

A study of effectiveness of iron dextran versus iron sucrose for the treatment of iron deficiency anemia in adult patients at tertiary health care centre

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Abstract

Background: Intravenous iron can be a useful treatment for iron-deficiency anaemia in several clinical situations, including in patients who are intolerant to or unresponsive to oral iron. **Aims and Objectives:** To Study effectiveness of Iron Dextran versus Iron Sucrose for the treatment of Iron Deficiency Anemia in Adult patients at tertiary health care centre. **Methodology:** This was a cross-sectional study carried out in the patients of moderate to severe anemia admitted to the department of Medicine during the one year period i.e. January 2017 to January 2018. All the patients who were not responsive to oral Iron treatment or due to severity of Anemia were given i.v. Iron Dextran Group A (n=35) and Iron Sucrose Group B (n=35). The statistical analysis was done by paired and unpaired t-test by SPSS 19 version software. **Result:** In our study we have seen that average age of the patients in both the groups was 51.43 ± 4.92 and 52.23 ± 6.23 ($p > 0.05$, $df=68$, Unpaired $-t=1.92$) was comparable to each other. The Female: Male sex ratio was 2.5 and 1.91 was comparable to each other ($X^2=0.24$, $df=1$, $p > 0.05$) in both the groups. Base line values were comparable in both the groups i.e. 7.88 ± 1.07 and 7.29 ± 2.73 ($p > 0.05$, unpaired $-t=0.468$, $df=68$); 11.49 ± 1.18 and 11.56 ± 3.45 ($p > 0.05$, unpaired $t=0.582$, $df=68$); the mean hemoglobin level in each group were raised significantly in each group i.e. 11.49 ± 1.18 ($p < 0.0001$, paired $-t=10.45$, $df=34$); 11.56 ± 3.45 ($p < 0.0001$, paired $-t=12.34$, $df=34$) respectively in Group A and Group B but it does not differ significantly from each other ($p > 0.05$, unpaired $t=0.582$, $df=68$). The overall complications especially musculoskeletal i.e. joint pain etc. Were more in the Group B as compared to Group A i.e. ($X^2=11.43$, $df=1$, $p < 0.0005$). **Conclusion:** It can be concluded from our study that both the drugs i.e. Iron Dextran, Iron Sucrose were equally effective in elevating the mean hemoglobin concentration over the six month period but the complications were significantly more common in the Iron Dextran group as compared to Iron sucrose group. **Key Words:** Iron Dextran, Iron Sucrose, Iron Deficiency Anemia (IDA).

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INTRODUCTION

Intravenous iron can be a useful treatment for iron-deficiency anaemia in several clinical situations, including in patients who are intolerant to or unresponsive to oral iron¹, patients undergoing elective surgery², and in patients in whom the severity of the anaemia requires rapid correction³. Iron deficiency anemia (IDA) affects approximately 30% of the world's population.⁴ Although more prevalent in children and neonates, IDA remains extremely common in the adult population. In the United States, 5–12% of non-pregnant women and 1–5% of men have IDA.⁵

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METHODOLOGY

This was a cross-sectional study carried out in the patients of moderate to severe anemia admitted to the department of Medicine during the one year period i.e. January 2017 to January 2018. All the patients who were not responsive to oral Iron treatment or due to severity of Anemia were given i.v. Iron Dextran Group A (n=35) and Iron Sucrose Group B (n=35) randomly after written and explained consent, all the patients in the study group were given Iron Dextran Iron Sucrose with precautions of management of all complications may possibly arise, they followed over the period of six month and at the end of six month the rise in Hb. level was assessed by routine CBC. The statistical analysis was done by paired and unpaired t-test by SPSS 19 version software.

RESULT

Table 1: Distribution of the patients as per age in two different groups

	Group A (n=35)	Group B (n=35)	p-value
Average age (mean \pm SD)	51.43 \pm 4.92	52.23 \pm 6.23	p>0.05, df=68, Unpaired -t= 1.92.

The average age of the patients in both the groups was 51.43 \pm 4.92 and 52.23 \pm 6.23 (p >0.05, df=68, Unpaired -t= 1.92.) was comparable to each other.

Table 2: Distribution of the patients as per the sex

Sex	Group A (n=35)	Group B (n=35)	
Male	10	12	$\chi^2=0.26$, df=1, p>0.05
Female	25	23	

The Female: Male sex ratio was 2.5 and 1.91 was comparable to each other ($\chi^2=0.24$, df=1, p>0.05) in both the groups.

Table 3: Distribution of the patients as per the mean hemoglobin values Baseline and at the end of 6 weeks of therapy

	Group A (n=35)	Group B (n=35)	Unpaired t-test
Baseline values	7.88 \pm 1.07	7.29 \pm 2.73	p>0.05, t=0.468 df=68
At the end of Six weeks of therapy	11.49 \pm 1.18	11.56 \pm 3.45	
Paired t-test	p<0.0001, t=10.45 df=34	p<0.0001, t=12.34, df=34	p>0.05, t=0.582 df=68

From above table it is clear that the base line values were comparable in both the groups i.e. 7.88 \pm 1.07 and 7.29 \pm 2.73 (p>0.05, unpaired -t=0.468, df=68); 11.49 \pm 1.18 and 11.56 \pm 3.45 (p>0.05, unpaired t=0.582, df=68); the mean hemoglobin level in each group were raised significantly

in each group i.e. 11.49 \pm 1.18 (p<0.0001, paired-t=10.45 df=34); 11.56 \pm 3.45 (p<0.0001, paired-t=12.34, df=34) respectively in Group A and Group B but it does not differed significantly from each other (p>0.05, unpaired t=0.582, df=68)

Table 4: Distribution of the patients as per the various complications during therapy

Complications	Group A	Group B
Nausea	4	2
Abdominal pain	5	2
Diarrhea	2	1
Allergy	2	1
Anaphylaxis	2	0
Joint pain	7	2
Headache	3	2
Chills	2	3
Total	27	13

($\chi^2=11.43$, df=1, p<0.0005)

The overall complications especially musculoskeletal i.e. joint pain etc. Were more in the Group A as compared to Group B i.e. ($\chi^2=11.43$, df=1, p<0.0005)

DISCUSSION

The prevalence varies greatly according to age, gender, race, and ethnicity. In premenopausal women, menstrual blood loss and pregnancy-related iron losses account for most IDA diagnoses. Nevertheless, occult bleeding from the gastrointestinal (GI) tract is the leading cause for IDA in men and postmenopausal women. A loss of 10 ml of blood per day is usually required for a positive guaiac-based fecal occult blood test (FOBT), although FOBT positivity is highly dependent on the locus of the bleeding source.⁶ Bleeding lesions in the GI tract are identified in about 50% of patients with IDA.⁷ IDA some time signifies underlined malignancies especially, GI malignancy; which also significantly more common in men and postmenopausal women with IDA, with a prevalence of 10–17%^{8,9}. Factors such as older age, male sex, elevated serum lactate dehydrogenase (LDH), and lower ferritin are considered markers for GI malignancy in IDA patients^{9,10}. The first choice in the treatment of iron deficiency anemia for the majority of patients is the oral iron replacement therapy which is easily available at all peripheral health centers and subcenters. However, parenteral iron therapy is often required in many pregnant women. Situations like failure of oral iron therapy or increased demands in spite of regular oral iron therapy often necessitate parenteral iron therapy in anemic pregnant women. Iron dextran and iron sorbitol citric acid are widely used parenteral iron preparations since long time. However, threat of unpredictable anaphylactic reaction by these conventional parenteral iron preparations prevented their wide use. Some of the

studies show that new parenteral iron preparation, iron sucrose, is safe and effective for the management of anemia and can administer without a test dose.^{11,12,13} It suggests that it can be given at most peripheral health centers even with minimum facilities. Intravenous iron preparations are available as ferric gluconate, iron sucrose, iron dextran, and ferric carboxymaltose. Ferric gluconate (Ferrlecit) is effective in treating IDA patients on hemodialysis and IDA patients without renal disease.¹⁴ For those who develop hypersensitivity reactions to ferric gluconate, iron sucrose (Venofer) may be given.^{14,15} Doses of iron sucrose for patients on hemodialysis are adjusted lower.¹⁵ Also, iron sucrose appears to be a safe and effective alternative form of treatment that is able to rapidly restore iron stores in pregnant and postpartum women with IDA.^{16–18} Iron dextran (INFeD, DexFerrum), unlike ferric gluconate and iron sucrose, is higher in molecular weight and releases iron more slowly to be bound by transferrin and to supply the bone marrow. Because of these properties, it has historically had the advantage of being able to be administered in large doses (200–500 mg), satisfying the patient's total iron requirement with just one administration (totaldose infusion), thereby saving cost and improving patient compliance. Nevertheless, a smaller test dose is currently recommended due to reports of severe anaphylactic reactions in addition to adverse effects such as hypotension, myalgia, arthralgia, nausea, vomiting, and fever. Therefore, iron dextran is rarely used as it is contraindicated in the pediatric population and discouraged in adults.¹⁹ In our study we have seen that average age of the patients in both the groups was 51.43 ± 4.92 and 52.23 ± 6.23 ($p > 0.05$, $df = 68$, Unpaired $t = 1.92$.) was comparable to each other. The Female: Male sex ratio was 2.5 and 1.91 was comparable to each other ($X^2 = 0.24$, $df = 1$, $p > 0.05$) in both the groups. Base line values were comparable in both the groups i.e. 7.88 ± 1.07 and 7.29 ± 2.73 ($p > 0.05$, unpaired $t = 0.468$, $df = 68$); 11.49 ± 1.18 and 11.56 ± 3.45 ($p > 0.05$, unpaired $t = 0.582$, $df = 68$); the mean hemoglobin level in each group were raised significantly in each group i.e. 11.49 ± 1.18 ($p < 0.0001$, paired $t = 10.45$, $df = 34$); 11.56 ± 3.45 ($p < 0.0001$, paired $t = 12.34$, $df = 34$) respectively in Group A and Group B but it does not differed significantly from each other ($p > 0.05$, unpaired $t = 0.582$, $df = 68$) The overall complications especially musculoskeletal i.e. joint pain etc. Were more in the Group B as compared to Group A i.e. ($X^2 = 11.43$, $df = 1$, $p < 0.0005$) Bala Waziri²⁰ *et al* found the mean increase in Hb concentration from baseline was comparable between the two groups: low molecular weight iron dextran 0.4 ± 0.7 g/dL versus iron sucrose 0.6 ± 0.9 g/dL, mean difference 0.2 g/dL (95% CI: -0.26 – 0.61 ; $P = 0.28$). The proportion of patients that

experienced at least one or more adverse events was 27.3% in the iron dextran group versus 14.7% in the iron sucrose arm ($P = 0.21$).

CONCLUSION

It can be concluded from our study that both the drugs i.e. Iron Dextran, Iron Sucrose were equally effective in elevating the mean hemoglobin concentration over the six month period but the complications were significantly more common iron sucrose.

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