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Evaluation of Selected Mineral Elements In Some Selected Parboiled Rice Varieties From Sokoto, Nigeria

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Abstract

Different mineral elements present in rice play important roles in the biological system in morphology and proper functions. In the present investigation,the elemental contents of the imported rice was analyzed. The mineral contents of magnesium, calcium,zinc, iron, manganese and copper analyses of the imported parboiled rice types were determined. The lowest concentration was recorded by Cu (0.117 +0.02 and 0.124+0.01) in samples A and B respectively. The 2nd most lowest was Zn, with 0.228+0.01 and 0.202+0.01 in the two samples A, and B, respectively. Then, Mn with 0.539+0.1 and 0.579 +0.2 in samples A and B respectively. On the other hand, the highest concentration was recorded by Mg with 75.921+0.4 and 75.407+1.2. The 2nd most highest elemental content was that of Ca with 24.477+0.7 and 13. 731+0.4, in the samples A and B, respectively. The 3rd most highest element was the Fe, with 4.587+0.3,7.340+0.6 in the samples A and B respectively. There was diverse levels of Fe, Cu, Mn, Zn, Ca and Mg in the two studied rice types. The levels are very low compared to the Recommended Dietary Intake.

Key Words: Calcium; magnesium; copper; manganese; parboiled rice

Introduction:

Rice (*Oryza sativa* L.) Is among the most important cereals consumed by humans. It is considered as a queen of the cereals, because ofvitsvwide acceptability among the continents of the earth (Eshun *et al*.,2019). Almost greater than 50% of the people of the world fulfil their nutritional needs from rice or its products (Zubair*et al*., 2011; Eshun, 2019). Many studies revealing that rice is a source of diverse nutrients, such as gluten, starch, fiber, fatty acids, vitamins, and relations (Zubair *et al*., 2011).

In many developing countries, Nigeria inclusive, the supply of minerals is inadequate. Particularly, Sokoto is reported to have nurtion problems in different classes of the population due to the deficient soil,poverty,and other factors (Mohammed and Ahmad, 2014).

Elements in both free and unfree states are compositions of cells and tissues in the human body. They serve as building blocks and are required by catalysts to speed up several chemical reactions that are essential in biological life. Their indispensability lies in the sense that, they are participants in growth, development, metabolism,and adaptation. Invariably, physiological and anatomical roles of mineral elements are only played whenever there are optimum concentrations. Higher or lower levels are characterized with diverse disorders (Umar*et al*., 2017; Sarkingobir *et al*., 2020).

Generally, mineral elements, such as Fe, Cu, Mn, Zn, Ca and Mg, are indispensable to the human body as they play important roles. Insufficient intake of these mineral elements from food leads to the impairment of human health. Previous studies echoed that some mineral elements are abundant in the rice upper layer, but less so in the lower layer. Unfortunately, the form of rice most commonly globally consumed is milled rice, which endosperm with the aleurone layer and embryo removed. Milled rice is rich in starch but lacks adequate nutritional components.

Anatomical and physiological roles of mineral elements are only played whenever there are optimum concentrations. Higher or lower levels are characterized with diverse disorders (Umar *et al*., 2017; Sarkingobir *et al*., 2020). However, the source

of the essential mineral elements has always been from good we consumed. In Sokoto, a large portion of the inhabitants consumes parboiled rice, more especially the imported parboiled rice. The people in the urban areas, and the elite or wealthy individuals prefer imported parboiled rice as their favourite food. Elsewhere, studies to determine mineral elements in imported rice were carried out, but in Sokoto the data is very scarce. Therefore, in the present investigation, the elemental contents (Fe, Cu, Mn, Zn, Ca and Mg) of the two imported parboiled rice were analyzed.

Materials and Methods:

Samples:

Serial Number	Name	Location obtained	Label
1	Sargar	Sokoto Central Market	Sample A
2	Turkey	Sokoto Central Market	Same B

Table 1: Parboiled rice samples obtained from Sokoto, Nigeria

Sample and sample pretreatment:

The samples used in this study are rice (*Oryza sativa*) obtained from Sokoto Central Market, Sokoto state, Nigeria. Small amount of samples were crushed separately into smaller pieces using ceramic mortar and piston before digestion.

Wet digestion:

2g each of the prepared sample was weighed into 2 100cm^3 beaker. 5cm^3 of HNO3 and 2m^3 $HCLO_4$ was added and the beakers were covered with watch glass. The samples were digested in a fine cupboard, heating till the disappearance of brown colour of HNO_3 and a final volume of 3cm^3 to 5cm^3. 10cm^3 of distilled water was added and the digested solutions were filtered through filter paper into 50cm^3 volumetric flask, the solutions were diluted to 50cm^3 using deionized water.

Determination of Zinc (Zn), Iron (Fe), Calcium (Ca), Magnesium (Mg), Manganese (Mn), and Copper (Cu) by Atomic Absorption Spectroscopy (AAS)

Concentration of Zn, Fe, Mn, Ca, Mg, and Cu were determined from the 50cm^3 wet digested solution using AAS machine been all the elements metallic. A standard was used for calibrating the machine and a linear straight-line graph was plotted, the concentration of all the elements in the three samples were calculated from the linear graph.

Results:

Elements	Sample A (µg/g)	Sample B (µg/g)
Mn	0.539±0.1	0.579+0.2
Ca	24.48±0.7	13.731±0.4
Fe	4.583±0.3	7.340±0.6
Zn	0.228±0.01	0.202±0.01
Mg	75.921±0.4	75.407±1.2
Cu	0.117±0.02	0.124±0.01

Table 2: Results of selected elements in two parboiled rice types from Sokoto, Nigeria Key:

Sample A: Sargar Rice, Sample B: Turkey Rice

Discussion:

The results of the mineral contents of magnesium, calcium,zinc, iron, manganese and copper analyses of the imported parboiled rice types was shown in Table 1. The lowest concentration was recorded by Cu (0.117±0.02 and 0.124±0.01) in samples A and B respectively. It is lower than the studies by Mohammed and Amadu (2014), Herath (2019), Tegegne *et al*., (2020) and lower than the recommended daily intake (RDI). This low Cu content also complied with the finding of Sebastian and Vara Prasad (2015), that rice contain low elements compared to other grains. The 2nd lowest was Zn, with 0.228±0.01 and 0.202±0.01 in the two samples A, and B, respectively. Then, Mn with 0.539±0.1 and 0.579±0.2 in samples A and B respectively.

On the other hand, the highest concentration was recorded by Mg with 75.921 ±0.4 and 75.407±1.2. It is lower than the RTI (Muhammad *et al.*, 2020). Mohammed and Ahmed (2014) also reported higher concentration in rice,but comparatively higher than the results of this study. Similarly,this finding is lower than that of Zubair *et al.*, (2011) and Eshun *et al*., (2019). The 2nd most highest elemental content was that of Ca with 24.477±0.7 and 13. 731±0.4, in the samples A and B, respectively. It is lower than the RDI.Mohammed and Ahmad (2014), reported high Ca, which is higher than that of this study. Similarly, lower than Zubair *et al*., (2011) and Eshun *et al*., (2019). The 3rd most highest element was the Fe, with 4.587±0.3,7.340±0.6 in the samples A and B respectively. It is lower than the RDI. The comparatively higher levels of Mg, Ca, and Fe might be connected with their very important roles in the biological system. The biological systems require them in relatively higher concentrations (Sarkingobir *et al*., 2020).

Generally, based on past studies and reports, it was revealed that, rice contains low concentration of essential elements. This study complied with that trend, by showing that the analyzed imported parboiled rice contains low Ca, Mg, Fe, Cu, and Mn. It might be due to its genetic nature, and more especially the processing nature. Processing to firm white rice is achivef after removal of the shells of the rice to satisfy the consumers through polishing. Whereas, the removed shell contains considerably higher amount of nutrients (Lu *et al*., 2013; Sebastian *et al*., 2015; Umar *et al*., 2017; Herath *et al.*, 2019).

Conclusion:

There is diverse levels of Fe, Cu, Mn, Zn, Ca and Mg in the two studied rice types. The levels are very low compared to the Recommended Dietary Intake.

References:

1. Eshun.G, Amankwah.E. A, Barmah. J. (2019). Proximate composition, mineral nutrients and functional properties of Digang, NERICA-1, NERICA-2 rice varieties from Ghana. *Global Advanced Research Journal of Agricultural Science*, 8(6):207-213.
2. Herath.H.A.J, Chandrasekara.G.A.P, Pulenthiraj.U, Chandrasekara. C.M.N.R., Wijesinghe. D.G.N.G. (2019). Mineral contents of Sri Lankan Rice varieties as affected by inorganic fertilization. *Tropical Agriculture Research*,30(3):89-96.
3. Lu.L, Tian.S, Liao.H, Zhang J, Yang X etal. (2013). Analysis of metal elements distribution in rice (Oryza sativa L.) seeds and relocation during germination based on X-ray fluorescence imaging of Zn, Fe, K, Ca, and Mn. *PLoS ONE*,8(2):1-9.
4. Mohammed.MI., and Amadu U.M. (2014). Mineral elements content of some coarse grains used as staple food in Kano Metropolis,Nigeria. *Bayero Journal of Pure and Applied Sciences*,7(1):85-89.
5. Muhammad NB, Salihu S, Umar A.I. (2020). Comparative of different drying methods on the phytochemical and some nutrient components of Scent leaf (*Ocimum gratissum*). *Asian Journal of Biochemistry,Genetics and Molecular Biology*, 5(3):19-23.
6. Sarkingobir.Y, Dikko.M, Tukur.U, and Umar AI. (2020). Determination of some macroelements (sodium, potassium, calcium, magnesium, and phosphorus) in Sokoto Metropolis. *Journal of Science and Technology Research*, 2(1):162-166.
7. Sebastian.A. and Vara Prasad M.N. (2015). Trace elements management in rice. Agronomy,5:374-404.
8. Ok, A.O, Ubi.B.E, Efisu.A.A, Dambaa.N.(2012). Comparative analysis of the chemical nutrient composition of selected local and newly introduced rice varieties growth in Ebonyi state of Nigeria. *International Journal of Forestry*, 2(2): 16-23.
9. Tegegne, B. Belay A, Gashaw T. (2020). Nutritional potential and mineral profiling of selected rice variety in Ethiopia. *Chemistry International*,6(1):21-29.
10. Umar A., Umar. R.A, Wasagu.R.S.U, & Oche. M.O. (2017). Assessment of iodine levels of secondary schools' girls in Sokoto State, Nigeria. *International Journal of Food and Nutrition Science*, 2(2): 028-34.
11. Zubair.M, Anwar F, Ali S, and Labal T. (2012). Proximate composition and minerals profile of selected rice (*Oryza sativa L.*) varieties of Pakistan. *Asian Journal of Chemistry*, 24(1):417-421.