A-20: Bioavailability of dietary zinc and its relationship to phytate, tannin and calcium concentrations

W R Wimalasiri[1], P A J Perera[2]
([1]*Div of Oral Biochemistry, Faculty of Dental Sciences,*
[2]*Dept of Biochemistry, Faculty of Medicine, Univ of Peradeniya*)

Zinc is a micro nutrient essential for growth and reproduction. Its deficiency is known to result in disorders such as sexual infantilism in teenagers, idiopathic hypogeusia and impaired wound healing. Information available on trace elements of local foods, refer to the total content and not to their bioavailability. It has been reported that phytate, tannin, calcium, certain hemicelluloses and amino acid-carbohydrate complexes could interfere with zinc absorption and reduce their bioavailability.

To study the bioavailability of zinc, an *in vitro* method was used. This was an alternative method to the conventional animal model experiment, which is laborious, time consuming and expensive.

A 2-stage enzymatic digestion was used in the same order as the events occurring in the stomach and duodenum. The food material was first

subjected to digestion with pepsin followed by pancreatin. A closed dialysis tube was used during the digestion so that diffusible material could diffuse into the dialysis tube. Trace elements present in the dialysate were measured using atomic absorption spectrometry.

Food items analysed comprised of leafy vegetables: agathi, amaranthus, beet leaves, black nightshade, Brussels sprouts, cabbage (2 species), drumstick leaves, gotukola (big var.), kankun, leeks, manioc leaves, mukunuwenna, onion leaves, passion fruit leaves, sarana, spinach (bush and creeper), val-kohila and yellow pumpkin leaves, fruit vegetables: brinjal, okra, root vegetables; beet, carrot, and vegetable flowers: plantain flower.

Vegetables with high Zn bioavailability included gotukola (72%), drumstick leaves (65%), carrot (49%), agathi (45%) and leeks (42%). Others had low bioavailable Zn ranging from 40 to 8%. Vegetable with high content of total Zn included mukunuwenna (5.4 mg). amaranthus (4.4 mg), gotukola (3.5 mg), beet leaves and manioc leaves (2.9 mg), spinach (bush 2.2 mg), val-kohila (2.7 mg) and yellow pumpkin leaves (2.1 mg). The bioavailability of these vegetables with high content of Zn was less than 25%, except for gotukola. The phytate, tannin and calcium content of the vegetables with high Zn bioavailability was relatively low compared to those with low Zn bioavailability.

Support from NARESA (grant RG/92/M/6) and technical assistance from D.V. Chaminda Niroshana, are acknowledged.