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ASSESSING THE EFFICACY OF PARENTERAL IRON THERAPY IN TREATING PREGNANCY ANEMIA OF MILD TO MODERATE SEVERITY: A CLINICAL STUDY

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ABSTRACT

Background: A clinical disease known as anemia is defined by a reduction in the quantity of red blood cells or in their ability to deliver oxygen, which is necessary for bodily processes.

Aim: AThe purpose of this study was to evaluate the effectiveness of parenteral iron therapy in the management of mild to moderate cases of pregnant anemia.

Methods: A total of 120 pregnant women with verified diagnoses of iron deficiency anemia were involved in this study. For three days, anti-helminthic medication and a dose of 100 mg mebendazole were administered twice a day to every subject that was included. Additionally, all of the subjects received folic acid during the therapy. All of the individuals underwent routine urine examination, culture, microscopy, renal function test (RFT), kidney function test (KFT), and stool examination for cyst and ovary.

Results: From baseline to follow-up, a number of hematologic markers revealed notable changes, according to the study's findings. The study's findings also showed a significant increase in mean hemoglobin values from baseline (7.28 gm to 11.28 gm).

Conclusion: The current study shows that parenteral iron therapy is a useful treatment option for moderate to severe pregnant anemia, showing notable improvements in a number of parameters over time. As a result, it should be taken into consideration when treating iron deficiency.

Keywords: Parenteral therapy, iron deficiency anemia, hemoglobin levels, anemia, and pregnant women

INTRODUCTION

A clinical disease known as anemia is defined by a reduction in the quantity of red blood cells or in their ability to deliver oxygen, which is necessary for bodily processes. Less than two standard deviations below the median hemoglobin (Hb) value for healthy individuals matched for age, gender, altitude, smoking, and pregnancy status. It is difficult to establish iron-deficiency anemia during pregnancy since the female body experiences many changes, such as frequentiron supplementation, ethnic variability in hemoglobin (Hb) concentrations, and the physiological expansion of plasma.1

The Centers for Disease Control (CDC) defines anemia of pregnancy as follows: hemoglobin values of 11 gm/dl or hematocrit values of <33% in the first and third trimesters, and hemoglobin values of <10.5 gm/dl or hematocrit values of <32% in the second trimester. However, the World Health Organization (WHO) describes pregnancy-related anemia as a syndrome marked by hemoglobin levels of less than 11gm/dl in any pregnancy trimester. Intravenous iron has been shown to be quite efficient for treating all forms of iron-deficiency anemia, including pregnancy-related anemia. As a result, it should be considered when oral iron therapy is not working.2

Another drawback of using oral iron instead of parenteral iron to treat iron-deficiency anemia is that the latter is less effective when iron absorption through the gastrointestinal tract is compromised or when iron loss is significant or ongoing, as in the cases of patients recovering from surgery, those experiencing gastrointestinal bleeding, and individuals experiencing menorrhagia. Compromised patient compliance due to side effects is another important issue that also lowers the effectiveness of taking iron orally. In these circumstances, parenteral iron therapy—which bypasses the stomach and promotes quicker iron repletion—is preferable to oral iron therapy.3

Compared to the use of oral iron, which similarly prevents the long-term recurrence of iron-deficiency anemia, the delivery of iron quickly increases ferritin expression and achieves higher levels.4 Therefore, the goal of the current clinical investigation was to evaluate the effectiveness of parenteral iron therapy in the treatment of mild to moderate cases of pregnant anemia.

MATERIALS AND METHODS

The goal of the current clinical investigation was to evaluate the effectiveness of parenteral iron therapy in the management of mild to moderate cases of pregnant anemia. The study was conducted at the Sri Siddhartha Institute of Medical Sciences' Department of Obstetrics and Gynecology in Thippagondanahalli, Karnataka. All study participants gave their informed consent after being fully told about the study's design.

A total of 120 pregnant female participants with verified diagnoses were included in the study. of anemia due to a lack of iron. Subjects with anemia from causes other than iron deficiency anemia, those who had recently received blood transfusions, high-risk pregnant women who were about to go into term labor, and pregnant women with more than one child were all excluded from the study. Following the final enrollment of the research participants, folic acid and 100 mg twice day of mebendazole were administered as part of an anti-helminthic medication for three days. At baseline, standard urine examination, culture, microscopy, kidney function test (KFT), renal function test (RFT), and stool examination for cyst and ova were performed for each patient. The following formula was used to determine the dosage of sucrose iron:

The formula to calculate required elemental iron in milligrams is 2.4 times (normal Hb – patents actual Hb) x Prepregnancy weight in kg + 1000.

The standard coefficient in this calculation was 2.4, and a normal hemoglobin level was defined as 14 g/dl. To the quantities derived from the aforementioned calculation, 1000 mg was added for replenishment. The needed elemental iron dosage ranged from 1600 to 220 mg, depending on the patients' pre-pregnancy weight and hemoglobin index. The entire course of treatment

It lasted between 2.5 and 4.5 weeks. Three times a week, an intravenous dose of 200 mg of iron sucrose was given in 200 ml of normal saline over 15 to 20 minutes. The individuals were monitored during intake and for one hour following intravenous drug administration in order to evaluate any potential side effects. Additionally, the fetal heart rate was measured both prior to and after treatment. All individuals had a blood sample taken under aseptic and sterile settings in order to measure hemoglobin (Hb), serum ferritin, and red cell indices prior to the administration of the medication as well as three, six, and eight weeks thereafter. Changes in Hb concentration and serum ferritin levels after three, six, and eight weeks were the study's primary outcomes. In contrast, secondary

were prenatal outcomes such as the need for blood transfusions, the birth weight of the fetus, the style of delivery, and the length of the gestational period. Any negative effects, mean corpuscular volume (MCV), total iron-binding capacity (TIBC), reticulocyte count, and increases in serum iron levels were additional secondary measures. Using SPSS software version 21 (Chicago, IL, USA) for statistical assessment and one-way ANOVA and t-test for result formulation, the gathered data were examined. The data were presented as a mean, standard deviation, percentage, and number. At $p<0.05$, the significance threshold was maintained.

RESULTS

The goal of the current clinical investigation was to evaluate the effectiveness of parenteral iron therapy in the management of mild to moderate cases of pregnant anemia. A total of 120 pregnant female patients with a verified diagnosis of iron deficiency anemia were included in the study. Table 1 contains a list of the study individuals' demographic details. The age range of the study individuals was 19–31 years, with a mean age of 28.26±1.24 years. The research participants had an average weight of 57.3±4.6 kg and a mean BMI of 20.5±1.6 kg/m2. The kind of Anemia was severe in 4.16% (n=5) of research participants and moderate in 95.83% (n=115) of respondents (Table 1).

The hematological parameters of the study subjects were assessed from baseline to 8 weeks. The results showed that

the MCV was 64.34 at baseline and increased significantly to 75.38, 81.28, and 87.27 at 3 weeks, 6 weeks, and 8 weeks with p=0.0001. The reticulocyte counts also increased significantly from baseline 1.44% to 3.95%, 4.97%, and 5.67% to 3, 6, and 8 weeks respectively with p=0.03, and the serum ferritin was 13.64 µg/dl at baseline and significantly increased to 17.85, 28.07, and 69.33 µg/dl with p=0.02, and the TIBC was 370.4 µg/dl at baseline and significantly decreased to 351.27, 325.7, and 309.27 to 3 weeks,

Likewise, eight weeks. At p=0.04, this was statistically significant. At baseline, serum iron levels were 28.27 µg/dl; however, after 3, 6, and 8 weeks, there was a significant increase to 40.14, 59.38, and 81.27 µg/dl, which was statistically significant (p=0.003). As shown in Table 2, hemoglobin also significantly rose from baseline, ranging from 7.28 gm to 8.37 gm at 3 weeks, 9.27 gm at 6 weeks, and 11.28 gm at 8 weeks, respectively, with p=0.002.

DISCUSSION

The goal of the current clinical investigation was to evaluate the effectiveness of parenteral iron therapy in the management of mild to moderate cases of pregnant anemia. A total of 120 pregnant female patients with a verified diagnosis of iron deficiency anemia were included in the study. The average The age range of the study individuals was 19–31 years old, with an average age of 28.26±1.24 years. The research participants had an average weight of 57.3±4.6 kg and a mean BMI of 20.5±1.6 kg/m2. 95.83% of the study participants (n=115) had mild anemia, whereas 4.16% (n=5) had severe anemia. The present study's demographics were similar to those of studies conducted by Bhavi SB et al. (2017) and Froessler B et al. (2018), in which the authors evaluated subjects with similar demographics.

When the study subjects' hematological parameters were assessed from baseline to eight weeks, it was observed that their MCV was 64.34 at baseline and climbed to 64.34 after three, six, and eight weeks. Reticulocyte counts also increased considerably from baseline to 75.38, 81.28, and 87.27 with p=0.0001. Serum ferritin was 13.64 µg/dl at baseline; it increased significantly to 17.85, 28.07, and 69.33 µg/dl with p=0.02, rising from 1.44% to 3.95%, 4.97%, and 5.67% to 3, 6, and 8 weeks, respectively, with p=0.03. The present study's findings aligned with the research conducted by Radhika AG et al7 in 2019 and Onken JE et al8 in 2014, which also found a comparable hematologic parameter alteration.

TIBC was 370.4 µg/dl at baseline; after three, six, and eight weeks, it dramatically dropped to 351.27, 325.7, and 309.27, respectively. At p=0.04, this was statistically significant. At baseline, serum iron levels were 28.27 µg/dl, a considerable rise at 3, 6, and 8 weeks to 40.14, 59.38, and 81.27 µg/dl, which was statistically significant (p=0.003). Additionally, hemoglobin increased significantly (p=0.002) from baseline levels, rising from 7.28 gm to 8.37 gm at 3 weeks, 9.27 gm at 6 weeks, and 11.28 gm at 8 weeks. These findings were consistent with those of Koutroubakis IE et al. (2010) and Neeru S et al. (2012), whose study subjects had similar alterations in serum iron, TIBC, and hemoglobin as did the participants in this investigation.

CONCLUSION

The current study, despite its limitations, concludes that parenteral iron therapy is a useful treatment option for moderate to severe pregnancy anemia, with gradual improvements in a number of parameters. As such, it should be taken into consideration when treating pregnant patients with iron deficiency anemia. A few drawbacks of the current study included biases related to geographic areas, a limited sample size, and a short monitoring time. Therefore, further long-term research with bigger sample sizes and longer observation periods will aid in coming to a conclusive result.

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TABLES

S. No	Characteristics	Percentage (%)	Number (n)
1.	Mean age (years)	28.26±1.24	
2.	Age range (years)	19-31	
3.	Mean weight (kg)	57.3±4.6	
4.	BMI (kg/m2)	20.5±1.6	
5.	Anemia Type		
a)	Moderate	95.83	115
b)	Severe	4.16	5

Table 1: Demographic and disease characteristics of the study subjects

SN	Hematologic parameters	Baseline	3 weeks	6 weeks	8 weeks	p-value
1.	MCV (fl)	64.34	75.38	81.28	87.27	0.0001
2.	Reticulocyte counts (%)	1.44	3.95	4.97	5.67	0.03
3.	Serum Ferritin (µg/dl)	13.64	17.85	28.07	69.33	0.02
4.	TIBC (µg/dl)	370.4	351.27	325.7	309.27	0.04
5.	Serum Iron (µg/dl)	28.27	40.14	59.38	81.27	0.003
6.	Hemoglobin (gm)	7.28	8.37	9.27	11.28	0.002

Table 2: Assessment of the changes in the parameters from baseline to follow-up