pregnancy; pp. 262–7.
2. Ezzati M, Lopus AD, Dogers A, Vander HS, Murray C. Selected major risk factors and global and regional burden of disease. Lancet. 2002;360:1347–60.
3. Worldwide prevalence of anaemia. 1993-2005. 2008. [Internet] http://whqlibdoc.who.int/publications/2008/9789241596657_eng.pdf .
4. WHO meeting report. Preconception care to reduce maternal and childhood mortality & morbidity. 2012. [Internet] http://apps.who.int/iris/bitstream/10665/78067/1/9789241505000_eng.pdf .
5. Kalaivani K. Prevalence & consequences of anaemia in pregnancy. Indian J Med Res. 2009;130:627–33.

6. Hernandez-Martinez C, Canals J, Aranda N, Ribot B, Escribano J, Arija V. Effects of iron deficiency on neonatal behavior at different stages of pregnancy. Early Hum Dev. 2011;87:165–9.
7. Cantor AG, Bougatsos C, Dana T, Blazina I, McDonagh M. Routine iron supplementation and screening for iron deficiency anemia in pregnancy: a systematic review for the U.S. Preventive Services Task Force. Ann Intern Med. 2015; 162:566–76.
8. Zimmermann MB, Hurrell RF. Nutritional iron deficiency. Lancet (London, England). 2007;370:511–20
9. Scholl TO. Iron status during pregnancy: setting the stage for mother and infant. Am J Clin Nutr. 2005;81:1218s–22s.
10. Toteja GS, Singh P, Dhillon BS, et al. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull. 2006;27:311–5.
11. Rome: FAO; 1988. FAO/WHO Joint Expert Consultation Report. Requirements of vitamin A, iron, folate and vitamin B12 (FAO Food and Nutrition series 23
12. Prema K, Neela Kumari S, Ramalakshmi BA. Anaemia and adverse obstetric outcome. Nutr Rep Int. 1981;23:637–43.
13. Kriplani A,Dash BB, Kulshreshta V, Agarwal N, Bhatla N. Intravenous iron sucrose therapy for moderate to severe anaemia in pregnancy. The Indian journal of medical research. 2013;138(1):78.
14. 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. JPMA. 2002;52:392–7.
15. Sood SK, Ramachandran K, Rani K, et al. WHO sponsored collaborative studies on nutritional anaemia in India. The effect of parenteral iron administration in the control of anaemia of pregnancy. Br J Nutr 1979;42:399–406
16. Sharma JB, Jain S, Mallika V, Singh T, Kumar A, Arora R, Murthy NS. A prospective, partially randomized study of pregnancy outcomes and hematologic responses to oral and intramuscular iron treatment in moderately anemic pregnant women. The American journal of clinical nutrition. 2004 Jan 1;79(1):116-22.

Conflict of Interest: Nil Source of support: Nil