

The Effect of Food-To-Food Fortification with Baobab Fruit Pulp on Iron Bioaccessibility of Conventionally Cooked Maize Porridges

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Abstract

Introduction: Iron is an essential mineral that plays vital role in the human body. Despite the fact that there are many intervention programmes, iron deficiency anaemia remains a concern especially in developing countries. This is due to over reliance on cereal-based diets that are generally low in iron and their content of iron bioavailability inhibitors such as phytate and polyphenols. Baobab is rich in iron bioaccessibility enhancers; thus, it can be combined with maize in food-to-food fortification efforts to achieve enhanced mineral nutritional quality.

Methodology: Conventionally cooked maize meal porridges fortified with baobab fruit pulp or with commercial ferrous sulphate (FeSO₄) and organic acids (citric and ascorbic acids) were prepared. In vitro mineral dialysability was used to determine iron bioaccessibility of the cooked porridge.

Results and discussion: The baobab fruit pulp had high levels of citric acid and ascorbic acid. All porridges fortified with baobab fruit pulp and the organic acids had higher amount (by up to 345%) and percentage (by up to 68%) of bioaccessible iron than the unfortified porridge. Maize-baobab formulation showed the highest increase in the percentage of bioaccessible iron (68%) as compared to maize meal fortified with citric acid (28%) and ascorbic acid (11%). These results clearly indicate the ability of organic acids to enhance bioaccessibility of iron by forming soluble chelates with the iron. The apparent higher iron bioaccessibility observed with citric acid fortification compared with ascorbic acid may be related to potential steric effects of the ascorbic acid chelate due to the presence of a ring structure which may hinder release of the iron. The baobab-fortified maize porridge would contribute 43.5% of the iron recommended nutrient intake (RNI) for women in reproductive age at 5% iron bioavailability, which indicates the potential of baobab fruit pulp to be used in food-to-food fortification.

Conclusions: Baobab fruit pulp showed positive enhancing effect on iron bioaccessibility as compared to the organic acids on their own. Fortification with baobab also contributes significantly to the RNI for women of reproductive age, indicating its potential to be used in food-to-food fortification to address iron deficiency in sub-Saharan Africa.