Total and Available Minerals as Influenced by Antinutritional Factors of Some Vegetables

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Abstract: Fifteen species of vegetables were analyzed for moisture, ash, antinutritional factors (phytate, oxalate and polyphenols) contents and total and available minerals. Moisture content ranged from 64.4% to 94.9%, while ash content ranged from 3.3% to 21.8%. Some vegetables contained no oxalate, while others such as purslane contained high amounts. Phytate and polyphenols ranged from 150.6 to 1115.4 mg/100 g and from 34 to 1296 mg/100 g, respectively. For all vegetables, major minerals content was 19.5-2383.3 mg/100g, while trace ones ranged from 0.1 to 58.8 mg/100g. In vitro availability of major minerals (percent of total for each mineral) varied from 1.2% to 90.7%, while it ranged from 0.87% to 78.10% for minor ones.

INTRODUCTION

The nutritional impact of anti-nutrients such as phytic acid, oxalic acid and polyphenols has mainly been recognized in connection with mineral and protein utilization. Thus, phytic acid reduces the availability of minerals by forming unavailable complexes (Harland and Oberleas 1987). The nutritional quality of a vegetable is dictated mainly by its chemical composition and the presence of antinutritional factors, such as phytic acid, oxalic acid and polyphenols. Phytic acid and/or phytate is a principal storage form of phosphate, ubiquitously distributed in plants. The effect of such antinutritional factors in human and animal nutrition is related to their interaction with proteins, vitamins and several minerals and thereby restricting their bio-availability.

In addition to their importance in providing the body with basic carbohydrates and proteins, vegetables contain vitamins and minerals, which are deficient in other food materials (Pushpanjali and Khokhar 2002). Since such minerals and vitamins are not synthesized in the human body, they should be taken daily (Onate et al. 1990).

The nutritional impact of antinutritional factors, such as phytate, should be of great importance from the nutritional point of view. It has been reported that phytate greatly influence the availability of minerals by binding divalent cation, and the magnitude of the effect depends on the amount of phytate (Reddy and Salunkhe 1981).

Phytate was also found to be a strong agent and can bind with dietary essential minerals such as Ca, Zn, and Mg to form complexes with them, hindering the availability of such minerals especially at neutral pH (Khetrapaul and Chauhan 1990). Polyphenol is also responsible for reduction of minerals availability.