



Mixaferrum® Tablets: clinical studies report

Mixaferrum® Tablets is an innovative iron supplement formulation containing Fosfosome® Iron, a patented biotechnology developed by Shedir Pharma Group, able to improve iron absorption; its safety and efficacy have been studied in some clinical studies.

First of all, in order to evaluate this new iron delivery system, a combination of in vitro digestion process along with intestinal epithelium models has been used to emulate digestion and absorption in the human intestine¹.

Gastroresistance has been assayed according to US pharmacopeia (USP) protocols. An equal amount of Fosfosome® Iron and control iron salt have been dissolved in HCl 0.1 M and incubated for 2 h at 37 °C. At the end of the incubation time, Fe titre has been measured by ICP-AES analysis and the results showed that the iron release from Fosfosome® Iron was lower than the control preparation.

The fraction obtained from gastric digestion has been utilized for investigating iron absorption in Caco-2 and human follicle-associated intestinal epithelium (FAE – model employed to simulate M cells absorption) models; Fosfosome® Iron showed an improved resistance to gastric digestion and higher intestinal absorption than ferric pyrophosphate salt used as a control in both models. In the FAE model, Fosfosome® Iron induces higher iron absorption than in the Caco-2 monolayer, most likely due to the transcytosis ability of M cells. The greater iron absorption in the Fosfosome® Iron-treated FAE model corresponds to higher ferritin level, proving physiological effect of the iron delivered by Fosfosome® Iron. Finally, the formulation did not induce any alterations in viability and barrier integrity. To sum up, Fosfosome Iron® helps iron absorption and ferritin expression, avoid any adverse effects.

After the in vitro investigation, a clinical study was performed in order to evaluate the efficacy of Fosfosome® Iron compared to iron sulphate in patients affected by anaemia deficiencies. The multicenter randomized study enrolled 300 patients divided in two groups: group A treated with Mixaferrum® and group B treated with iron sulphate. The treatment lasted for six months. Inclusion criteria are: age > 18, Hb level < 10 g/dl, ferritin level < 30 ng/ml, TIBC sat level < 20%, failure or intolerance to iron sulphate therapy, no neoplasia. Exclusion criteria are: high blood loss rate (loss of 1 g/dl Hb level in a time < 7 days), hyperthyroidism, autoimmune disease, neoplasia, IBD, pregnancy or breastfeeding, severe organ failure).

The results showed that Mixaferrum® thanks to Fosfosome® Iron increases haemoglobin level from 7.8 g/dl to 12.5 g/dl and this value is significantly higher than iron sulphate (10.5 g/dl) even if the treated group with iron sulphate had an entry haemoglobin value of 8.5 g/dl (Figure 1).

¹ Micheletto, M., Gaio, E., Tedesco, E., Di Maira, G., Mantovan, E., Zanella, M., Pastore, P., Roverso, M., Favaro, G., Benetti, F. *Intestinal Absorption Study of a Granular Form of Ferric Pyrophosphate*. *Metabolites*, 2022.

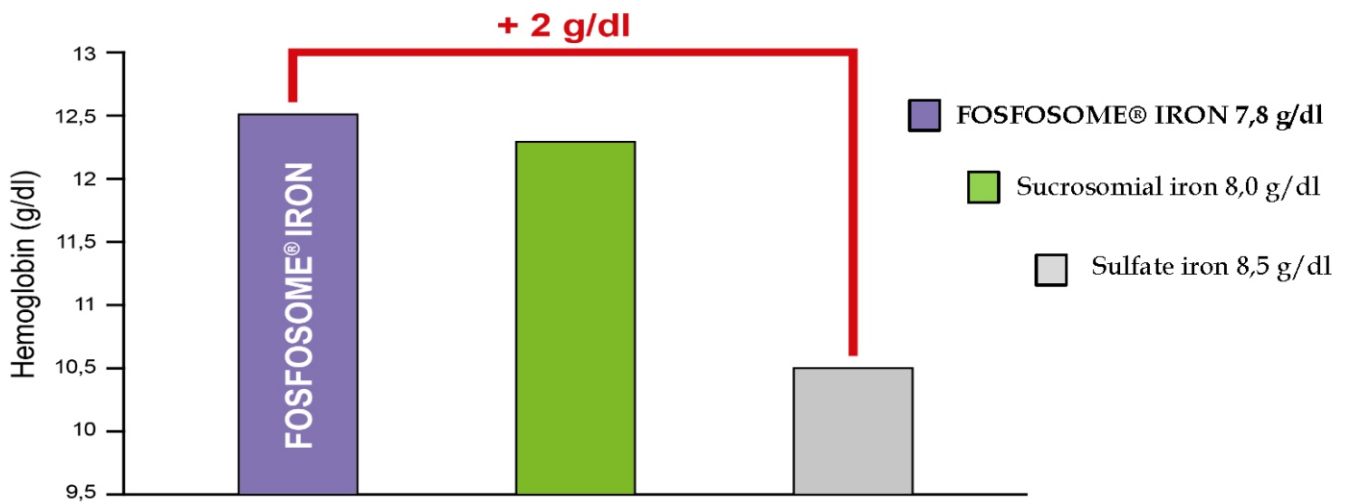


Figure 1. Hemoglobin level comparison between Fosfosome® Iron, Sucrosomial Iron and Sulphate Iron.

On the other hand, Mixaferrum® has a high efficacy to restore ferritin level; in fact, after six months of treatment with Mixaferrum®, patients show ferritin level three times higher than patient treated with iron sulphate (Figure 2).

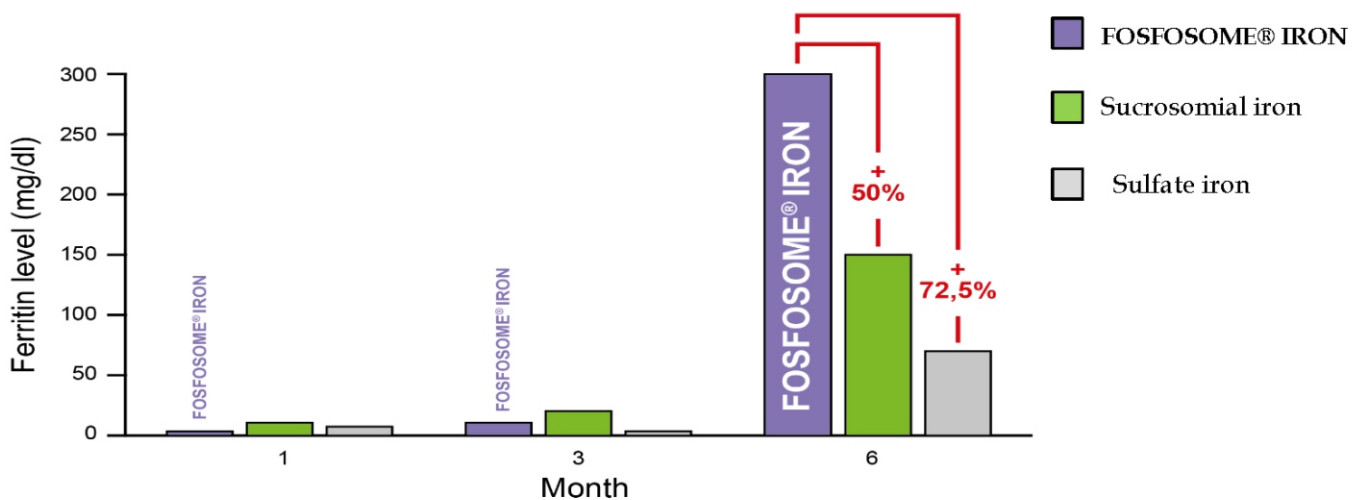


Figure 2. Ferritin level comparison between Fosfosome® Iron, Sucrosomial Iron and Sulphate Iron.

Furthermore, Mixaferrum® is more effective to increase haemoglobin level compared to iron sulphate in patients with anaemia of inflammation.²

² In press.

