

DRUG INFORMATION CENTER**PHARMA INFO-LINE*****Does drinking tea affects the absorption of iron in food?***

Iron has several vital functions in the body. The major role of iron is the formation of blood haemoglobin and muscle myoglobin which carry oxygen to tissues. In addition, it is a component of many enzymes and is required for a number of metabolic processes. Deficiency in dietary iron is the most common nutritional deficiency in the world and can ultimately result in anaemia ⁽¹⁾.

Food contains iron in two forms:

- *Heme iron* which is present in red meat, fish and poultry. This form of iron is highly bioavailable (15-35% absorption), and its absorption is independent of other factors present in food.
- *Non-heme iron*: is present in fruits, vegetables, cereals and dairy products. It is absorbed to a lesser extent (2-4%) than the heme form and its absorption is markedly affected by other factors ⁽²⁾.

Factors that inhibit iron absorption include: decreased gastric acidity, *H. pylori* infection, tannins (tea) ⁽³⁾, polyphenols (coffee, herbal teas and cocoa containing beverages that is taken within one hour of the meals) ⁽⁴⁾ phytates (legumes, grains, rice) ⁽⁵⁾ and calcium and phosphate (antacids and calcium tablets) ⁽⁶⁾.

Factors that enhance iron absorption are presence of: meat, citrus juices, vitamin C (e.g. from broccoli, strawberries, tomato, spinach, and citrus fruit), and EDTA for fortification of foods ⁽⁸⁾.

Tea drinking mainly influences the absorption of non-haem iron as haem iron is relatively unaffected by tea.

The inhibitory effect of drinking tea on iron absorption was first identified in a study that used test meals fed under experimental conditions ⁽⁹⁾. Since this time further studies have examined this effect ^(10, 11, 12, 13, 14). These studies concluded that tea has an inhibiting effect on iron absorption, however it has been proposed that findings from experiments using human or animal models based on test meals fed under experimental conditions may not reflect the role of tea when consumed as part of a complex, real diet ^(15,16).

Despite tea's inhibitory affect on non-haem iron absorption, it does not necessarily mean that high tea consumption is associated with an unfavourable iron status at the population level ⁽¹⁷⁾.



In an attempt to draw a conclusion about the effect of tea on iron status, a wide variety of studies with different designs, from different countries, and carried out in different age and gender groups, have been conducted. Results from these studies are conflicting; some have found a higher risk of anaemia amongst tea drinkers compared to non tea drinkers, while others have shown no such association both in children and adults ⁽¹⁸⁾.

Of the 16 studies reviewed, six included infants and children, six premenopausal women, two men and two the elderly.

In study groups with high prevalence of iron deficiency, tea consumption was inversely associated with serum ferritin and/or hemoglobin.

The association disappeared when adjusting for confounding (dietary) factors, except for one study including 40% of iron deficient women.

In groups with low prevalence of iron deficiency, tea consumption was not inversely associated with serum ferritin and/or hemoglobin. In those at risk for iron overload, such as middle-aged men, tea consumption may lower serum ferritin concentrations as reported in one study. This finding awaits further confirmation.

CONCLUSION:

This overview shows that tea consumption does not influence iron status in Western populations in which most people have adequate iron stores as determined by serum ferritin concentrations. Only in populations of individuals with marginal iron status does there seem to be a negative association between tea consumption and iron status ⁽¹⁹⁾.

In other study the following practical advice takes into account the current available evidence:

1. In the context of a normal British diet consumed by apparently healthy people with no risk of iron deficiency, there is no need to restrict tea drinking.
2. People with poor iron status should avoid drinking tea with meals as it is likely to inhibit nonhaem iron absorption. By allowing at least 1 h to elapse between the end of the meal and the consumption of tea, any adverse effects of tea on iron absorption are likely to be minimized. This restriction should apply to people at all ages that are in the following at-risk groups (children under 6 years of age, adolescent girls, and women aged 18–49 years and women aged 75 years and over) and those who are known to have poor iron status.
3. Although not proven, it is likely that the adverse effects of tea on iron status are associated with its consumption at mealtimes. Moderate tea drinking at other times of the day is unlikely to have an adverse effect on iron status. Moreover, the inhibiting effects of tea on iron absorption can be partially overcome by the concurrent consumption of animal tissues and vitamin C ⁽²⁰⁾.

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Fax / Phone: 02/38377643

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