Ferrous sulfate

1. Relative bioavailability
Because ferrous sulfate is the standard that all the others are measured against, the relative bioavailability trials with sulfate are in the documents of the other supplements.

2. Overall bioavailability
There is a lot of variation in this, mostly due to the effect of iron status on bioavailability, and also due to enhancers/inhibitors. In general the overall bioavailability seems around 20%, with it going up to 40% for anemic and with enhancers, and down towards 0 with inhibitors and people with sufficient iron.

This article http://www.hindawi.com/journals/tswj/2012/846824/abs/ says 10-15% bioavailability but the reference they give isn’t a study and has no mention of that figure.

(Davila-Hicks, Theil, and Lönnerdal 2004)
This study is outlined in the ferritin section, but the overall bioavailability for sulfate that they came to was 21-22%. This was with non-anemic subjects taken with breakfast that contained a low amount of inhibitors. Usual measurements and full body counting.

(Harrington et al. 2011)
Study outlined in fumarate section.
Overall bioavailability = 20.5% women, 10-13% children.
They were all non-anemic thought there were more iron deficient in the women group compared to the children which is probably the reason for the difference in bioavailability. Taken with a sweetened maize-milk drink, so contained inhibitors. Used hemoglobin incorporation method

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Iron absorption (%) by non-anemic women, infants and young children from a sweetened maize-milk drink fortified with ferrous sulfate or ferrous fumarate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Fractional iron absorption (%)</td>
</tr>
<tr>
<td></td>
<td>$^{57}$Fe fumarate</td>
</tr>
<tr>
<td>Infants (n=18)</td>
<td>7.0 (3.9, 12.8)</td>
</tr>
<tr>
<td>Children (n=20)</td>
<td>6.3 (2.8, 14.1)</td>
</tr>
<tr>
<td>Women (n=18)</td>
<td>17.5 (8.8, 34.9)</td>
</tr>
</tbody>
</table>

$^a$Values are given as geometric mean (−1 s.d., +1 s.d.).

$^b$RBV = relative bioavailability ($(absorption$ ferrous fumarate/absorption ferrous sulfate) x 100).
(Lönnerdal et al. 2006) – study mentioned in ferritin section document
Shows bioavailability when compared against the subjects ferritin levels. So low ferritin (anemic) = higher bioavailability. Taken with a meal that included inhibitors. Small amount of iron (2.5mg).

3. Side effects
(Melamed et al. 2007) – study outlined in FeBS section document
unknown dose so take with caution

taken from table: % with any side effects
Ferrous fumarate - 56%
Ferrous sulfate immediate release- 53%
Ferrous sulfate slow release - 43%
Ferrous bisglycinate - 21%

(Fochi, Ciampini, and Ceccarelli 1985)
This study doesn’t say much about side effects, but he does reference these results from (Kerr and Davidson 1958). Shows the huge variation in patients that had an intolerance to sulphate.
4. Enhancers/inhibitors

More in the enhancer/inhibitor section

(Fidler 2003) study outlined in fumarate section document

“Ascorbic acid and Na2EDTA have repeatedly been shown to enhance iron absorption from ferrous sulphate “

(Hurrell et al. 2004)

“Numerous scientific studies report two- to three-fold increases in iron absorption associated with ascorbic acid use “

5. References used in this section


