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Original Research

Efficacy of ferrous ascorbate and iron polymaltose complex in Iron deficiency anemia in children

Dr Sanjeev Kumar Suman

Assistant Professor, Department of Pediatrics, Noida International Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India

ABSTRACT:

Background: Iron deficiency anemia (IDA) occurs in infants and young children mainly due to inadequate dietary iron. The present study compared efficacy of ferrous ascorbate (FA) and iron polymaltose complex (IPC) in Iron deficiency anemia (IDA) in children. **Materials & Methods:** 58 children with iron deficiency anaemia of both genders were classified in groups such as group I (29) who were given 6 mg/kg ferrous ascorbate (FA) and group II (29) who were given 6 mg/kg iron polymaltose complex (IPC). Level of haemoglobin and MCV was measured on day 0, 7, 1 month and 3 months. **Results:** There were 15 boys and 14 girls in group I and 13 boys and 16 girls in group II. The mean haemoglobin level in group I on day 0 was 6.9 g%, on day 7 was 8.3 g%, at 1 month was 9.5 g% and at 3 months was 11.2 g%. It was 6.1 g%, 7.0 g%, 8.2 g% and 10.1 g% on day 0, 7, 1 month and 3 months respectively in group II. The mean MCV level in group I on day 0 was 59.3fl, on day 7 was 66.5 fl, at 1 month was 70.4 fl and at 3 months was 82.2 fl. It was 59fl, 62 fl, 65.2 fl and 80.1 fl on day 0, 7, 1 month and 3 months respectively in group II. The difference was significant (P< 0.05). **Conclusion:** The improvement in hematological parameters such as haemoglobin and MCV was better in FA supplemented patients as compared to IPC.

Key words: haemoglobin, Iron deficiency anemia, iron polymaltose complex

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Corresponding author: Dr Sanjeev Kumar Suman, Assistant Professor, Department of Pediatrics, Noida International Institute of Medical Sciences, Greater Noida, Uttar Pradesh, India

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INTRODUCTION

Anemia is defined as a hemoglobin concentration that is 2 standard deviations (SD) or more below the mean for a normal population of the same gender and age. Iron deficiency anemia (IDA) occurs in infants and young children mainly due to inadequate dietary iron.[1] A 2010 report of data from federally funded programs serving low-income children found that the prevalence of anemia in this population increased from 13.4% in 2001 to 14.6% in 2010. The highest prevalence (18.2%) was among children 12 to 17 months of age. Most infants and children with mild anemia do not exhibit overt clinical signs and symptoms.[2] Initial evaluation should include a thorough history, such as questions to determine prematurity, low birth weight, diet, chronic diseases, family history of anemia and ethnic background. A complete blood count is the most common initial diagnostic test used to evaluate for anemia, and it allows for differentiating microcytic, normocytic, and macrocytic anemia based on the mean corpuscular volume.[3]

Different varieties of oral iron preparations are available for the correction of iron deficiency. Oral preparations can be either in the form of Ferrous or Ferric salts. A daily dose of 3–6 mg/kg of elemental iron in single or three divided doses is well tolerated by the pediatric age group. Oral administration of ferrous salts provides inexpensive and effective improvement in the correction of anemia due to its high bioavailability.[4] Due to this high bioavailability, it promotes the development of free radicals when gastrointestinal receptors get saturated resulting in numerous adverse events. Iron Polymaltose Complex (IPC) is a highly water-soluble, non-precipitating stable macromolecular complex of polynuclear ferric

ox hydroxide coupled with polysaccharide groups.[5] The present study compared efficacy of ferrous ascorbate (FA) and iron polymaltose complex (IPC) in Iron deficiency anemia (IDA) in children.

MATERIALS & METHODS

The present study consisted of 58 children with iron deficiency anaemia of both genders. Their parent gave written consent for the inclusion of their wards in the study. Children between the age group of 1 to 12 years with anemia were eligible; defined as hemoglobin (Hb) less than 10 (g%). IDA diagnosis was based on the guidelines by the British society of Gastroenterology.

Demographic profile of each subject was recorded. They were classified in groups such as group I (29) who were given 6 mg/kg ferrous ascorbate (FA) and group II (29) who were given 6 mg/kg iron polymaltose complex (IPC). Level of haemoglobin and MCV was measured on day 0, 7, 1 month and 3 months. Results were compared with chi- square test. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of children

Groups	Group I	Group II
Agent	Ferrous ascorbate	Iron polymaltose complex
Boy:girl	15:14	13:16

Table I shows that there were 15 boys and 14 girls in group I and 13 boys and 16 girls in group II.

Table II Measurement of haemoglobin

Hb (g%)	Group I	Group II	P value
Day 0	6.9	6.1	0.12
Day 7	8.3	7.0	0.05
1 month	9.5	8.2	0.02
3 months	11.2	10.1	0.03

Table II, graph I shows that mean haemoglobin level in group I on day 0 was 6.9 g%, on day 7 was 8.3 g%, at 1 month was 9.5 g% and at 3 months was 11.2 g%. It was 6.1 g%, 7.0 g%, 8.2 g% and 10.1 g% on day 0, 7, 1 month and 3 months respectively in group II. The difference was significant (P< 0.05).

Graph I Measurement of haemoglobin

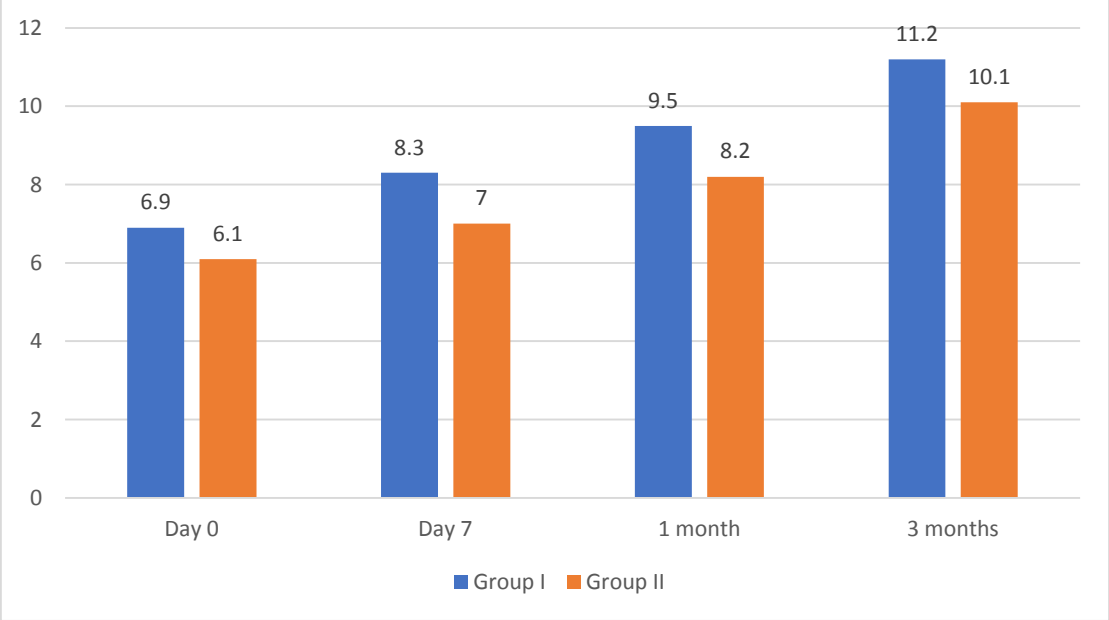
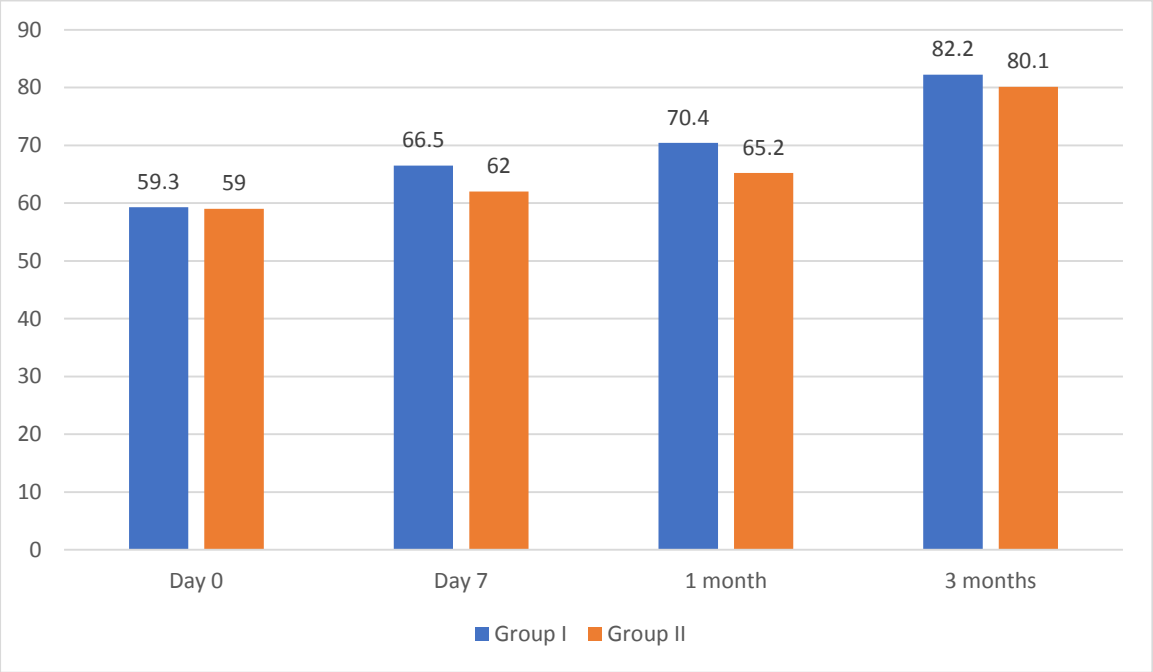


Table III Measurement of MCV

MCV	Group I	Group II	P value
Day 0	59.3	59.0	0.17
Day 7	66.5	62.0	0.02
1 month	70.4	65.2	0.01
3 months	82.2	80.1	0.81

Table II, graph I shows that mean MCV level in group I on day 0 was 59.3fl, on day 7 was 66.5 fl, at 1 month was 70.4 fl and at 3 months was 82.2 fl. It was 59fl, 62 fl, 65.2 fl and 80.1 fl on day 0, 7, 1 month and 3 months respectively in group II. The difference was significant (P< 0.05).

Graph II Measurement of MCV



DISCUSSION

Microcytic anemia due to iron deficiency is the most common type of anemia in children. The U.S. prevalence of iron deficiency anemia in children one to five years of age is estimated to be 1% to 2%.[6] A child with microcytic anemia and a history of poor dietary iron intake should receive a trial of iron supplementation and dietary counselling. Iron deficiency anemia is likely if the hemoglobin level increases by more than 1.0 g per dL (10 g per L) after one month of presumptive treatment.[7] Although iron deficiency anemia is usually microcytic, some patients may have normocytic red blood cells.[8] Further testing may also be necessary if suspected iron deficiency anemia does not respond to treatment. Ferritin measurement is the most sensitive test for diagnosing iron deficiency anemia.[9] Ferritin is a good reflection of total iron storage and is also the first laboratory index to decline with iron deficiency. It may be less accurate in children with infectious or inflammatory conditions because ferritin is also an acute phase reactant.[10] The present study compared efficacy of ferrous ascorbate (FA) and iron polymaltose complex (IPC) in Iron deficiency anemia (IDA) in children.

In present study, there were 15 boys and 14 girls in group I and 13 boys and 16 girls in group II. The mean haemoglobin level in group I on day 0 was 6.9 g%, on day 7 was 8.3 g%, at 1 month was 9.5 g% and at 3 months was 11.2 g%. It was 6.1 g%, 7.0 g%, 8.2 g% and 10.1 g% on day 0, 7, 1 month and 3 months respectively in group II. Patil et al[11] compared the therapeutic efficacy of Ferrous ascorbate (FA) and Iron polymaltose complex (IPC) in Iron deficiency anemia (IDA) in children. Participants were randomized into FA group and IPC group. Both the groups received iron salts (FA or IPC) randomly in a dose of 6 mg/kg elemental iron for 3 mo and followed up on day 3, day 7, at the end of 1 mo and 3 mo for Hemoglobin (Hb), Mean corpuscular volume (MCV), Red cell distribution width (RDW) and reticulocyte count. Results Both groups had an improvement in hematological parameters at 3 mo of intervention. The difference in the rise of Hb (g%) at the end of 1 mo in FA group (3.13 ± 1.01) vs. IPC group (2.0 ± 0.85); p = 0.017 and at 3 mo in FA group (4.88 ± 1.28) vs. IPC group (3.33 ± 1.33); p = 0.001 was statistically significant. The difference in the rise of mean Hb was significantly better in FA than the IPC group F [3392] =1.79; p = 0.00 (ANOVA). The difference in the mean increase in MCV (fL) at day 7 in FA group (6.71 ± 8.32) vs. IPC group (2.91 ± 6.16); p = 0.011 and at 1 mo FA group (9.80 ± 8.56) vs. IPC group (5.35 ± 6.11); p = 0.004 was statistically significant. The mean decrease in RDW (%) at 1 mo in FA group (4.23 ± 3.27) vs. IPC group (2.67 ± 1.95); p = 0.005 and at 3 mo in FA group (5.74 ± 3.63) vs. IPC group (4.04 ± 2.17); p = 0.006 was statistically significant. The difference in the rise in mean reticulocyte count at day 3 in FA group (0.88 ± 0.50) vs. IPC group (0.43 ± 1.20); p = 0.017 and at day 7 in FA group (4.00 ± 1.69) vs. IPC group (2.19 ± 1.24); p = 0.001 was statistically significant. F [2294] = 29.2, p = 0.00 (ANOVA). During the study period, the FA group had

minor adverse reactions whereas the IPC group had none.

We found that mean MCV level in group I on day 0 was 59.3fl, on day 7 was 66.5 fl, at 1 month was 70.4 fl and at 3 months was 82.2 fl. It was 59fl, 62 fl, 65.2 fl and 80.1 fl on day 0, 7, 1 month and 3 months respectively in group II. In a study by Ganguly et al[12], FA was used at 3 mg/kg/d which showed better efficacy with negligible side-effects compared to Colloidal iron in the treatment of IDA and found no difference in reticulocyte count at 1 mo, 2 mo and 3 mo of intervention.

CONCLUSION

Authors found that the improvement in hematological parameters such as haemoglobin and MCV was better in FA supplemented patients as compared to IPC.

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