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Oral Versus Parenteral Therapy to Improve the Hemoglobin Level Among Antenatal Women with Iron Deficiency Anemia

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Abstract:

Objective: To compare the effectiveness of oral versus parenteral medication in improving Hb levels in pregnant women with iron deficiency anemia.
Methods: This study was done among antenatal women with "Iron deficiency anemia". A total sample size of 200 females were selected in this study and divided randomly into 2 groups: Group-A was given 240 mg elemental iron as ferrous sulphate for 8 weeks. Group B was given parenteral iron at the same interval as in Group A.
Results: After Iron supplementation, the Hemoglobin concentration was improved in both the groups (statistically significant). Group A had lower increase of hemoglobin concentration in comparison to Group B. No significant association was seen between age and gestational age of women and percentage increase in Hemoglobin in both the groups. Almost 1/3rd of the subjects of both groups experienced constipation as a side effect.
Conclusion: We found that "the parenteral iron therapy in the form of iron sucrose was better choice to reduce iron deficiency anemia as compared to oral therapy. Early supplementation will help to decrease the risk of blood transfusion during the peripartum period".

Key words: Iron sucrose, antenatal women, Hb, anemia

Introduction

Anemia affects over half of all pregnant women worldwide, with 52 percent in underdeveloped countries and 23 percent in industrialized countries[1]. The high frequency of iron deficiency anemia among pregnant women in underdeveloped countries is concerning, and it is a major cause of morbidity and mortality[2]. The WHO defines "anemia as a condition in which hemoglobin (Hb) is less than 11 gm/dl and hematocrit is less than 33%". Iron and folate deficiencies are the most prevalent causes of anemia. Anemia due to iron deficiency accounts for 75-95 percent of anemia cases in pregnancy. Poor diet, malaria, hook worm infestation, and closely spaced pregnancies can all cause it. Preterm delivery, low birth weight, decreased cognitive development in children, postpartum hemorrhage, postpartum depression, and lower adult job productivity are all linked to anemia[3].
Severe anemia during pregnancy has a negative impact on both the mother and the fetus. Preterm labor, hypertension of pregnancy, sepsis, and postpartum hemorrhage are among maternal consequences, as is an increased requirement for blood transfusions[4]. According to one research, fetal death rates were 50 percent at 7 months, 28 percent at 8 months, and 24 percent at 9 months of pregnancy[5]. Mild to moderate iron deficiency anemia can affect a child's or adolescent's motor and mental development[6,7]. Apart from eating a well-balanced diet, general therapy involves iron supplementation, which can be given orally, intramuscularly, or intravenously. Iron supplementation and iron fortification, health and nutrition education, parasitic infection prevention, and improved sanitation are some of the interventions used to combat IDA[8].
Despite the fact that India's National Nutritional Anemia Control Program (NNACP) was established in 1970, anemia remains a serious public health issue. Due to a lack of appropriate health education and oversight, the initiative was a failure[9]. In most poor countries, such as India, the choice to prescribe adequate IDA supplementation in pregnant women is left to the discretion of health care providers and is dependent on the specific maternal condition[10]. For the majority of pregnant women, oral iron supplementation is sufficient.

However, in certain women, iron resistance, irregularities in absorption, and noncompliance may render oral iron therapy ineffective, and these women may benefit from parenteral iron therapy. Iron sucrose is a good alternative to iron pills and may be given as an intravenous infusion. It's widely accepted and safe, however it might produce low back discomfort, nausea, and hypotension[11,12]. The main aim of our study was "to evaluate the effect of oral versus parenteral therapy to improve the Hemoglobin level among antenatal women with iron deficiency anemia".

Material and Methods:

This study was conducted in our hospital among antenatal women with iron deficiency anemia. Informed consent was taken from all the participants.

Inclusion criteria:

Hemoglobin conc. < 11 gm/dl
Gestational age is 21-36 wks.

Exclusion criteria:

Anemia due to other causes
H/O of i.v. iron medication
Non-consenting subjects

Our research comprised 200 women who were randomly assigned to one of two groups: Group-A received 240 mg elemental iron as ferrous sulphate every 15 days for 8 weeks. To ensure compliance, participants were asked to note down and mark the calendar whenever they took their daily medicine. Parenteral iron was administered to Group B at the same time as Group A. The total iron dosage was determined using the following formula, which was then rounded to the nearest multiple of 100:

"Total Iron Dose = Weight (kg) x [Target Hb (gm/l) – Actual Hb (gm/dl)] x 0.24 + 500mg"[13]

"The target Hemoglobin was taken as 12 gm/dl because of physiological hemodilution during pregnancy[6]. Actual Hemoglobin was Hemoglobin at the time of inclusion, 0.24 was correction factor and 500 mg are average stored iron in adults[13]. Each ampoule of iron sucrose contains 100 mg iron. It was given in 100 ml normal saline over a period of 30 to 40 minutes. Initial few drops were given very slowly, and the patient was kept under observation for any adverse reaction. No oral iron was given to Group B patients during the study period. The patients were asked to come on day 30 to enquire about any side effects and at day 60 for Hb levels".

Results:

The results of this study are presented in table 1, table 2 and Fig. 1

The Hemoglobin concentration was increased in both the groups from before supplementation (p=0.0001, statistically significant). However, this increase was lower in Group A subjects in comparison to Group B subjects (Table-1 & 2).

No significant association was seen between age & GA of women and percentage increase in Hemoglobin concentration in both these groups (Fig.1).

Side effect: "About one third of the women of both Group A and Group B women experienced constipation while 24% of Group A and 22% of Group B women faced the problem of nausea during the supplementation (Fig.2)".

Discussion

Anemia is a global public health issue that affects both developing and wealthy countries, with serious implications for human health and social and economic development. It affects people at all phases of their lives, although it is more common among pregnant women and small children. .

It happens when a person's hemoglobin concentration falls below what is considered normal for their age, gender, and environment, reducing the blood's oxygen carrying ability. Across comparison to other developing nations, India has a greater prevalence of anemia in all age groups[14]. South Asian countries have one of the highest rates of anemia in the world. According to WHO, India has the greatest rate of anemia among South Asian nations. What's more important is that South Asian nations account for about half of all maternal fatalities worldwide owing to anemia, with India accounting for nearly 80% of all maternal deaths in the region[15].

The goal of our study was to compare the effectiveness of oral vs parenteral medication in improving Hb levels in pregnant women with iron deficiency anaemia. In our study, we discovered that patients in Group B had a much higher hemoglobin content than patients in Group A, which was similar with the findings of Françoise et al[13], who provided iron at weekly intervals. In contrast to our findings, Al-Memon et al[16] found no significant difference in the efficiency of iron sucrose versus oral iron in raising Hb levels during pregnancy. The deleterious effects of parenteral iron treatment were less severe than those seen in the Reveiz et al[17] trial. There was no link between a woman's age and her gestational age and a rise in Hb.

Because of digestive adverse effects, physicians frequently encounter poor compliance with oral medication, which can lead to anemia worsening. In these circumstances, as well as in those individuals for whom oral therapy is ineffective[18], such as those with IBD, many of whom are iron deficient and have digestive sensitivity to ferrous salt[19], parenteral forms of supplementation are recommended. Wali et al[20] found "intravenous iron therapy to be safe, convenient, and more successful than intramuscular iron therapy". We believe that more research on the effects of parenteral iron treatment on the newborn is needed.

Suganya G et al. [21] did "a prospective randomised clinical and interventional study in the department of Obstetrics and Gynaecology in Vinayaka Mission Kirupananda Variyar Medical College and Hospital in 2018. The total numbers of 100 mothers were allotted into two major groups, group A and group B of 50 subjects each. The rise in hemoglobin in both the groups were compared In their study the mean rise of hemoglobin in carbonyl iron was 0.914±0.20 gm% whereas in iron sucrose group was 2.43±0.20gm%. This showed that iron sucrose (i.v) had better rise in Hb than carbonyl iron (oral)".

Bhavi et al. [22] compared "the efficacy, safety and tolerability of intravenous iron sucrose with that of oral ferrous fumarate in iron deficiency anemia during 14 to 34 weeks of pregnancy. They found that the change in haemoglobin in women receiving intravenous iron was higher than with oral ferrous fumarate 22 ± 11.5 g/L vs 12 ± 9 g/L ($p < 0.0001$).Similarly the change of serum ferritin was significantly higher in women receiving intravenous iron compared to oral iron. 55% participants in the intravenous group had an improvement in haemoglobin more than 20 g/L compared to only 11% of the oral therapy group.48% of patients in I.V group showed increase in ferritin level between 51 to 100 ng/ml in comparison to only 3.5% in oral group. Intravenous iron sucrose is an effective in correction of anemia in pregnancy or iron store depletion".

I. Conclusion

We found that "the parentral iron therapy in the form of iron sucrose was better choice to reduce iron efficiency anaemia as compared to oral therapy. Early supplementation will help to decrease the risk of blood transfusion during the peripartum period".

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Table-1: Distribution of women

	Group A (n=100)		**Group B (n=100)**		**p-value**
	No.	**%**	**No.**	**%**	
Age in years					
20-25	52	52	56	56	
26-30	26	26	22	22	0.71
>30	22	22	22	22	
Mean ± sd	24.78±5.41		25.43±5.16		
Gestational age in weeks					
21-30	57	57	56	56	0.89
31-36	43	43	44	44	

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Table-2: Hemoglobin concentration before and after iron therapy by oral and intravenous routes

Hb (gm/dl)	Group A (n=100)	Group B (n=100)	p-value[1]
Before	8.56±1.18	8.31±1.03	0.09
After	11.77±1.20	12.20±1.70	0.003*
p-value[2]	0.0001*	0.0001*	
Average %age change	27.3%	31.9%	

[1]Unpaired t-test, [2]Paired t-test

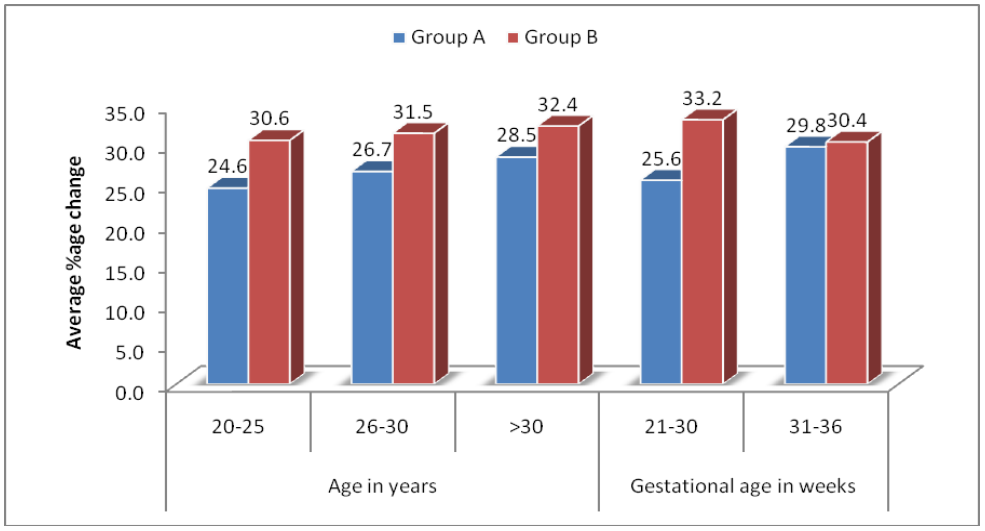

Fig.1: Average %age change in hemoglobin concentration before and after iron therapy by oral and intravenous routes according to age (p>0.05) and gestational age (p>0.05)

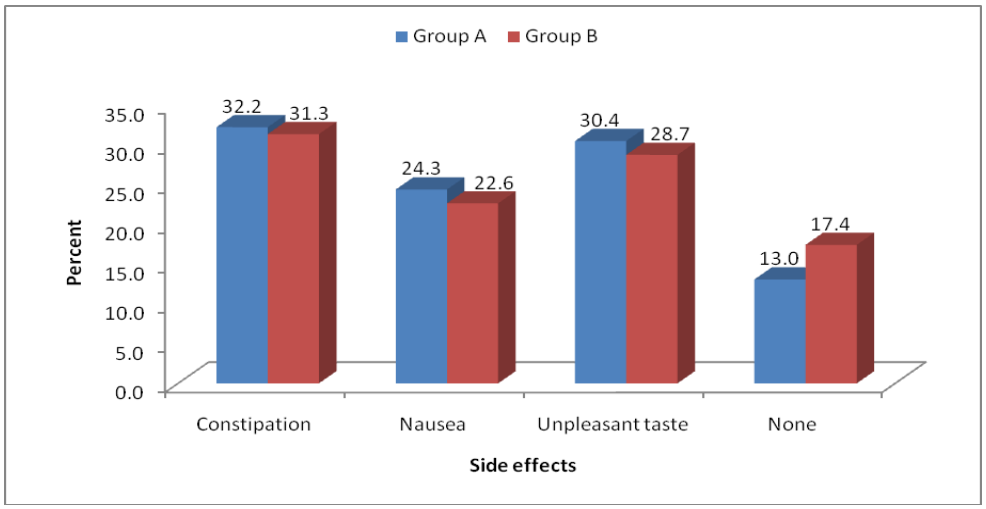

Fig.2: Distribution of side effect during the supplementation in both the groups