



Original Article

Effectiveness of Oral Iron Regimens on Hematological Parameters in Pregnant Women Presenting with Iron Deficiency Anemia (IDA) in Tertiary Care Hospital

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Abstract

Objective: Present study was longitudinal and randomized study. The Aim of present study was to evaluate the relative effectiveness of two different oral Iron regimens on hematological parameters among anemic pregnant woman.

Material and Methods: A total of 64 pregnant anemic woman having hemoglobin level between 7 mg/dl to 11.5 gm/dl with no any obstetric complications attending the GOPD were selected for study. All the pregnant women were divided in two groups according to Iron supplement. **Group A:** pregnant woman (n=32) was receiving 200 mg of oral iron supplement once daily and **Group B:** pregnant woman (n=32) were taking 200 mg of oral iron supplement twice weekly. Follow up visit were planned after every 4 weeks and total duration of study was 12 weeks. In each follow up thorough physical and clinical examination was done, any side effect after taking iron supplements were noted, after that blood sample was taken for evaluation of hematological parameter (Hemoglobin, RBC count, Hematocrit, MCV, MCH, MCHC, Reticulocyte count and serum ferritin). All the test were run on fully automated five part CBC machine supplied by Horiba.

Results: All the hematological parameter showed significant improvement in both the study groups. Hemoglobin, hematocrit and RBC count showed a non significant better response in twice weekly group. While MCH, MCHC and Reticulocyte count showed a significant better response in twice weekly group. MCV showed a significant better response in daily group.

Conclusion: Twice weekly iron supplementation is equally effective to treat anemia during pregnancy. Daily iron intake results in greater increase in MCV which might be an additional cause of physiological macrocytosis.

Keywords: Iron deficiency anemia (IDA), MCH, MCHC, MCV, Reticulocyte count, Hemoglobin, RBC.

Introduction

Iron deficiency anemia is considered as the most widespread nutritional deficiency. It affects people of all ages and of both developed and developing countries. Severe Anemia in the first half of pregnancy has been proved to be associated with preterm delivery and small for gestational age fetus. Anemia of pregnancy, directly or indirectly contributes to a significant proportion of maternal deaths as well. Among the general measures to control iron deficiency the, oral iron supplement program is the most practical short-term approach to alleviate the problem. Either daily or weekly, iron supplements are required in iron deficiency anemia, as they improve in preterm labor and birth weight. Significantly low Hemoglobin Percentage and packed cell volume in pregnancy is due in part to dietary iron deficiency, therefore iron therapy is helpful to maintain the Hemoglobin Percentage and PCV nearer to that of non-pregnant women. Also low serum iron and high Total iron binding capacity (TIBC) in pregnant women is due to dietary iron deficiency therefore needed to be corrected with iron supplements. Although iron supplements are required to maintain the iron requirements of mother and her developing fetus during pregnancy, still there are some doubts about their relative benefits. To solve the problems, different doses are being in use to correct iron supplements should not be used on daily basis. Studies have been carried out both in laboratory setups and in clinical trials. These studies have concluded that with the use of iron supplementation on daily basis, the constant gut mucosal iron load is reduced. This over load usually accompanies daily supplementation. When this burden is reduced, iron absorption occurs more efficiently and about 2.6 folds increase in absorption is seen. This iron over load not only decrease iron absorption but might also be a cause of oxidative stress and decreased absorption of other micro nutrients. Based on these views some studies suggest intermittent iron supplement and even suggest that weekly supplement to

adolescent girls should be universally started to correct that iron store

Materials and Methods

Present study was the randomized and longitudinal study which compare the hematological effect of daily and twice weekly iron supplement which was given to the pregnant woman with IDA, conducted in the Department of Pharmacology, Sri Krishna Medical College, Muzaffarpur, with the help of obstetrics and Gynecology Department, during the period of October 2017 to April 2018. A total of 64 pregnant women, attending the outpatient department with single fetus of gestational age of 16 weeks and above with Hemoglobin value between 7g/dl to 11.5g/dl with no obstetric complications or any co-morbidity, were eligible for study. Women with history of any drug intake or iron supplements in current pregnancy or intolerant to iron supplements in any previous pregnancy were not included in the study. At the time of enrollment detailed history was obtained. In addition a detailed general physical and clinical examination was carried out including gestational age of fetus. Gestational age was investigated by both by the date of last menstrual period and ultrasound. Other information included height, weight and blood pressure. From all the women written informed consent was taken. Eligible women were categorized in two groups. **Group A:** Pregnant women receiving 200mg ferrous sulphate daily + 500 mg. elemental calcium once daily + vitamin C 500 mg. once daily (n=32.) **Group B:** Women receiving 200 mg ferrous sulphate twice weekly + 500 mg. elemental calcium once daily + vitamin C 500 mg. once daily (n=32). Follow up visits were planned after every 4 weeks and total duration of study was 12 weeks. In each follow up thorough physical and clinical examination was done, any side effect (Nausea, vomiting, diarrhea and constipation) after taking iron supplements were noted, after that Blood sample was taken for evaluation of hematological parameter (Hemoglobin, RBC

count, Hematocrit, MCV, MCH, MCHC, Reticulocyte count and serum ferritin). All the test were run on fully automated five part CBC machine supplied by Horiba.

Results

Hemoglobin concentration and RBC indices of two groups were not much different at the beginning of therapy. Although they were either at lower side of normal value or below normal limits. All these parameters showed significant improvement after the completion of therapy.

These improvements were seen in both groups when pretreatment and post treatment value were compared. Except for hematocrit all the parameters of both groups were when compared with their pretreatment values. Hemoglobin, hematocrit and RBC count showed a no significant better response in twice weekly group. MCH, MCHC and reticulocyte count showed a significant better response when compared to twice weekly group. Hematological parameters before and after the treatment are shown in table.

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Table – 1 Hematological Pattern of Pregnant Women after Iron supplement, at 1st week, 4th week, 8th week and 12th week visit, according to Daily Dose Or twice weekly Dose.

Hematological Parameter	Iron Supplement (200 mg Ferrous Sulphate)	1 st week effect	4 th week effect	8 th week effect	12 th week effect
Hemoglobin	Daily Dose	9.3 ± 2.2	9.8 ± 2.3	10.5 ± 2.1	11.93 ± 2.4
	Twice weekly Dose	9.41 ± 2.3	10.2 ± 2.2	11.9 ± 2.2	12.5 ± 2.6
RBC Count	Daily Dose	3.62 ± 0.8	3.81 ± 1.0	3.86 ± 1.2	4.16 ± 1.3
	Twice weekly Dose	3.63 ± 1.1	3.86 ± 1.2	4.12 ± 1.3	4.42 ± 1.5
Hematocrit	Daily Dose	34.3 ± 2.42	34.6 ± 1.2	34.9 ± 1.2	35 ± 1.4
	Twice weekly Dose	34.5 ± 1.8	34.1 ± 2.5	33.9 ± 1.8	34.8 ± 1.6
MCV	Daily Dose	83.72 ± 3.4	84.68 ± 3.6	86.26 ± 4.1	90 ± 2.4
	Twice weekly Dose	84.12 ± 2.8	84.69 ± 3.2	86 ± 6.4	88 ± 6.9
MCH	Daily Dose	26.8 ± 2.8	27.4 ± 3.1	27.8 ± 3.1	28.1 ± 2.4
	Twice weekly Dose	25.3 ± 1.6	26.2 ± 1.8	27.9 ± 2.8	28.6 ± 2.6
MCHC	Daily Dose	28.4 ± 2.1	29.6 ± 2.9	30.6 ± 3.2	32.2 ± 1.6
	Twice weekly Dose	29.6 ± 2.4	30.8 ± 3.1	31.6 ± 1.8	32. ± 1.8
Reticulocyte Count	Daily Dose	1.42 ± 0.4	1.75 ± 0.6	2.1 ± 0.8	2.2 ± 0.5
	Twice weekly Dose	1.38 ± 0.6	1.89 ± 0.8	2.4 ± 0.6	2.6 ± 0.9

Discussion

Long terms iron deficiency result in iron deficiency anemia due to imbalance between iron absorption and requirements. Importance of IDA in pregnancy and its treatment has been reported widely. Iron deficiency result not only in the short terms effects on mother and developing fetus but the long terms effects have been reported (WHO 2002 and James et. al., 2009). This study aims to provide data regarding effects of two different regimen oral iron on Hemoglobin concentration and erythrocyte indices during pregnancy. During pregnancy, physiological changes in hemodynamic state leads to hemodilution. Hemodilution is basically due to increase in plasma volume that exceeds RBC count (Jaun et al. 2004). This is

much evident during mid pregnancy. This hemodilution results in decrease of Erythrocytes indices but within normal physiological limits. It has been postulated that this plasma expansion is particularly a source for better blood circulation to placenta and ultimately to fetus (Ziaei et.: al, 2007). With the improvement of Hemoglobin concentration, oxygen carrying capacity of RBCs increase and ultimately more oxygen is provided to the tissues. RBC production is stimulated by erythropoietin production. Altered oxygen supply stimulates erythropoietin production, Altered Oxygen supply stimulates erythropoietin from kidneys.

In present study iron supplements, both daily or weekly not only improved Hemoglobin

concentration but also effects erythrocytes indices. Like many previous studies this study showed physiological macrocytosis (Mukhopaddhay et al., 2004; Taylor and lind 1976). When macrocytosis is within normal physiological limits its quite safe but studies have reported that iron induced macrocytosis could result in increased blood viscosity with impaired blood perfusion of placenta. This might explain why high materials Hemoglobin levels are related to low birth weights, preterm and small for gestational age babies (Lao et aol. 2000 and scanlon et al., 2000) When above result are considered, intermittent iron supplementation seems to be good choice to prevent or treat anemia (Mukhodaphaday et al., 2004. Result of present study favors intermittent iron supplementation not only on the basis of Hemoglobin value but has considered RBC indices for the effectiveness of treatment regimen. Limitations of study were use of oral iron only and the facts that only urban population with non vegetarian diet were recruitment for the study. Also folic acid supplementation was not included in the trial which might result in macrocytosis as data shows that folate anemia and mixed anemia's are still seen in pregnant women (Bux et al, 2003).

Conclusion

In Iron Deficiency Anemia of pregnancy intermittent iron supplementation has greater increase in hemoglobin level whereas daily iron supplementation results in greater increase in RBC volume.

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