



CODEN [USA]: IAJPBB

ISSN : 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**

SJIF Impact Factor: 7.187

<http://doi.org/10.5281/zenodo.4117837>Available online at: <http://www.iajps.com>

Research Article

INTRAVENOUS IRON THERAPY EFFICACY ON MEAN INCREASE IN HB (HEMOGLOBIN) LEVEL IN CHILDREN NOT RESPONDING TO ORAL IRON THERAPY IN IRON DEFICIENCY ANEMIA¹Dr Muhammad Adil, ²Dr Muhammad Omer Farooq, ³Dr Muhammad Asadullah¹Allama Iqbal Medical College, Lahore²Allama Iqbal Medical College, Lahore³Allama Iqbal Medical College, Lahore**Article Received:** August 2020**Accepted:** September 2020**Published:** October 2020**Abstract:**

Aim: To determine the effect of intravenous iron therapy on the mean increase in Hb (hemoglobin) in children not responding to oral iron therapy in iron deficiency anemia.

Study design: quasi-experimental study.

Place and Duration: The study was conducted in the Pediatric Unit-II of Jinnah Hospital Lahore for six-months duration from February 2020 to July 2020.

Methods: A total of fifty (50) cases 1-10 years of age were included in both sexes visiting the Multan Military Hospital outpatient (OPD) with iron deficiency anemia less than 8 g / dl who did not respond to three months of oral iron therapy. In a research.

Results: In this study, the mean and standard deviation for age were calculated as 6.75 + 2.69 years, 30 (60%) are males and 20 (40%) are females, mean Hb levels (g / dl) were calculated on the line baseline (before therapy).) were 7.12 + 0.59 Hb g / dl, while these post-treatment results were reported as 9.33 + 0.50 g / dl,

Conclusion: We concluded that intravenous iron therapy to increase mean Hb (hemoglobin) levels in children not responding to oral iron therapy for iron deficiency anemia is an effective treatment option and may be recommended in our population.

Key words: Children, iron deficiency anemia, non-response to oral therapy, intravenous therapy,

Corresponding author:**Dr. Muhammad Adil,**

Allama Iqbal Medical College, Lahore

QR code



Please cite this article in press Muhammad Adil et al, **Intravenous Iron Therapy Efficacy On Mean Increase In Hb (Hemoglobin) Level In Children Not Responding To Oral Iron Therapy In Iron Deficiency Anemia.**, Indo Am. J. P. Sci, 2020; 07(10).

INTRODUCTION:

Anemia is defined as decreased hemoglobin and red blood cell mass compared to an age-matched control. The incidence of iron deficiency anemia in Pakistan is approximately 10% in healthy children. A common cause of iron deficiency anemia (IDA) is poor dietary iron intake, especially in children suffering from malnutrition, worm invasions, malabsorption and occult blood loss in the digestive tract. Other causes of IDA in children include chronic blood loss from the digestive tract.

Many studies clearly mention that iron deficiency anemia causes long-term sequelae such as impaired psychomotor development, low IQ, lack of concentration, poor academic performance, poor memory, and cognition.

Oral iron supplementation is a well-established, effective, and internationally accepted treatment for IDA. Various forms of oral iron preparations are available. However, patients do not always adequately respond to oral iron therapy due to non-compliance due to side effects and prolonged treatment duration. Gastrointestinal disturbances associated with orally ingested iron are a major problem with oral iron supplements. The most commonly prescribed and used oral iron preparations are ferrous salts. However, the patient's response to oral therapy is usually poor with regard to increases in% hemoglobin and ferritin. This is due to many factors. The main concern is adherence to long-term oral therapy. The use of these salts is limited by low and variable absorption, chelation by food products, and free radical mediated mucosal damage. In the latter cases, oral iron therapy is impractical and therefore iron should be administered parenterally, while oral iron is not often followed in young children or adolescents, so these children may also benefit from parenteral iron therapy.

The mean increase in hemoglobin after intravenous iron therapy is 3.1 ± 1.7 g / dL who have not responded to oral iron therapy.

There are very few indications for blood transfusion or parenteral iron therapy. One indication for intravenous iron therapy is the lack of response to oral iron supplements.

Intravenous iron sucrose therapy is very safe and effective in children with IDA and increases hemoglobin levels whatever the cause. The benefits seen with intravenous iron therapy are independent of serum ferritin levels, iron, total iron binding capacity, and percentage of saturation transfer. Other benefits of

iron-sucrose therapy include a low rate of serious side effects and no need for a test dose prior to treatment. Several patients have reported mild side effects including rash, fever and irritability during or shortly after the iron sucrose infusion.

However, we planned this study to investigate the increase in hemoglobin following intravenous iron therapy in children with iron deficiency who do not respond to oral iron therapy and apply it to patients not responding to oral iron therapy.

MATERIAL AND METHODS:

A total of 50 cases between 1-10 years of both genders having Iron deficiency anemia of less than 8 g/dl not responding to three months of oral iron therapy from pediatric outpatient department (OPD) at Jinnah Hospital Lahore for six-months duration from February 2020 to July 2020 were included in the study and treated while patients of anemia suffering from gastrointestinal or pulmonary hemorrhage, severely anemic patients requiring Red Cell concentrate (Hb less than 4g/dl), patients having malabsorption syndromes like celiac disease, inflammatory bowel disease and tropical sprue and patients with transfusion dependent anemias like hemolytic anemias, aplastic anemias, fanconi anemia, diamond black fan anemia etc were excluded from the study. Informed written consent and consent was obtained from the Hospital Ethics Committee.

Appropriate history was collected regarding symptoms, systemic examination, birth, feeding, past medical and surgical immunizations, family, and duration and adherence to oral iron therapy. Detailed physical examination of all patients was recorded. Baseline% Hb and ferritin levels were investigated. Subjects meeting the inclusion criteria were offered an intravenous preparation of ferric sucrose (venofer) according to the dose calculated according to the formula given above in the operative definition and administered by infusion. The maximum single dose was 7 mg / kg of the required dose, exceeding that given in divided doses every 3-7 days until the total dose was administered. The infusion was infused to patients under a closed condition for a period of 2 hours at a 1: 1 dilution in 250 ml of normal saline. A control reaction was observed four weeks after the intravenous administration of iron sucrose by taking Hb (g / dl). If the child develops dysentery, vomiting blood, any condition causing blood loss, or if the patient receives a blood transfusion, he was excluded from the study.

Patient samples were collected and submitted to AFIP (Armed Forces Institute of Pathology, Multan) for Hb

analysis and checked by a hematologist consultant. All data was saved in Performa.

Data analysis was computer based using SPSS version 12. Quantitative variables such as age, baseline Hb, and Hb at 4 weeks were calculated from the mean and standard deviation. A p value of <0.05 was considered significant. Confusing variables such as age and gender were controlled by stratification.

RESULTS:

The age distribution of the patients was carried out, showing 13 (26%) between 1-3 years, 17 (34%) between 4-6 years and 20 (40%) between 7-10 years, while the mean and SD were calculated as 6, 75 + 2.69 years. (Table 1)

Table 1: Age distribution (n=50)

Age (in years)	n	%
1-3	13	26
4-6	17	34
7-10	20	40

The gender distribution of the patients has been prepared and presented in Table 2, where 27 (60%) were male and 18 (40%) females. (Table 2)

Table 2: Gender Distribution (n=50)

Gender	n	%
Male	30	60
Female	20	40

Mean Hb levels (g / dL) were calculated on the baseline (before treatment) which showed that 22 (48.89%) were 5-6 Hb (g / dL), while 23 (51.11 %) had 7-7.9 (g / dl), mean and standard deviation were calculated as 7.12 + 0.59 hb g / dl (Table 3)

Table 3: Mean Hb Level of patients at base line (n=50)

Hb level(g/dl)	n	%
5-6	24	48
7-7.9	26	52

Mean Hb levels (g / dL) were calculated after treatment which showed 41 (91.11%) had levels of 8-9 Hb (g / dL), while 4 (8.89%) had > 9 g / dl, mean and SD was 9.33+ 0.50 g / dL (Table 4).

Table 4: Mean Hb Level of patients after therapy (n=50)

Hb level(g/dl)	n	%
8-9	46	92
>9	4	8

DISCUSSION:

In the present study, the mean and standard deviation for age were calculated as 6.75 + 2.69 years, 30 (60%) are males and 20 (40%) are females, mean Hb levels (g / dl) calculated on the baseline (before treatment) were 7.12 + 0.59 hb g / dl, while these post-treatment results were reported as 9.33 + 0.50 g / dl, the average increase was 2.21 + 0.87 hb g / dl. The results of this study are consistent with the study showing that the mean increase in hemoglobin after intravenous iron therapy is 3.1 ± 1.7 g / dL who did not respond to oral iron therapy.

Shelley E. Crary and colleagues concluded that parenteral iron is a safe and effective treatment for iron

deficiency in children who cannot take or fail to take iron by mouth due to iron intolerance, poor adhesion, or malabsorption.

As far as we know, there are only a few such reports of ferric sucrose in the literature. The best-described series includes 45 patients in Israel with iron deficiency from dietary iron deficiency and various other causes where previous oral iron treatment has failed. They received 5 mg / kg / day of elemental iron in the form of intravenous iron sucrose until the calculated iron deficiency was completely replenished. These children had an excellent response, with a significant increase in hemoglobin both at 14 days and 6 months after treatment. Ferrous sucrose was well tolerated, only one patient experienced

transient hypotension and vomiting, and two patients experienced additional vasification.

Intravenous iron preparations other than ferrous sucrose have recently been studied in adults and children. The sodium ferric gluconate complex showed a similar safety profile to iron sucrose in children undergoing hemodialysis who were treated with erythropoietin. Like iron, sucrose, ferric gluconate should be administered in divided doses, which is not convenient for most conditions that hematologists encounter, including iron deficiency due to poor diet.

However, the results of the study, supported by other studies, show that intravenous iron therapy to moderately increase Hb (hemoglobin) levels in children not responding to oral iron therapy in iron deficiency anemia is an effective method.

A limitation of the study is that we did not include any side effects of the drug, however no such significant side effects were noted during the course of the study, this can be documented in further studies leading to the drug's safety.

CONCLUSION:

We concluded that intravenous iron therapy to increase the average Hb (hemoglobin) level in children not responding to oral iron therapy in iron deficiency anemia is an effective treatment and can be recommended in our population.

REFERENCES:

- Ozsahin, Hulya, Michela Schaeppi, Michael Bernimoulin, Magali Allard, Clémence Guidard, and Frank van den Ouweland. "Intravenous ferric carboxymaltose for iron deficiency anemia or iron deficiency without anemia after poor response to oral iron treatment: Benefits and risks in a cohort of 144 children and adolescents." *Pediatric Blood & Cancer* 67, no. 10 (2020): e28614.
- Russo, Giovanna, Vincenzo Guardabasso, Francesca Romano, Paola Corti, Piera Samperi, Annalisa Condorelli, Laura Sainati et al. "Monitoring oral iron therapy in children with iron deficiency anemia: an observational, prospective, multicenter study of AIEOP patients (Associazione Italiana Emato-Oncologia Pediatrica)." *Annals of Hematology* 99, no. 3 (2020): 413-420.
- Numan, Syed, and Karolina Kaluza. "Systematic review of guidelines for the diagnosis and treatment of iron deficiency anemia using intravenous (iv) iron across multiple indications." *Current Medical Research and Opinion* just-accepted (2020): 1-1.
- Scaramellini, Natalia, Marco Capecchi, Andrea Artoni, Silvia La Marca, Maria Domenica Cappellini, and Irene Motta. "Ferric carboxymaltose for sub-acute and chronic iron deficiency anemia in inherited platelet function defects." *Internal and Emergency Medicine* (2020): 1-3.
- Ambarsari, Cahyani Gita, Partini Pudjiastuti Trihono, Agustina Kadaristiana, Dedi Rachmadi, Murti Andriastuti, Henny Adriani Puspitasari, Taralan Tambunan, Sudung Oloan Pardede, Irawan Mangunatmadja, and Eka Laksmi Hidayati. "Low-dose maintenance intravenous iron therapy can prevent anemia in children with end-stage renal disease undergoing chronic hemodialysis." *International Journal of Nephrology* 2020 (2020).
- Pachuta Węgiel, Lidia, Maciej Kubiak, Agata Liebert, Thierry Clavel, Agnès Montagne, Aline Stennevin, Sandrine Roye, and Asmaa Boudribila. "Ferrous sulfate oral solution in young children with iron deficiency anemia: An open-label trial of efficacy, safety, and acceptability." *Pediatrics International* 62, no. 7 (2020): 820-827.
- Kim, Su Young, Sejin An, Dong Kyun Park, Kwang An Kwon, Kyoung Oh Kim, Jun-Won Chung, Jung Ho Kim, and Yoon Jae Kim. "Efficacy of iron supplementation in patients with inflammatory bowel disease treated with anti-tumor necrosis factor-alpha agents." *Therapeutic Advances in Gastroenterology* 13 (2020): 1756284820961302.
- Mattiello, Veneranda, Markus Schmutz, Heinz Hengartner, Nicolas von der Weid, Raffaele Renella, and SPOG Pediatric Hematology Working Group. "Diagnosis and management of iron deficiency in children with or without anemia: consensus recommendations of the SPOG Pediatric Hematology Working Group." *European journal of pediatrics* (2020): 1-19.
- Wesström, Jan. "Safety of intravenous iron isomaltoside for iron deficiency and iron deficiency anemia in pregnancy." *Archives of Gynecology and Obstetrics* 301, no. 5 (2020): 1127.
- Pollock, Richard F., and Gorden Muduma. "A patient-level cost-effectiveness analysis of iron isomaltoside versus ferric carboxymaltose for the treatment of iron deficiency anemia in the United Kingdom." *Journal of Medical Economics* (2020): 1-9.

11. Goyal, Alka, Yuhua Zheng, Lindsey G. Albenberg, Natalie L. Stoner, Lara Hart, Razan Alkhouri, Kyle Hampson et al. "Anemia in Children With Inflammatory Bowel Disease: A Position Paper by the IBD Committee of the North American Society of Pediatric Gastroenterology, Hepatology and Nutrition." *Journal of pediatric gastroenterology and nutrition* 71, no. 4 (2020): 563-582.
12. Ballester-Clau, Raquel, Gisela Torres Vicente, Mercedes Cucala Ramos, Carles Aracil Blanch, Josep Maria Miñana Calafat, Eva Pijoan Comas, Josep Maria Reñé Espinet, and Montse Planella de Rubinat. "Efficacy and safety of treatment with ferric carboxymaltose in patients with cirrhosis and gastrointestinal bleeding." *Frontiers in Medicine* 7 (2020).
13. Verma, Puja, Dipti Roy, and Surbhi Suman. "COMPARISON BETWEEN FERRIC CARBOXYMALTOSE AND IRON SUCROSE IN PREGNANT WOMEN WITH IRON DEFICIENCY ANAEMIA." *International Journal of Scientific Research* 9, no. 1 (2020).
14. Kant, Shashi, Ravneet Kaur, Farhad Ahamed, Archana Singh, Sumit Malhotra, and Rakesh Kumar. "Effectiveness of intravenous ferric carboxymaltose in improving hemoglobin level among postpartum women with moderate-to-severe anemia at a secondary care hospital in Faridabad, Haryana—An interventional study." *Indian Journal of Public Health* 64, no. 2 (2020): 168.
15. Erce, JA García, A. Altés, M. López Rubio, and Á. F. Remacha. "Management of iron deficiency in various clinical conditions and the role of intravenous iron: Recommendations of the Spanish erythropathology group of the Spanish society of hematology and hemotherapy." *Revista Clínica Española (English Edition)* 220, no. 1 (2020): 31-42.