

THE EFFECT OF PHYTATE AND FIBRE FROM CEREAL GRAIN FOODS ON MINERAL AVAILABILITY IN HUMANS - A LITERATURE REVIEW

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The mineral-binding action of high extraction wheat flour has formerly been attributed to its high phytate content. Recent studies suggest that this effect may also be due to its high fibre level. Unprocessed bran, which is currently recommended as a rich source of fibre, is high in phytate (myo-inositol 1,2,3,4,5,6-hexakis (dihydrogen phosphate)). Bran increased faecal excretion of sodium, potassium, magnesium and calcium (Eastwood *et al.* 1976); cellulose has been shown to interfere with zinc absorption.

Totally dephytinised wholemeal bread and bran showed unchanged ability to bind minerals. Balance studies reveal highly significant correlations between wheat fibre intake and mineral excretion in faeces; zinc deficiencies in Iran and rickets in Asian migrants may thus be due to high fibre intakes from unleavened wholemeal breads (Reinhold *et al.* 1976).

Phytase activity has been demonstrated in human intestine but is inhibited by high phytate concentrations (Ranhotra 1972). Naturally-occurring phytates exert a different effect from purified sodium phytate, which complexes most calcium and iron. Calcium, zinc, iron and phytate mutually interact. A high calcium intake may protect against iron and zinc losses (Anon 1967). Zinc appears most readily affected by phytate-calcium synergism and may be the first limiting nutrient. (Oberleas 1973).

Fermentation in breadmaking and processing during bran breakfast cereal manufacture decrease the phytate content. Changes in particle size, however, affect the water-binding capacity of cereal fibre and reduce its effectiveness.

Recommendations

- (i) Until conclusive evidence is available on the optimum intake of fibre and phytate, the benefit of consuming large amounts of cereal fibre must be weighed against the lowered mineral availability. An increased calcium intake should be recommended for rapidly-growing children, vegans, those with milk intolerance and the elderly (in view of increasing geriatric osteoporosis).
- (ii) Bran-based cereals and yeast-leavened wholemeal products are recommended as a source of fibre, rather than unprocessed bran.

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