

Phytate, iron, zinc and calcium contents and their molar ratios in selected raw and prepared food commonly consumed in Malaysia

ABSTRACT

Bioavailability is the ability of the body to digest and absorb the mineral in the food consumed. There are several factors that can influence the bioavailability of the food such as oxalate, phytate, acidity of intestinal environment, fibre and also competition with other minerals. The objective of this study is to estimate the inhibitory effect of phytate on the bioavailability of iron, zinc and calcium by measuring their molar ratios. A total of 30 food samples consisting of 12 rice and rice products, 5 wheat and wheat products, 5 grains and cereal based products and 7 different popular varieties of cooked rice and rice products and 1 cooked wheat and wheat products were selected. The samples were purchased from three different supermarkets and shops in Serdang, Selangor. The phytate content in food was analysed using the anion-exchange chromatography followed by spectrophotometry whereas iron, zinc and calcium contents were analysed using atomic absorption spectrophotometry. One-way ANOVA test was used to statistically analyse the mean difference between the phytate and mineral contents and their molar ratios between the food samples. The lowest phytate content in food sample is chicken rice (0.210 ± 0.073 mg/100 g) whereas Quaker Oats has the highest phytate content (19.746 ± 0.985 mg/100 g). The food sample that has the highest content of iron is Quaker Oats (3.567 ± 0.120 mg/100 g) and the lowest is chicken rice (0.123 ± 0.003 mg/100 g). For zinc content, the food sample that has the highest values is Quaker Oats (2.940 ± 0.049 mg/100g) and the lowest is fried kueh-teow (0.126 ± 0.002 mg/100g). The food sample that has the highest calcium content is Cookie Crisps (203.616 ± 16.680 mg/100g) whereas the lowest is kueh-teow (0.262 ± 0.007 mg/100g). Generally results show that the cooked products mostly have lower content of phytate and minerals as compared to the raw products. This could be due to the cooking method that could have influenced the phytate and minerals content in the food. Of the 30 food samples, 24 foods have a phytate/iron ratio > 1.00 , 2 foods had phytate/zinc ratio > 15 and 22 foods had phytate/calcium ratio > 0.24 . This results show that although many foods analysed have high mineral content, they also contain high phytate that may impair the bioavailability of minerals in the body.