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RESEARCH ARTICLE

A COMPARITIVE STUDY OF THREE DOSES OF INTRAMUSCULAR IRON VERSUS HUNDRED TABLETS OF ORAL IRON FOR PROPYLAXIS OF ANEMIA IN PREGNANT WOMEN

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ABSTRACT

Anemia is responsible for 40 to 60% of maternal death in non industrialized countries. The women are well aware about the tetanus toxoid , this can be used as an opportunity to give intramuscular iron to the patients for prophylaxis of anemia. The present study is used to evaluate the effectiveness of giving intramuscular iron as compared to oral iron for prophylaxis of anemia in pregnancy.

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INTRODUCTION

Anemia is one of the world's leading cause of morbidity and a serious global public health problem. It is one the most common medical disorder of pregnancy that has varied prevalence, etiology and degree of severity in different population. Out of the 60,000 deaths from pregnancy related complications, anemia is responsible for 60-70% of maternal deaths. Prevalence of anemia is higher in developing countries and in India it is as high as 88% (World Health Organization, 1996; ICMR, 1989). WHO defines anemia in pregnant women as haemoglobin concentration of less than 11g/dl and haematocrit of less than 0.33 (World Health Organization, 2001). However, Centre of Disease Control (CDC) uses criteria for anemia according to the gestational age i.e. haemoglobin concentration less than 11g/dl or haematocrit of less than 0.33 during first and third trimester, and less than 10.5 g/dl and haematocrit less than 0.32 during the second trimester (WHO, 1996). Indian Council of Medical Research (ICMR)categorises anemia based on haemoglobin levels in their study: mild anemia(10.0-10.9 g/dl), moderate anemia (7-10.0 g/dl), severe anemia (less than 7 g/dl), very severe anemia (less than 4 g/dl) (Sharma, 2003). Maternal iron demand increases during pregnancy owing to various physiological changes.

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The average iron demand in pregnant women is 4.4 mg and non pregnant women is 1-2 mg. the common cause of anemia are poor nutrition, iron defeciencies, micronutrients defeciencies, malaria, hookworm infection and schistosomiasis. Besides these, additional factors are HIV infection and haemoglobinopathies (Van den Broek, 1998). In India, other contributory factors are poor availability of iron in the diet in view of religious reasons, poverty, dietary pattern of taking more carbohydrates and low iron (Sharma, 2003). Government of India recommends 100 mg of elemental iron with 500 µg of folic acid daily for 100 days for prophylaxis of anemia in pregnancy. Parenteral therapy has been studied alternatively as mode of therapy for prophylaxis. Intramuscular administration of iron is usually achieved by repeated injections of small doses of iron. A single intramuscular dose of iron with oral iron produced greater concentration of haemoglobin as compared to oral iron alone (Jenkinson, 1984).

MATERIALS AND METHODS

This study was done on 300 pregnant females attending the antenatal clinic of department of Obstetrics and Gynaecology, Dr Baba Saheb Ambedkar Hospital and Medical College over a period of two years from January 2007 to December 2008. The inclusion criteria included age between 18 to 40 years, singleton pregnancy, gestation between 16 to 20 weeks, haemoglobin between 7 to 10 g/dl, no associated medical or surgical illness.

The exclusion criteria included multiple pregnancy, obstetrical complications like pregnancy induced hypertension, gestational diabetes. It was a prospective randomized study. A total of 300 women who fulfilled the above criteria and consented to participate were recruited in the study. The were randomly allocated in two groups using table of random numbers, group I (n=150) and group II(n=150). All the patients in the study were given a course of anti helminthic treatment with 100 mg of mebendazole twice a day for three days.

Group I: Injection iron sorbitol citrate complex 150 mg was given intramuscularly after a test dose of 0.5 ml. Emergency kit with injectable adrenalin, hydrocortisone and intravenous fluid was always kept ready for management of anaphylactic reactions. Injection was given in the gluteal area via deep intramuscular route using Z teack technique. All women were prescribed 500 µg folic acid. First and second dose of parenteral iron were given simultaneously with tetanus toxoid injection and third dose after on month of second dose.

Group II: Received tablets containing 100 mg of ferrous sulphate with tablets of 500µg of folic acid. They were asked to bring back empty packs, inquired about the change of stool colour, thus compliance was checked and recorded.

Estimation of haematological indices in both the groups were done at the time of inclusion in the study, between 28-32 weeks and at 37-38 weeks. If pregnant women had pre term pains, these were taken at the time of labor pains. Venous blood was taken from patient at first visit for complete blood count, serum ferritin and other ante natal investigations. Samples were divided into three parts. 3 ml blood was taken into EDTA vial for hematological parameters that included hemoglobin, MCV (mean corpuscular volume), MCH (mean corpuscular hemoglobin), MCHC (mean corpuscular hemoglobin concentration), PCV (packed cell volume) and peripheral smear for type of anemia. For serum ferritin, ample was taken in a plain vial. Student t-test was used to compare between the two groups. Qualitative data was analyzed using the chi-square test.

OBSERVATIONS AND DISCUSSION

The present study was conducted to compare the efficacy of oral iron with parenteral iron in anemia of pregnancy. The difference in mean age in two groups was not significant

Table 1. Age distribution

Group	No. of patients	Mean Age (years)	Standard deviation	P=0.158 (not significant)
I	150	23.66	2.380	
II	150	23.29	2.103	

The educational status was comparable in both groups

Table 2. Educational Status

Educational Status	Group I N=150	Group II N=150	total	P=0.039 (not significant)
Illeterate	36	31	67	
Primary	19	12	31	
Secondary	76	83	159	
graduate	19	24	43	

Socio economic status of two groups was also comparable.

Table 3. Socio-economic status

	Group I n=150	Group II N=150	Total	P=0.143 (not significant)
Lower	35	30	65	
Upper middle	20	13	33	
Lower middle	77	81	158	
Upper	18	26	44	
Total	150	150	300	

The difference in gestational age at the time of enrolment was also comparable in both the groups (p=0.356), the difference in distribution of parity in the two groups was also not statistically significant (p=0.0112). Thus two groups were comparable in age, parity, literacy, socioeconomic status and gestational age prior to the start of treatment.

Table 4. Haemoglobin after supplementation in parenteral group

Parenteral group N=150	Mean haemoglobin (g/dl)	Standard deviation	P<0.001 Significant
Initial haemoglobin	9.402	0.767	
Haemoglobin after supplementation	11.139	1.119	

After parenteral supplementation, significant rise in hemoglobin was observed. Absolute rise in haemoglobin was 1.737±0.791.

Table 5. Haemoglobin after supplementation in oral group

Oral group N=150	Mean haemoglobin (g/dl)	Standard deviation	P<0.001 Significant
Initial haemoglobin	9.332	0.910	
Haemoglobin after supplementation	10.681	0.611	

A significant rise in haemoglobin was also seen in the oral group with absolute rise of 1.349±0.463. The haemoglobin at the time of enrolment in the study in both the groups was comparable (p=0.472). At 28 to 32 weeks the mean haemoglobin in parenteral group was 10.498, whereas in oral group was 10.259, p value was <0.005, therby having a significant difference. At term, the mean haemoglobin in parenteral group was 11.139, whereas in oral group was 10.681, p value was <0.001 having a significant difference. After both parenteral and oral iron supplementation, significant rise in hematocrit was observed (p<0.001). The absolute rise of serum ferritin in parenteral group was 7.97±2.253, as compared to oral iron group which had a rise of 5.013±2.561. The difference in MCHC in both the groups was not significant at enrollment (p=0.581) and at 28 to 32 weeks (p=0.519). At 37 to 38 weeks MCHC rise in parenteral group was better than oral group (p<0.001). The MCH and MCV was comparable in both the groups at 16 to 20 weeks (p=0.903 and p=0.382 respectively), whereas at 28 to 32 weeks and at 37 to 38 weeks both MCH and MCV was higher in parenteral group (p<0.001 in both).

The difference in birth weight was significant.

Table 6. Birth weight

Group	Mean birth weight	Standard deviation	P<0.001 Significant
Parenteral	2.854	0.2344	
Oral	2.755	0.2598	

Table 7. (Compliance)

Group	Good compliance	Poor compliance
Parenteral	149	111
Oral	111	39

The compliance was more in the parenteral group.

Table 8. Side effects of Oral and Parenteral iron

Side effects	Parenteral	Oral
Leg cramp	6	0
Constipation	0	51
Diarrhea	0	38
Dyspepsia	0	1
Headache	7	0
Metallic taste	1	22
Pain	89	0
Staining	10	0
No side effect	37	38

The results of the present study showed that both types of iron treatment were effective in improving various iron indicators in the pregnant women. Definitive improvement in haemoglobin and all other blood indices was observed but, parenteral iron was better in improving various haematological indices. Present study has been compared to the study done by Kumar et al. (2005) Absolute change in haemoglobin was 1.34±0.77 in parenteral and 1.18±0.68 in the oral group, as compared to 1.73±0.791 in parenteral and 1.349±0.463 in the present study. Absolute rise in serum ferritin was 10.43±7.92 as compared to 7.97±2.52 in the present study. Absolute rise in haemoglobin is comparable in two studies but absolute change in serum ferritin is better in A Kumar et al study. The mean haemoglobin rise can be compared with the study done by Zutshi Vijay et al.[10]In this study the rise was 10.5±0.84 gm% and 9.96±0.89 in the parenteral and oral group respectively, while in the present study the mean haemoglobin rise was 11.139±1.118 and 10.681±0.611 in parenteral and oral group respectively. The mean haemoglobin rise was more in the present study. JB Sharma et al showed that oral and parenteral iron were equally effective in improving various iron indicators, the haemoglobin concentration did not differ much after supplementation (Sharma, 2004). The birth weight in the two groups were comparable, however in the present study the two groups have statistical difference of birth weight.

Conclusion

Results of the present study suggest that three doses of 150mg injection of iron sorbitol citrate complex as compared to 100 tablets of ferrous sulphate are more effective for prophylaxis of anemia and also to replenish the iron stores.

Three doses of iron have a role in a developing country like India where compliane to oral iron is a major issue. Most mothers are aware of the advisability of receiving a tetanus toxoid injection during pregnancy and will make at least two antenatal visits, which can be used as an opportunity for intramuscular administration of iron.

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