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Short Communication

Mineral nutrients of 'pazhaya sadham': A traditional fermented food of Tamil Nadu, India

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Traditionally, in Tamil Nadu, the fermented rice is a desirable staple food. It is prepared by overnight soaking of cooked parboiled rice in water. The main complementary role of fermentation is the bioenhancing or bioavailability of essential nutrients especially minerals through the enzymatic reduction of Phytate. In the present study, essential trace elements such as Calcium, Magnesium, Iron, Sodium, Potassium and Selnium were determined by using Inductively coupled plasma optical emission spectrometry (ICP-OES) method. The minerals such as Calcium (9.23 mg/100 g) and Sodium (17.18 mg/100 g) are rich in the sample Source 2. The determination of the presence of selenium (0.2 to 0.3 mg/100 g) in this fermented rice can be explained as a preventive mechanism to cancer as natural source of mineral availability.

Key words: Traditional food, phytic acid, cancer.

INTRODUCTION

Fermentation is one of the oldest and most economical methods of producing and preserving food (Billings, 1998; Chavan and Kadam, 1989). Cereal grains are considered to be one of the most important sources of dietary proteins, carbohydrates, vitamins, minerals and fibre for people all over the world. However the nutritional quality of cereals and the sensorial properties of their products are sometimes inferior or poor in comparision with milk and milk products. The reasons behind this are the lower protein content, the deficiency of certain essential amino acids (Lysine), the low starch availability, the presence of determined antinutrients phytic acid, tannins and poly phenols and the coarse nature of the grains (Chavan and Kadam, 1989).

Natural fermentation of cereals leads to a decrease in the levels of Carbohydrate as well as some non-digestible poly and oligosaccharides. Certain amino acids may be synthesized and the availability of B group vitamins may be improved. Fermentation also provides optimum pH conditions for enzymatic degradation of phytate which is present in cereals in the form of complexes with polyvalent cations such as iron, zinc, calcium, magnesium and proteins. Such a reduction in phytate may increase the amount of soluble iron, zinc and calcium several folds (Haard et al., 1999; Khetar and Chauhan, 1990; Nout and Motarjemi, 1997).

The bioavailability of minerals from foods is defined as the proportion of the minerals that can be absorbed and utilized within the body (Larsson et al., 1997; Lestienne et al., 2005a, b, c). Solubility of minerals, pH of intestinal lumen, dietary factors and residence time at the absorption site influences the bioavailability of minerals (Larsson et al., 1997). The study was carried out to investigate the mineral content of the fermented rice from two different house hold preparations by using ICP-OES method.

MATERIALS AND METHODS

The samples were collected from local houses in the District Thanjavur, Tamil Nadu. The traditional method of preparation in household is presented in Figure 1.

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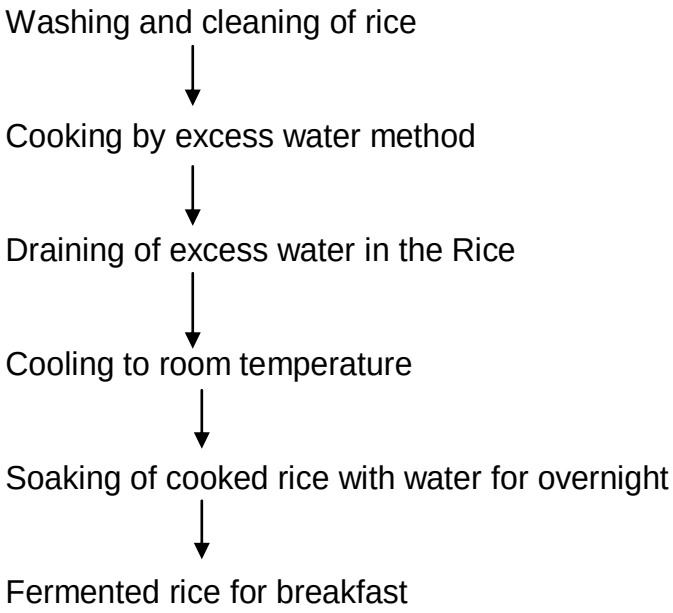

Figure 1. The traditional method of preparation.

Table 1. Instrumental conditions of ICP-OES.

Parameter	Setting
RF power	1100 W
Nebulizer flow	0.950 L/min
Auxiliary flow	1.0 L/min
Plasma flow	15 L/min
Sample flow	1.0 mL/min
Source equilibration time	15 s
Viewing height	15 mm
Background correction	Manual selection of points
Measurement processing mode	Area
Auto integration	1 s minimum to 50 s maximum
Read delay	45 s
Rinse delay	45 s
Number of replicates	3

Table 2. Mineral analysis by ICP-OES in fermented rice.

S/No	Minerals	Source 1	Source 2
1	Calcium (mg/10 g)	8.2±0.21	9.23±0.27
2	Iron (mg/1 g)	0.20±0.03	0.24±0.04
3	Potassium (mg/10 g)	2.93±0.06	3.57±0.38
4	Magnesium (mg/100 g)	2.77±0.23	3.02±0.26
5	Sodium (mg/100 g)	13.63±0.40	17.18±0.50
6	Selenium (mg/100 g)	0.02±0.01	0.03±0.01

Values are given as mean ± Standard deviation of the *triplicate* samples.

Mineral analysis by ICP-OES method

The fermented rice was homogenized with mortar and pestle and 4 g of homogenized sample was ashed with muffle furnace at 550°C for 3 h and it was cooled for 30 min. After cooling, the ash was dissolved with 30 ml of HCl with distilled water (1:1) and kept in sand bath for 15 min to reduce the volume of the solution to 5 to 8 ml and the sample solution was filtered through a Whattman No. 1 filter paper and made up to 25 ml in standard flask. The mineral contents were determined by using ICP-OES method (Perkin Elmer DV-2000). The sample was digested in triplicate and analysed using the following conditions in ICP-OES (Table 1).

RESULTS AND DISCUSSION

The mineral analysis of fermented rice showed that it was rich in sodium, potassium and calcium (Table 2). It also contains iron and magnesium which is the essential elements of our living system. It also contains the trace element selenium in the amount of 0.02 to 0.03 mg/100 g. Selenium is an essential element for normal development, growth and metabolism because of its role in the regulation of thyroid hormones (Gladyshev, 2006). The study showed that source 2 has more amount of mineral content than source 1. The fermented rice could serve as a mineral rich breakfast and it contains essential minerals for the metabolic activities of our normal body functioning.

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