

Hematological Evaluation of Anemic Pregnant Females on Intravenous Iron Sucrose Therapy in A Tertiary Care Hospital.

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Abstract:

Background: *Anemia of pregnancy is most common medical disorder in the developing countries, affecting 2 billion population worldwide. In India prevalence of anemia in pregnancy is 50% contributing to 80% of maternal mortality. Parental iron therapy produces rapid correction of iron deficiency in pregnancy and decreases the need for blood transfusions. Intravenous iron sucrose therapy has become gold standard in management of iron deficiency anemia in pregnancy and has many advantages over other iron preparations in correction of anemia in pregnancy.*

Objective: Evaluation of hemoglobin improvement, time required to achieve target hemoglobin level and effect on blood transfusion rates in pregnancy.

Material and Methods: prospective study of 250 pregnant women diagnosed as iron deficiency anemia, admitted in department of Obstetrics and Gynaecology Government Medical College Srinagar Kashmir for treatment from January 2016 to December 2017 was undertaken. All anemic pregnant females were treated with iron sucrose therapy, 200 mg per week till targeted hemoglobin of 11gm/ dl was reached. Initial complete blood count (CBC) and Peripheral blood film examination (PBF) was done by pathologists and hemoglobin level at the time of admission were recorded, then weekly estimate of Hemoglobin (Hb) improvement was noted before each dose of iron sucrose by doing CBC and PBF examination. 200 mg iron sucrose was dissolved in 200 ml normal

saline and transfused in 30 minutes. Patients were observed for any transfusion reaction. Patients having iron deficiency anemia and dimorphic anemia on PBF were included in the study and patients diagnosed as frank Megaloblastic anemia were excluded from the study. Patients with Dimorphic anemia received additional 1 ml of vitamin B12 injection intramuscularly along with IV iron sucrose doses.

Results: Total 250 pregnant women were enrolled in the study from January 2016 to December 2017. Most of the patients belonged to age group 22-29 years (54.4%). 66.4% of patients were from rural areas and 33.6% were from urban areas. 84.8% were multigravida and 15.2% were primigravida. Most of the anemic patients were seen in the 24-28 weeks of gestation (45.6%) followed by 28-32 weeks of gestation (31.2%). 50.4% of patients had mild anemia, 44% had moderate and 5.6% had severe anemia. Total amount of iron sucrose required to achieve target hemoglobin of 11g/dl was 800mg in 63.6% and 200mg in 21.2%, 400mg in 9.6% and 1000mg in 5.6% patients and need for Blood

transfusions was markedly reduced.

Conclusion: From this study we can conclude that intravenous iron sucrose is the most effective therapy for iron deficiency anemia in pregnancy. Intravenous iron sucrose rapidly corrects anemia in late second trimester and third trimester of pregnancy and profoundly decreases the need of blood transfusions. Looking at the patient compliance and feasibility this drug has replaced strategy of unnecessary blood transfusions in the peripartum, intrapartum and postpartum period.

Keywords: Iron deficiency anemia, Iron sucrose, Peripheral blood film (PBF), Pregnancy, Primigravida, Multigravida.

INTRODUCTION :

Pregnancy as well as childbirth, both are universally celebrated events. A mother expresses her motherhood by growing foetus in her womb^{1,2}. Near about 1/3 of the world population is anaemic³. According to World Health Organization (WHO) prevalence of anaemia in women with pregnancy is 18% in developed countries and

relatively high 35-75 % (average 56%) in developing countries.^{2,4} In South East Asian countries prevalence of anaemia is highest. According to WHO, among South East Asian countries, highest prevalence is present in India,² prevalence ranges between 50 to 58%.^{2,4}

In India anemia is still a very common cause of mortality and morbidity.² Major reasons being low intake and high demands of iron, maladjusted metabolism, pre pregnant health status and high iron demands as in multiple pregnancies, infectious diseases, labor induced blood loss, heavy menstrual cycle, hook worm infestation are some important factors which can lead to pregnancy induced anaemia.⁵

According to WHO anemia in pregnancy is defined as “haemoglobin less than 11gm/dl.⁶ In pregnancy, demand for iron increases to meet the red cells mass expansion⁷. In pregnancy, anaemia is the most common medical disorder and in developing countries anemia is indirectly responsible for 40-80% of the maternal death.⁸ Mother may be taken as anaemic if her haemoglobin (Hb) is <11 g/dL.^{10,11}

Despite responding well to iron supplementation, anaemia due to iron deficiency is a major health related problem in whole world. For effective management of this condition new approaches are required. Initially, iron dextran and iron sorbitol citrate were

the main therapies for the treatment. The main drawback of said therapy was that it required test dose before injections due to severe anaphylactic reactions. But Iron sucrose is reported safe and effective during pregnancy in many studies.¹² For iron sucrose test dose is not required.¹³

Iron sucrose has got more safety, rapid response, as compared to iron dextran, iron sorbitol and iron gluconate^{14,15}. Unlike other iron preparations, iron sucrose can be given without any test dose with no reported serious adverse reaction. Hence iron sucrose appears to be a treatment of choice for safe and rapid correction of anemia in pregnancy.^{14,15}

AIMS AND OBJECTIVE:

1. Evaluation of Hemoglobin improvement after iron sucrose administration.
2. Estimate time required for Hemoglobin improvement and to achieve target Hemoglobin of 11g/dl.
3. To test patient compliance and feasibility with intravenous iron sucrose and effect on blood transfusion rates in pregnancy.

MATERIAL AND METHODS:

Two years prospective study of 250 pregnant women diagnosed as iron deficiency anemia, admitted in department of Obstetrics and Gynaecology Government Medical Colleg Srinagar Kashmir for treatment from January 2016 to December 2017. Anemic pregnant females were treated with iron sucrose therapy, 200 mg per week till targeted hemoglobin of 11gm/dl was reached. Initial complete blood count (CBC) and Peripheral blood film examination (PBF) was done and hemoglobin level at the time of admission were recorded, then weekly estimate of Hemoglobin (Hb) improvement was noted before each dose of iron sucrose by doing CBC and PBF examination by Pathologist. 200 mg iron sucrose was dissolved in 200 ml normal saline and transfused over 30 minutes. Patients were observed for any transfusion reaction. Patients having iron deficiency anemia and dimorphic anemia on PBF were included in the study and patients diagnosed as Megaloblastic anemia were excluded from the study. Patients with Dimorphic anemia received additional 1 ml of vitamin B 12 injection intramuscularly along with IV iron sucrose doses. The

degree of anaemia was graded according to Hb levels as moderate (7 - 8 g/dL), severe (<7 g/dL) and mild (8-10.9g/dL) in this study.

RESULTS: Total 250 Pregnant women were enrolled in the study from January 2016 to December 2017. Most of the patients belonged to age group 22-29 years (54.4%) (Table 1). 66.4% of patients were from rural areas and 33.6% were from urban areas. (Table 2). 84.8% were multigravida and 15.2% were primigravidas. (Table 3). Most of the anemic patients were seen in the 24-28 weeks of gestation (45.6%) followed by 28-32 weeks of gestation (31.2%) (Table 4). 50.4% of patients had mild anemia, 44% had moderate and 5.6% had severe anemia. (Table 5). Total amount of iron sucrose required to achieve target hemoglobin of 11g/dl was 800gm in 63.6% and 200gm in 21.2% (Table 6). weekly rise in mean hemoglobin after 200mg of iron sucrose is given in Table 7. No patient developed any significant adverse reaction. The maximum time to achieve target hemoglobin level was five weeks. (Table 7).

Age in Years	Cases	Percentage
22-29	136	54.4%
30-39	91	36.4%
>40	23	9.2%
Total	250	100%

Table 1: Age Distribution of the Patients

Rural/Urban	Cases	Percentage
Rural	166	66.4%
Urban	84	33.6%
Total	250	100%

Table 2: Geographical Distribution of Patients

Parity	Cases	Percentage
Primigravida	38	15.2%
Multigravida	212	84.8%
Total	250	100%

Table 3: Parity wise Distribution of Anemia

Gestational Age	Cases	Percentage
24-28 weeks	114	45.6 %
28-32 weeks	78	31.2 %
>32 weeks	58	23.2 %
Total	250	100%

Table 4: Distribution of Anemic Cases According to Gestational Age

Initial Hemoglobin	Cases	Percentage
<7gm/dl (Severe anemia)	14	5.6 %
7-8gm/dl (Moderate anemia)	110	44 %
8-10.9gm/dl (Mild anemia)	126	50.4%
Total	250	100%

Table 5: Distribution of Cases according to Initial Hemoglobin Level (Mild, moderate, severe)

Total dose	Number of cases	Percentage
200mg	53	21.2%
400mg	24	9.6%
800mg	159	63.6%
1000mg	14	5.6%
Total	250	100%

Table 6 : Dose of Iron Sucrose Required In Anemic pregnant Women to achieve a target HB of 11g/dl.

Type of Anemia	Number of cases	Baseline Hb.	Week 1 Hb. (200mg)	Week 2 Hb. (200mg)	Week 3 Hb. (200mg)	Week 4 Hb. (200mg)	Week 5 Hb. (200mg)	Total mg of iron sucrose required
Severe	14	5.40gm/dl	6.70gm/dl	7.75gm/dl	8.76gm/dl	10.00gm/dl	11.12gm/dl	1000mg
Moderate	110	7.20gm/dl	8.50gm/dl	9.30gm/dl	10.81gm/dl	11.40gm/dl	–	800mg
Mild	12	8.30gm/dl	8.29gm/dl	9.24gm/dl	10.50gm/dl	11.54gm/dl	–	800mg
	37	8.90gm/dl	9.45gm/dl	9.96gm/dl	10.80gm/dl	12.00gm/dl	–	800mg
	24	8.76gm/dl	9.77gm/dl	11.12gm/dl	–	–	–	400mg
	53	9.40gm/dl	11gm/dl	–	–	–	–	200mg

Table 7: Weekly Rise in Mean Haemoglobin after Each 200mg of Iron Sucrose Given in Various Grades of Anemia

DISCUSSION: In the present study majority of cases belongs to the age group of 22-29 years, having a mean age of 25.67 ± 3.7 years which is comparable with study of Prasanna B et al¹⁶ and Sunita Dubay et al.¹⁷ who observed mean age of 24.23 ± 3.8 years and 25.53 ± 2.93 years respectively. Agrawal et al¹⁸ observed mean age of anemia as 28.1 ± 5.36 . This indicate that age is not the predominant factor which can determine prevalence of anemia of pregnancy.

In the present study majority of women (66.4%) belonged to rural area. Judhith A Naronha in¹⁹ observed almost similar result 69.4%. It means rural women are more likely to be affected by anemia of pregnancy.

In the present study all the women were taking mixed diet. Judhith A Naronha¹⁹ and Sharma JB et al²⁰ observed that 50.74%, and 96.18% women were found vegetarian by diet in their study, this highlights that anemia is more common in women consuming vegetarian only diet. This difference in our study is because in this geographical area most of the people consume mixed diet and pure vegetarians are too small in number.

In the present study 84.8% anemic women were multigravida, which is higher compared with the study conducted by Agrawal Rohina et al¹⁸, Judhith A Naronh et al¹⁹ and Awasthi et al²¹. They found that 60%, 61.4%, and 65.5% pregnant anemic women were multigravidas respectively. This proves that anemia is more common in multigravida due to maternal depletion of iron stores caused by repeated pregnancies. 15.2% primigravida women were anemic in the present study, It may be due to low iron stores in childhood and adolescent age.

In the present study all women had anemia after 24 weeks of gestation, 24-28 weeks of gestation(45.6%), 28-32 weeks of gestation(31.2%) and >32 weeks of gestation(23.2%). This denotes that the late second trimester is very vulnerable for anemia of pregnancy. Result of this study are comparable with study of Prasanna B et al,¹⁶ Sunita Dubey,¹⁷ Agrawal et al¹⁸ and Alka Kriplani et al,²² who detected maximum incidence in 26.3 ± 4.07 weeks, 29.68 weeks, 28.2 ± 2.30 weeks and 25.69 weeks respectively. Advancing gestational age significantly increases the risk of anemia due to physiological increase of plasma volume and more requirement of iron for building up of hemoglobin

mass at this gestational period, Signaling meticulous planning for the treatment and prevention of iron deficiency anemia.

In the present study 50.4% women were having mild, 44% moderate and 5.6% severe anemia. Our study is comparable to the study conducted by Judhith A Noronha et al¹⁹ who found 63.5% were mildly anemic, 35% moderately anemic and 1.5% severely anemic. Alka Kriplani et al²² found that 68% were moderately anemic and 32% mildly anemic. This indicates that mild and moderate anemia is more common as compared to severe anemia during pregnancy. In the present study the minimum iron sucrose required to achieve the target hemoglobin of 11gm/dl was 200mg and maximum iron sucrose required was 1000mg. In other studies conducted by Bhupesh Dewan et al,²³ Christopher et al,²⁴ and Christian Breyman et al²⁵ maximum dose required was 1050mg, 1200mg and 1600 mg and the minimum dose required was 100mg, 300mg, 400mg respectively. During pregnancy approximately 700-1400mg of iron is required. The fetal iron requirement during pregnancy is 20 mg at 20 weeks, 200mg at 32

weeks, 300mg at 36 weeks. Hence there becomes a negative iron balance during pregnancy and dietary iron is not enough to meet the daily requirement especially in the second half of the pregnancy.

CONCLUSION: On the basis of results we conclude that:

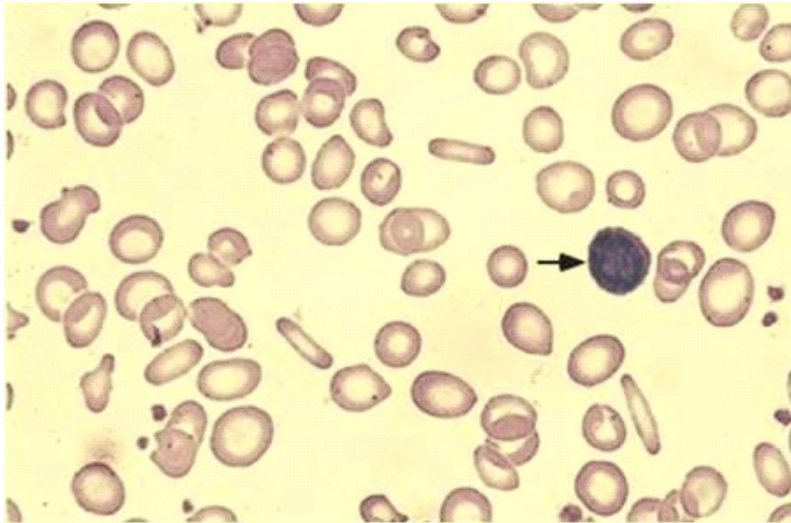
- Iron deficiency anemia is more common in the age group of 22-29 years, in rural population, in multigravida, and after 24 weeks of pregnancy.
- Mild and moderate anemia is more common than severe anemia. The best target achievement was attained in five weeks, as most of the women reported in late second trimester, they had the ideal benefit of gaining hemoglobin before the delivery hence decreasing the need of blood transfusions in the peripartum, intrapartum and postpartum period.
- Iron sucrose is the best tolerated drug in pregnancy showing rapid rise in hemoglobin levels without any significant adverse

reactions in all grades of anemia.

- Hence looking at patient compliance and feasibility

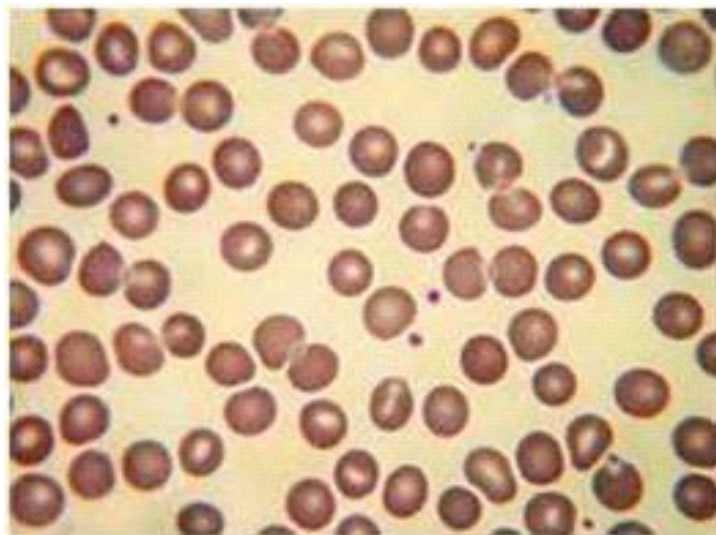
this drug has replaced the strategy of unnecessary blood transfusions in pregnancy.

Microphotograph 1(PBF)



26 weeks pregnant female with severe Microcytic Hypochromic blood picture.

Microphotograph 2(PBF)



Same patient at 32 weeks of pregnancy after receiving 1000 mg of iron sucrose showing Normocytic Normochromic blood picture.

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