

## FOOD IRON ABSORPTION IN PATIENTS WITH DERMATITIS HERPETIFORMIS

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**Abstract.** Food iron absorption from a standardized composite meal was measured in 23 patients with dermatitis herpetiformis (DH). Seven (30%) showed iron deficiency, defined as absence or only traces of bone marrow haemosiderin, and 5 of these showed anaemia. The mean absorption ratio (food iron/reference dose) was significantly reduced in the patients with DH, compared with a group of control subjects. The iron absorption ratio was especially low in the 7 patients with iron deficiency, which further supports the presence of a malabsorption of food iron in patients with DH.

**Key words:** Iron absorption; Dermatitis herpetiformis; Haemosiderin; Meals

Anaemia is common in patients with dermatitis herpetiformis (DH). Several pathomechanisms are possible, e.g. hemolysis caused by dapsone treatment or malabsorption caused by the gluten-sensitive enteropathy associated with DH.

Iron is principally absorbed in the proximal part of the gastrointestinal tract which also is the main location of the intestinal lesions in DH (8, 14). It is therefore conceivable that malabsorption of iron may occur. Iron deficiency occurs in 10-20% of DH patients (9). We have earlier reported a normal absorption of inorganic iron in patients with DH (9). That iron was administered as a solution and given under optimal conditions and we have therefore now studied the food iron absorption from a composite meal.

### MATERIAL

#### Patients

Twenty-three patients with DH were studied; 11 of these were men and 12 were women. The mean age was 43 years (range 16-67) and the mean duration of skin disease 10 years (1-37). Six of the women were still menstruating. The diagnostic criteria for DH were a typical clinical and histological picture and the occurrence of granular IgA deposits in dermal papillae of normal skin.

Five patients had achlorhydria according to the penta-gastrin test of gastric secretion. Eight patients had had a gluten-free diet for more than 3 months at the time of investigation. Seventeen were being treated with dapsone.

#### Control subjects

Fifty-nine volunteers (aged 19-60 years), consisting of 8 male blood donors, 7 male non-blood donors, 12 female non-blood donors and 32 preoperative male ulcer patients, were included in the study as a control group.

None of the subjects participating in this investigation had had any bleeding or blood letting during the last month preceding the investigation. Furthermore none had had any iron therapy during the last 2 weeks.

### METHODS

Food iron absorption was measured from a standardized composite meal consisting of hamburgers (110 g), haricots verts (60 g) and mashed potatoes (150 g). The composition of the meal is described elsewhere (11). Radio-iron (1-2  $\mu$ Ci <sup>59</sup>Fe) was added dropwise to the three foods. The meal was served with 150 ml water.

Iron absorption from an inorganic iron salt (reference dose) was measured from a solution of 10 ml 0.01 M hydrochloric acid containing 3.0 mg of iron as ferrous sulphate and 30 mg of ascorbic acid. The iron solution contained 2  $\mu$ Ci <sup>55</sup>Fe and was served in 10-ml vials.

The meal or the reference dose was consumed after an overnight fast on alternate days for 4 consecutive days. Two weeks later the non-haem food iron absorption (<sup>59</sup>Fe) was measured in a whole-body counter (13). The relative absorption of <sup>55</sup>Fe and <sup>59</sup>Fe was calculated from the radioactivity levels in the food or drink consumed and in the blood drawn 2 weeks later. The total absorption of <sup>55</sup>Fe was calculated from the relative absorption of <sup>55</sup>Fe and <sup>59</sup>Fe and the total absorption of <sup>59</sup>Fe measured in the whole-body counter. These methods are described elsewhere (11).

Haemoglobin was determined using the cyanmethaemoglobin method. Serum iron determinations were made by the ICSH Panel technique (6) and unsaturated iron binding capacity *ad modum* Herbert et al. (5). The bone marrow smears were stained according to Hansen & Weinfeld (4) and the grading of bone marrow haemosiderin was made according to Lundin et al. (10).

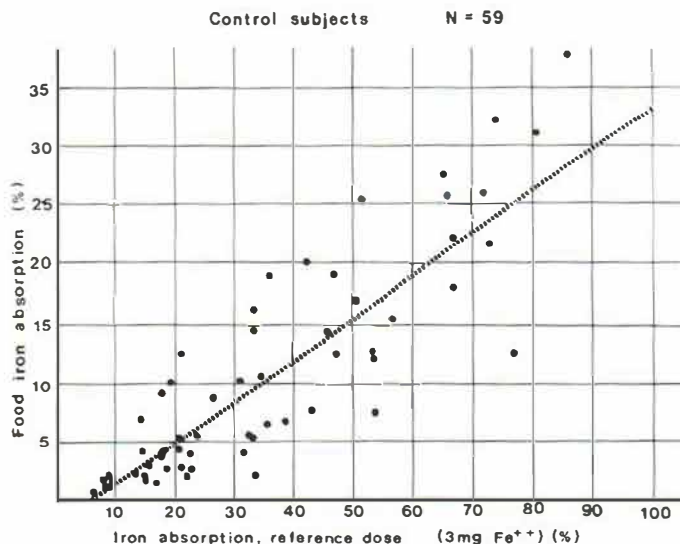


Fig. 1. The relationship between the absorption of non-haem iron in a composite meal and ferrous iron (3.0 mg  $\text{Fe}^{++}$ ) in 59 control subjects.

## RESULTS

### Haemoglobin

Three of the 11 men had haemoglobin concentrations below 13.0 g/100 ml and 5 of the 12 women had values equal to or below 12.0 g/100 ml. Seven of the anaemic patients were treated with dapsone. All had normal serum vitamin B 12 and folate values.

### Serum iron and TIBC

The mean serum iron concentration for the males was 17.5 and for the females, 18.4  $\mu\text{mol/l}$ . The mean transferrin saturation (serum iron/TIBC ratio) was 30% for the males and 29% for the females.

### Haemosiderin in bone marrow smears

Three subjects lacked and 4 showed only traces of haemosiderin (2 men and 5 women, 2 of whom had passed the menopause). Five of these subjects had anaemia. Achlorhydria was present in 2 and hypochlorhydria in one. Four had been on a gluten-free diet for more than 3 months.

### Iron absorption

The mean iron absorption data from all tests performed are presented in Figs. 1, 2, and Table I. The mean absorption ratio (food iron/reference dose) in patients with DH was 0.17 and in the controls, 0.28. This difference is statistically significant ( $p < 0.01$ , Wilcoxon rank sign test).

## DISCUSSION

A transferrin saturation value below 16% is often used as an indicator of iron deficiency (1). During dapsone treatment, the drug-induced haemolysis may, however, increase the serum iron value and under these circumstances the validity of transferrin saturation is uncertain. An evaluation of the bone marrow haemosiderin content is therefore valuable in the diagnosis of iron deficiency in patients with DH. In the present study, 30% of the patients showed no or only traces of haemosiderin in the bone marrow smears, thus indicating iron deficiency.

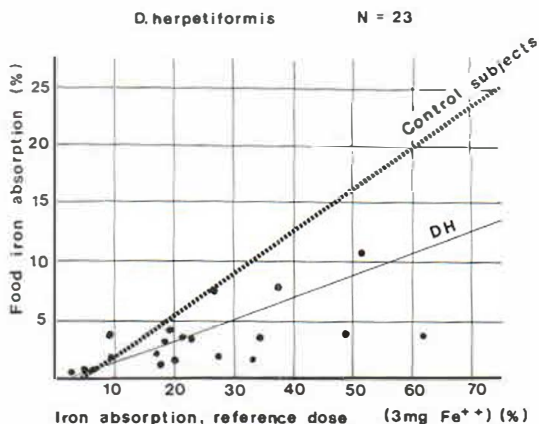


Fig. 2. The relationship between the absorption of non-haem iron in a composite meal and ferrous iron (3.0 mg  $\text{Fe}^{++}$ ) in 23 patients with dermatitis herpetiformis.

Table 1. Iron absorption values in 23 patients with dermatitis herpetiformis (DH) and in 59 controls (Mean  $\pm$  SEM)

	Food iron abs. (%)	Ref. dose abs. (%) (3 mg Fe <sup>++</sup> )	Ratio (Food Iron/3 mg Fe <sup>++</sup> )
Controls (n=59)	10.9 $\pm$ 1.2	36.4 $\pm$ 2.9	0.28 $\pm$ 0.02
DH (n=23)	5.0 $\pm$ 1.4	28.8 $\pm$ 3.8	0.17 $\pm$ 0.02
DH+iron deficiency (n=7)	3.8 $\pm$ 1.0	41.7 $\pm$ 7.2	0.09 $\pm$ 0.01

Most patients with DH have an associated gluten-sensitive enteropathy (8) which may cause malabsorption and develop iron deficiency, as in patients with non-tropical sprue (3).

The main problem in iron absorption studies is the great variation in absorption between different subjects caused by differences in the iron status of the subjects studied. The absorption is markedly increased in iron-deficient individuals. To be able to reveal a malabsorption of iron it is necessary to have a good expression of the individual iron status and iron requirement at the time of investigation. The absorption of iron from 3 mg doses of inorganic iron (reference dose) has been used as this basis for comparison of the food iron absorption in healthy individuals (12). Thus the ratio between the reference dose and food iron absorption has been used in comparative studies of the food iron absorption. We have earlier studied the inorganic iron absorption from such a reference dose (9) and found a normal absorption even in patients with DH. Thus this model using the ratio (ref/food iron) should be applicable even in patients with DH to reveal a malabsorption from the food iron in these patients.

This study shows a significantly reduced ratio (0.17) in DH-patients compared with the ratio (0.28) in the control subjects, which means that a malabsorption of food iron in these DH-patients is plausible. This explanation is strengthened by the finding in the 7 of our DH patients who had already developed an iron deficiency defined as absence or only traces of haemosiderin in the bone marrow smears. Their mean reference dose absorption was 41.7 $\pm$ 7.2%. This increased absorption from 3.0 mg ferrous iron supports the diagnosis of iron deficiency (12). Their food iron absorption and ratio value were only 3.8 $\pm$ 1.0% and 0.09 $\pm$ 0.01 respectively (Table I). These results strongly support our contention that patients with DH have a malabsorption of food iron.

A reduced secretion of gastric acid may affect food iron absorption unfavourably (2, 7). In this study 5 patients with achlorhydria had a low absorption ratio. The number of patients is, however, too few for any conclusions to be drawn.

The 8 patients on a gluten-free diet had a ratio intermediate between the control subjects and the patients on a standard diet. This might indicate that a restoration of the intestinal mucosa would tend to normalize the absorption of iron. This is currently being studied in a larger series of patients.

In conclusion, iron deficiency is not uncommon in patients with DH. This may be explained by a malabsorption of food iron. Whether or not iron deficiency will develop in DH-patients depends on several factors, such as the extent of intestinal lesions, any bleeding, and the daily iron intake.

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