SHORT COMMUNICATION

Ferrous Sulfate Versus Iron Polymaltose Complex for Treatment of Iron Deficiency Anemia in Children

ANKUR VIKAS BOPCHE, RASHMI DWIVEDI, RAKESH MISHRA AND GS PATEL

From the Department of Pediatrics, Kamla Nehru Hospital, Gandhi Medical College and Associated Hamidia Hospital, Bhopal, MP, India.

Correspondence to:
Dr Rakesh Mishra,
Department of Pediatrics, Gandhi Medical College and Associated Hamidia Hospital, Bhopal, MP, India. rakeshgastro@yahoo.co.in
Manuscript received: October 19, 2007; Initial review: March 10, 2008; Accepted: August 28, 2008.

We assessed the clinical response and side effects of Ferrous sulfate (FS) and Iron polymaltose complex (IPC) in 118 children with Iron deficiency anemia (IDA). Subjects were randomized to receive therapy with either oral IPC (Group A, *n*=59) or oral FS (Group B, *n*=59); all were given elemental iron in three divided doses of 6 mg/ kg/day. One hundred and six children could be followed up; 53 in each group. Children who received ferrous sulfate were having higher hemoglobin level, and less residual complaints as compared to those who had received iron polymaltose complex. Our study suggests ferrous sulfate has a better clinical response and less significant adverse effects during treatment of IDA in children.

Key Words: *Ferrous sulfate, Hemoglobin, Iron deficiency anemia, Iron polymaltose complex.*

Published online 2009 April 15. PII:S097475590700648-2

A joint UNICEF/USAID consultation has recommended that the most practical iron supplement for use in infants and young children should be an aqueous solution of a soluble ferrous salt, such as ferrous sulfate (FS) or a ferric complex, such iron polymaltose(IPC)(1). Both of them have been demonstrated to have equivalent bioavailability in infants(2,3). There is an ongoing debate over the efficacy of IPC in the background of pressure marketing done by the manufacturers and lack of data in the Indian context. This study was thus designed to compare the efficacy and side-effects of IPC versus the conventional FS preparations in treatment of iron deficiency anemia (IDA).

METHODS

This randomized clinical trial was conducted in a teaching institution with a tertiary level pediatric centre in central India over a period of one year (October 2004 – September 2005) to determine the therapeutic efficacy of two different oral iron preparations: iron polymaltose complex (IPC) and ferrous sulfate (FS). All the OPD patients of either sex, age ranging from 1-6 years with clinical features suspected of iron deficiency anemia (IDA) were assessed for eligibility. In addition, children without clinical manifestations whose blood had been tested for some other purpose and were found to have Hb <10 g/dL were also included for the study. We assessed 154 young children with suspected IDA, of which 118 were confirmed to have IDA by serum iron chemistry. These children were randomized to receive therapy with either oral IPC (Group-A: Syrup Mumfer®, *n*=59) or oral FS (Group-B; Tablet Nesfol®, *n*=59) (***Fig.*1**). All were given elemental iron in three divided doses of 6 mg/kg/day, 30 minutes before meals. Syrup Mumfer® was

purchased from the market and Tablet Nesfol® was freely available from the hospital. Randomization was achieved by simple randomization and allocation was concealed by sealed envelope technique. All children were dewormed before start of therapy and were asked to avoid tea, coffee and phytates. The patients were asked to return for follow up after 1 month. Compliance and side effects were checked by verbal enquiry. Verification was done by checking the used bottles and wrappers of tablets. Resolution of symptoms and signs were evaluated on follow up and a repeat hemoglobin was done.

Data were recorded on a pre-designed performa, tabulated and the result were analysed statistically by statistical package for social sciences (SPSS). Chi square test was applied to calculate statistical significance. A *P* value of <0.05 was considered statistically significant. The maximum permissible type II error is 20%. Our institutional review committee for ethical research approved the study. Written informed consent from parents was obtained prior to enrollment of the subjects in the study.

RESULTS

***Table* I** provides the outcome measures in the two groups. Majority of cases in both Group A and B showed rise in hemoglobin after treatment. No change in Hb was observed in 7.6% (*n*=4) children in group A and 1.9 % (*n*=1) in Group B. Eleven (20.75%) cases had decrease in the hemoglobin in Group A while no case showed decrease in hemoglobin in Group B.

Gastrointestinal side effects were 2.5 times more common in FS group as compared to IPC group (Odds ratio=0.4; 95% CI: 0.35-0.45). As a whole residual complaints were more common in IPC group as compared to FS group at one month follow

TABLE I THERAPEUTIC EFFICACY OF IRON POLYMALTOSE COMPLEX (IPC) AND FERROUS SULFATE (FS)

Therapeutic efficacy	Group A IPC (*n*=53)	Group B (FS) (*n*=53)
Hb at enrolment (g/dL)	8.46±0.73	8.53±0.84
Hb at followup (g/dL)	8.67±0.73	9.44±0.67
P value	>0.05	<0.01
Residual complaints [(*n*(%)]	16 (30.8%)	2 (3.8%)
Side effect [(*n*(%)]	4 (7.6%)	9 (17.0%)
Increase in Hb [(*n*(%)]	38 (71.7%)	52 (98.1%)

Hb: Hemoglobin.

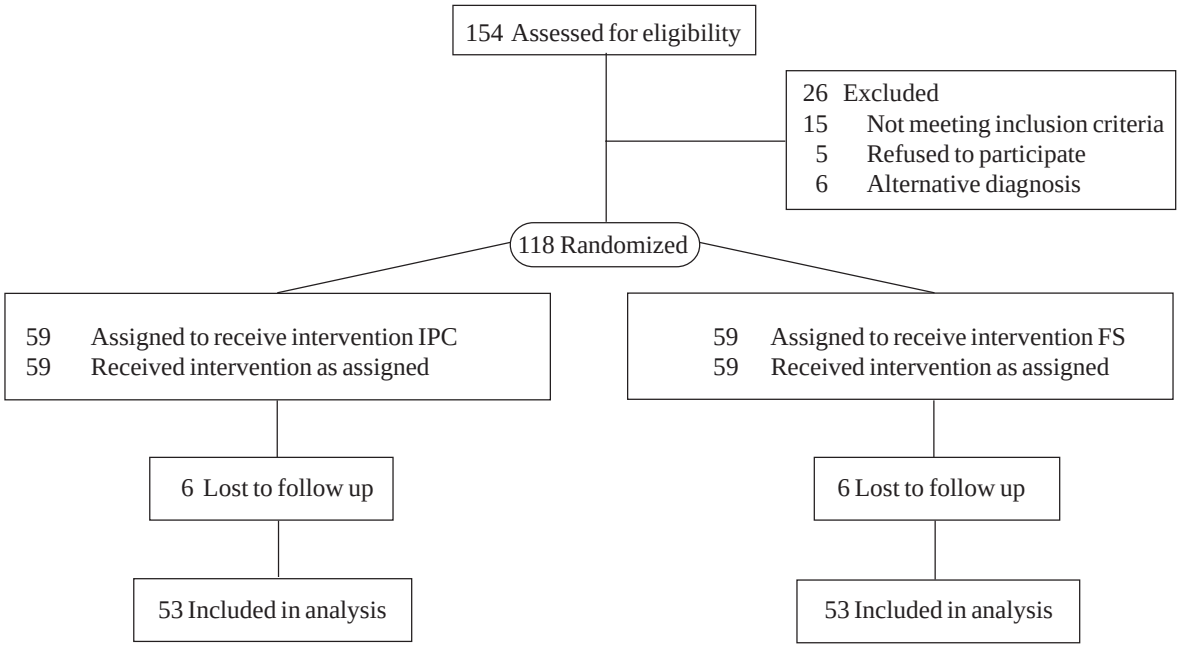

FIG. 1 *Study flow chart.*

WHAT THIS STUDY ADDS?

- Ferrous sulfate has a better clinical response as compared to Iron polymaltose complex for treating iron deficiency anemia in children.

up (Odds ratio=11.1; 95% CI 11.04-11.15). The cost of 100 mg elemental iron in form of IPC was four rupees against two rupees for equal amount of elemental iron from ferrous sulfate.

DISCUSSION

We conducted this study to compare therapeutic efficacy of FS versus IPC in the treatment of IDA in children. This study shows that number of children showing increase in hemoglobin as well as the level of rise in mean hemoglobin was significantly more in FS group at follow up. The results are similar to that reported by Arvas, *et al*.(4) and Langstaff, *et al*.(5). In contrast, both preparations were found to cause equivalent increase in hemoglobin and serum iron levels by Sozmen, *et al*.(6). In several other studies, the response to IPC was not adequate(7-9). Though the gastrointestinal side effect are more in ferrous sulfate group, yet the residual complaints were more in the iron polymaltose groups.

Our study has thus demonstrated the superiority of FS over IPC in treatment of IDA where hemoglobin rise as well as improvement in constitutional symptoms was considered. Our conclusions need to be substantiated in further randomized clinical trials on pediatric population with a longer follow up.

Contributors: AVB was responsible for acquisition of data, clinical examination and follow up interpretation of data. RM edited the manuscript and statistically analyzed the data. GSP conceived and designed the study, monitored the study and will act as guarantor. RD reviewed the manuscript for important intellectual content and approved the final draft.

Funding: None.

Competing interests: None stated.

REFERENCES

1. Nestel P, Alnwick D. Iron-micronutrient supplements for young children. Summary and conclusions of a consultation held at UNICEF, Copenhagen, August 19-20, 1996.
2. Borbolla JR, Cicero RE, Dibildox MM, Sotres DR, Gutierrez RG. IPC *vs.* Iron sulphate in the treatment of iron deficiency in infants. Rev Mex Padiatr 2000; 67: 63-67.
3. Jacobs P. Oral iron therapy in human subjects: comparative absorption between ferrous salts and iron polymaltose. J Med 1984; 3: 387-377.
4. Arvas A, Gur E. Are ferric compound useful in treatment of IDA? Turk J Pediatr 2000;42:352-353.
5. Langstaff RJ, Geisser P, Heil WG, Bowdler JM. Treatment of IDA: a lower incidence of adverse effects with IPC than FS. Brit J Clin Res 1993; 4: 191-198.
6. Sozmen EY, Kavakli K, Cetinkaya B, Akcay YD, Yilmaz D, Aydinok Y. Effects of iron (II) salts and iron (III) complexes on trace element status in children with iron-deficiency anemia. Biol Trace Elem Res 2003; 94: 79-86.
7. Mehta BC. Ineffectiveness of iron polymaltose in treatment of IDA. J Assoc Physicians India 2003; 51: 419-421.
8. Nielsen P, Gubbe EE, Fischer R, Heinrich HC. Bioavailability of iron from ferric polymaltose in human. Drug Res 1994; 44: 743-748.
9. Heinrich HC. Intestinal iron absorption of 59 Fe from neutron activated commercial iron (III) citrate and iron (III) hydroxide polymaltose in humans. Drug Res 1987; 37: 105-107.