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Bioavailability of trace elements in vitamin supplements

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In this work, the bioacessibility of Ca, Cu, Fe, Mg, Mn and Zn of vitamin supplements samples obtained commercially was evaluated. Bioacessibility was estimated by measuring the soluble or dialyzable mineral fraction resulting from in vitro gastrointestinal digestion of the vitamin supplements. The total and dialyzable inorganic elements were determined by inductively coupled plasma optical emission spectrometry (ICP OES) with radially and axially viewed configuration. The samples were decomposed before the determination of total elements using microwave radiation. For decomposition, 3 mL 65 % w w^{-1} HNO_3 plus 1 mL 30 % w v^{-1} H_2O_2 were added to approximately 200 mg of macerated sample, this mixture was submitted to microwave radiation in a closed system. For dialysis, 100 mL of 0.01 mol L^{-1} HCl was added to one macerated vitamin supplement pill. The pH of this mixture was adjusted to 2.0 with 2 mol L^{-1} HCl. To carry out pepsin-HCl digestion, 3.2 mL of pepsin was increased. The resultant solution was then incubated for 2 hours at 37° C in a shaking water bath. A dialysis bag containing 25 mL of water and an amount of $NaHCO_3$ equivalent to the titrable acidity was placed in the flasks, together with 20 g aliquots of the pepsin digest. Incubation was continued for 45 min, 5 g of pancreatic-bile salt mixture was added, and incubation was continued up to 2 h. The liquid retained in the dialysis bag was analysed by ICP OES. Among the two vitamin supplements samples analyzed, the sample 1 did not present absorption of microelements (Cu, Fe, Mn and Zn) in gastrointestinal simulate. This could be happened owing that elements are present in the samples as oxides. In sample 1, only calcium and magnesium were detected, and their percentages were 1.39 and 3.62, respectively. For sample 2, the percentages of absorption for each of the minerals were: Ca (1.1%), Cu (8.2%), Fe (2.3%), Mg (7.5%), Mn (1.4%) and Zn (4.1%). This results show the low level of bioacessibility of minerals contained in the vitamin supplements studied and that some elements could not be absorbed because its chemical form.