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Comparative analysis of some heavy metals in local and parboiled rice in Bauchi state, North Eastern, Nigeria

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Abstract
Comparative determination of some heavy metals (Cu, Zn, Cr, Pb & Mn) in local and parboiled rice, the present study aim at determining the comparison between some heavy metals in local and parboiled rice obtained from five samples at rice. the level of selected metals (Cu, Zn, Cr, Pb & Mn) were determined by atomic absorption spectrophotometry in the rice sample collected from various market located within Bauchi metropolis. The geometric mean concentration of Cu, Zn, Cr, Pb & Mn in rice sample were 0.302mg/l, 0.326mg/l, 0.074mg/lm, 0.214mg/l & 0.044 respectively, Cu & Zn content in parboiled rice were much higher than local rice sample examined in this work.

Keywords: heavy metals, parboiled rice, local rice

1. Introduction

The term heavy metals refers to any metallic chemical element that has a high density and is toxic or poisonous at low concentration example, zinc and lead, heavy metal are natural components of the earth's crust they cannot be degraded. To a small extent they enter our bodies via food, drinking water and air as trace element, some heavy metal e.g. copper and Zinc are essentials to maintain the metabolism of the human body. However at higher concentration they can lead to poisoning.

The scientific world has no widely accepted definition for heavy metals with a specific gravity that is at least 5 times the specific gravity of water. The specific gravity of war is 1 at 4c (39f). Simple stated specific gratuity is the measure of the density of given amount at a solid heavy metals has specific weight higher than 8 grams per cubic centimeter (g/cm) we are particularly interested in the following tonic metalloid element having specific gravities greater than 8 or more times than that of water, very few studies have investigate the heavy metal content sin rice sample from a typical E-waste recycling area the greater urgency to obtain more and more crop yield per capital has led to the excessive use of agro chemicals which not only supply the nutrients to the soils and adjust their PH but also protect the precious crops from various pest.

Rice is the second most prevalent cereal crop in the world. With an annual global production of approximately 600 million tons it is the staple food consumption per person of between 200 & 400g. Rice can be contaminated by toxic heavy metals present in water soil. Large amounts of these elements are responsible for acute or chronic poisoning resulting in damage or reduce mental and central nervous function; and damage to blood composition lungs kidneys liver and other vital organs long-term exposure may result in slowly progressing physical muscular, and neurological degenerative processes monitoring the presence of heavy metal in rice and its products therefore of particular importance on an essential, nutritional.

2. Methodology

2.1 Materials

i. Digestion flask
ii. 100ml volumetric flask
iii. 1 litre volumetric flask
iv. 25cm^3 pipette

2.2 Reagents

i. Concentrated hydrogen trioxonitrate (v) acid (HNO_3)
ii. Concentrated hydrocholoric acid (HCL)
iii. De-ionised water

2.3 Sample Collection
The sample were collected form four various markets that are located within Bauchi metropolis. Then the samples were first treated and clean with distilled water to remove all the necessary dirt from the sample. The samples were carried to the laboratory in a clean polythene bags for the preparation. The sample were grounded and store awaiting for digestion

2.4 Digestion Method
In digestion method 0.5g of rice sample that already ground were used, accurately weight and place into a khjedal digestion flask with 20cm^3 of HCL mixture HNO_3 were mixed together in a volume of 20cm^3, 50 cm^3 and 80cm^3 respectively, were added into the flask. The flask were placed in a digestion block inside a fume hood at the temperature of about 45^{0}c for 25 minutes, then the temperature increased to 50 ^{0}c for five minute to ensure the complete digestion. The flask were removed and about 30cm^3 of distilled water were added for seven minutes.

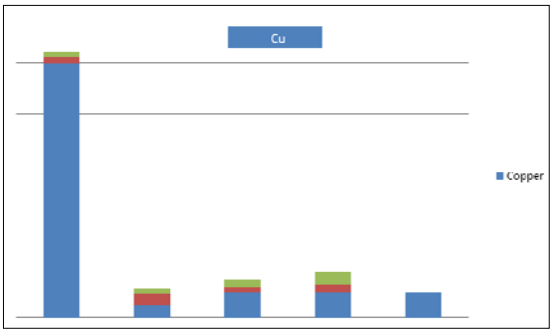
2.5 Sample Analysis Method
Atomic Absorption Spectrophotometer (AAS) is the process used to determine the concentration is the metallic element in the substance, such as zinc, copper, lead etc. in this process a flame system is generally used or employed to dissociate the element from their chemical bonding.
According to Wilson 1980 AAS is bared on beers law the amplifier gain is set to provide a signal corresponding to 100% transmittance when a blank solution is aspirate into the flame the corresponding absorbance is determine on the screen or by the formula.
A = log T
A = 200 – log (coT)
Absorbance is directly proportional to the concentration of the element in the sample at the fixed wavelength.
A= Absorbance
K = molar absorption coefficient
B = thickness of the medium through which absorption take place
C = concentration
T = transmittance

Warm recognized water were aspirated into the sample way capillary to remove the dirt's of any particle. Than the standard were aspirated into the instrument and absorbance will recorded. The sample solution were aspired one after the other into the instrument and their absorbance are recorded. The concentration of any element were determined and recorded.

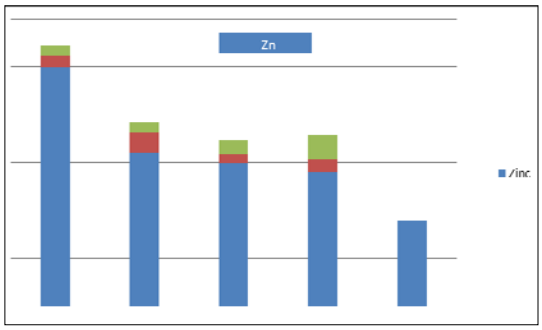
3. Results
In attempt to know whether highly consumed rice might contribute to metals exposure, copper, lead, manganese, chromium and zinc were analyzed in five (5) samples of rice commonly consumed within Bauchi metropolis by atomic absorption spectrometry (AAS) after acid digestion.
The mean concentration of metals in rice sample that has been detected is in table below:

S/N	Sample	Cu	Zn	Cr	Mn	Pb
1.	A	1.02mg/l	0.55mg/l	0.03mg/l	0.034mg/l	0.02mg/l
2.	B	0.09mg/l	0.30mg/l	0.05mg/l	0.15mg/l	0.03mg/l
3.	C	0.10mg/l	0.27mg/l	0.08mg/l	0.12mg/l	0.18mg/l
4.	D	0.10mg/l	0.33mg/l	0.09mg/l	0.28mg/l	ND
5.	E	0.10mg/l	0.18mg/l	0.12mg/l	0.18mg/l	ND

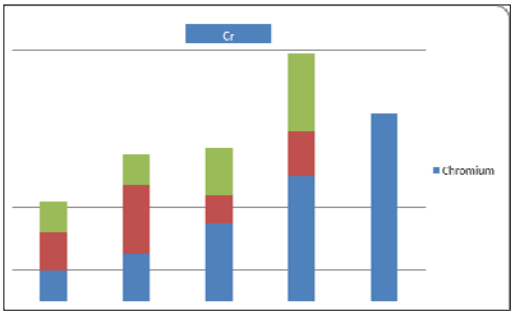
3.1 The graph concentration of the samples
The concentration of each metal were converted to whole number by multiplying each concentration by 10^2



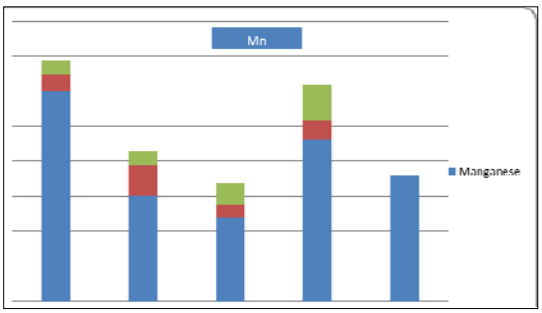
The scale of 20cm represent 1 unit Y axis



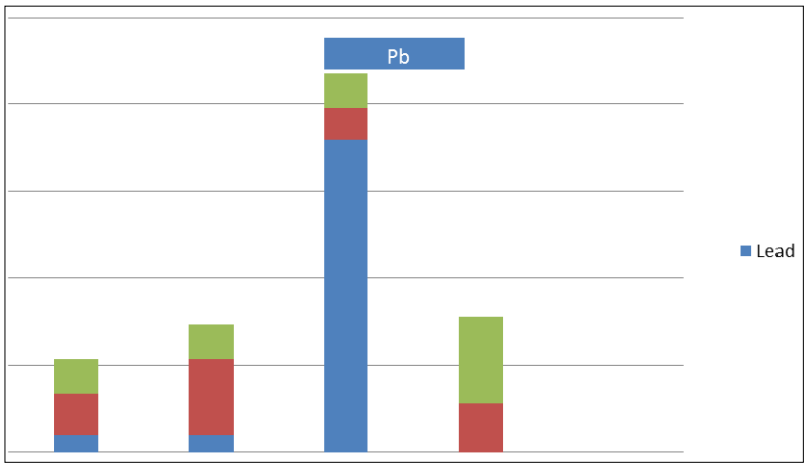
The scale of 10cm represent 1 unit Y axis



The scale of 2cm represent 1 unit Y axis



The scale of 5cm represent 1 unit Y axis



The scale of 10cm represent 1 unit Y axis

4. Discussion

Rice like other vegetable, fruit and grains is a translocator grown in water soaking up whatever is in the environment whether naturally occurring or due to pollution. There are areas throughout the world were industrials contaminating has affected the soil and everything that grow from it can be infected with heavy metals. In addition Cu, Zn and Mn content in parboiled rice were much higher than local rice sample examined in this work. Lead is known to be harmful to many organs and the central nervous system and is a particular risk for young children who suffer significant developmental problems if exposed to elevated lead level the human body contains approximately ten milligrams at manganese, most of which found in the liver, bones and kidneys.

4.1 Conclusion

Rice is grown in heavily irrigated conditions, it is more susceptible than other stable crops to environmental pollutants in the irrigation water. We eat rice from every corner of the world, but pollution conditions are different from region to region, agricultural activities are different from region to region but we ignore that the mean levels of Pb, Cu, Zn & Mn in local and parboiled rice commonly consumed within Bauchi metropolis were all below their maximum allowable concentration (MAC). The risk assessment in mean levels showed that health risk associated with these elements through consumption of rice were absent.

5. References

1. Ade Poju-Bello AA, Oguntibelu OO, Adebisi RA, Ikpalan Coker HAB. Evaluation of the Concentration of Toxic metals in cosmetics product in Nigeria, Fri. Journal Biotechno. 2012; 11(92):16360-16364.
2. Al-Saleh I, al-Enazis, Shinwarin. Asessement of Lead in Cosmetic Product, Regulatory toxical and Pharmacol, 2009; 54(2):105-115.
3. ATSDR. (Agency for Toxic substances and disease registry), 2007.
4. Canadian Environmental Defence, Heavy Metals Hazards, the health risk of hidden heavy metals in face make up, 2011. Available online form http//www.atsdr.cdc.gov.
5. CSC (The campaign for safe cosmetics) A poison kiss the problem of lead in lipsticks, 2007.
6. Cynthia L. Beauty quickie tip Glamour Magazine, 2002.
7. Nnorom C, Igwe J.C, Nnorom CGO African. A Journal Biotech 2005 (4) 1133 – 1138.
8. WHO, 2003 total dissolved solid drinking water Guidelines for Drinking Water Quality (WHO/SDE/WSH/03.04/16).