PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Pakistan Journal of Nutrition 8 (8): 1170-1171, 2009
ISSN: 1680-5194

Screening of *Achatina achatina* and *Pila ovata* for Trace Metals in Makurdi Metropolis

S.Y. Aboho, B.A. Anhwange and G.A. Ber
Department of Chemistry, Benue State University, P.M.B. 102119, Makurdi, Nigeria

Abstract: The viscera and shells of *Achatina achatina* and *Pila ovata* were analysed for the following trace metals; copper, cadmium, lead, iron, arsenic and zinc. The results indicate the mean concentrations (mg/g) of Cu, Pb, Fe and Zn for the viscera of *Achatina achatina* to be 0.31, 0.43, 0.50 and 0.47, respectively, while the values for the shell *Achatina achatina* were as follow; 0.08, 0.79, 0.74 and 1.81 for Cu, Pb, Fe and Zn, respectively. The viscera of *Pila ovata* had 0.14, 0.92, 0.78 and 0.72 as mean concentrations values in mg/g for Cu, Pb, Fe and Zn, respectively. The mean concentration values (mg/g) for Cu, Pb, Fe and Zn in *Pila ovata* shells were found to be 0.56, 0.92, 0.58 and 1.47, respectively. Cadmium and arsenic concentrations were not detected in both the viscera and shells of *Achatina achatina* and *Pila Ovata*. Generally, the concentrations of these trace metals in the samples were low but continuous bioaccumulation may lead to some health threat.

Key words: *Achatina achatina*, *Pila ovata*, trace metals, viscera and shell

INTRODUCTION

Snails belong to the class of animal kingdom called mollusk. They are found in water and on land. The common land snail *Achatina achatina* is found in agricultural areas, forests and riparian zones scrub/shrub lands, urban areas and wetlands. They are the largest snails in the world and are widely sought after due to their size, distinct markings and nutritional value. Moore (1996), reported that *Achatina achatina* have a three year breeding cycle, which is longer than other species. This couple with increasing deforestation and snail-picking for consumption had resulted to drastic reduction in their population in recent years. The specie is considered to be the most prizing snail for eating (Paul, 2008). *Achatinna achatina* just like any other type of snail feed on plants hence they are described as pest. Robert (2006), observed that land snail are considered to be one of the worst pests found in the tropics and subtropics.

Pila ovata, the most common species of water snail is usually found on the bottom, of streams, pounds, lakes, oceans, pet stones and people's aquaria. The shell is about 55-59 mm wide and 43-47 mm in height. The African species has a relatively high sphere and a round shell opening (aperture). The umbilicus is small, but deep and the lip somewhat thickened. It feeds on algae and decayed vegetation. It is believed to be a source of clearing agent for Aquarian, hence many people, who keep tropical fish also buy snail as cleaners for their aquarium irrespective of the waste products produced by the snails (Ajayi *et al*., 1978).

Snails constitute an important source of diet of most villagers especially the rural dwellers, in Africa and elsewhere in the world. Apart from serving as a source of protein, they are used for medicinal purposes especially, their shell in many parts of the world (Robert, 2006).

Achatina achatina and *Pila ovata* are common land and water snails found in many parts of Nigeria including Benue State. Snail habitat suggests that they are subject to environmental pollution especially, pollution by trace metals. Therefore since they form part of food chain of most population, their contamination by trace metals will eventually lead to some health implication to the vulnerable populations. According to Beady and Eaves (1983), snails can accumulate higher concentrations of metal ions than any other group of invertebrate. Furthermore, fresh water snail had been used as indicator for monitoring heavy metal pollution (Nuembang, 1984; Amusan, 2002). Heavy metal pollution has become turbulent recently especially in urban centers due to increasing technological advancement. It is therefore, necessary to continuously assess trace metals in food material found in these areas so as to ascertain their levels of contamination and suggest possible health implication and remediation. This study therefore, considers the assessment of trace metals in the common species of land and water snail found in Makurdi metropolis pertinent, since the snails serve as a major source of meat for most people of the area.

MATERIALS AND METHODS

The two species of snails were collected in October 2007 from streams, wetland and stagnant waters within Makurdi metropolis by hand-packing. The viscera were separated from the shells and both oven dried at 105°C

Table 1: Concentrations (mg/g) of Cu, Cd, Pb, Fe, As and Zn in *Achatina achatina* and *Pila ovata* shells and viscera

Sample	Cu	Cd	Pb	Fe	As	Zn
Achatina achatina soft tissues (viscera)	0.31±0.20	ND	0.43±1.28	0.50±0.26	ND	0.47±1.00
Achatina achatina shell	0.08±0.10	ND	0.79±1.22	0.74±0.10	ND	1.81±0.61
Pila ovata soft tissue (viscera)	0.14±0.43	ND	0.92±0.77	0.78±0.62	ND	0.72±1.02
Pila ovata shell	0.56±0.62	ND	0.92±0.87	0.58±0.12	ND	1.47±0.82

Values are mean±standard error, ND = Not Detected

to constant weight. The dried samples were ground and digested using the method described by Awofolu (2005) and analyzed using Atomic Absorption Spectrophotometer (AAS) (Allen *et al*., 1974).

RESULTS AND DISCUSSION

From the result (Table 1) the concentrations of copper, zinc, lead and iron in the *Achatina achatina* soft tissue (viscera) were 0.32, 0.47, 0.43 and 0.50 (mg/g), respectively. The concentrations (mg/g) of copper; zinc, lead and iron were 0.08, 1.8, 0.79 and 0.74, respectively for its shell. The result indicates zinc concentration to be highest in both viscera and shell. The concentrations (mg/g) of Cu, Zn, Pb and Fe were 0.14, 0.72, 0.92 and 0.78, respectively in the soft tissue of *Pila ovata*, while in the shell, the concentrations were obtained as 0.56 mg/g copper, 1.47 mg/g zinc, 0.92 mg/g lead and 0.58 mg/g for iron. Cadmium and arsenic were not detected in both the shell and viscera.

The result of analysis indicates higher concentrations of trace metals in the shell than the soft tissue. This may be due to adsorption of the metals on the shell; it also implies that the trace metals in these organisms are gradually leached from the viscera (soft tissue) to the shell with time. High levels of Pb, Zn and Fe were observed in the two special of snails. This agrees with Lin (2006) that Fe and Zn are capable of bioaccuminating up to ten times higher in freshwater snail than in soil sediments. The concentration of iron in the shells of water snail is lower than that of the soft tissue. This may be as a result of dissolution in the water. Generally, the concentrations of these trace metals in the snails is low but continuous bioaccumulation may lead to the health threat.

Conclusion: Since, Makurdi, the Benue State capital is experiencing accelerated growth in commercial activities and in the area of industries, coupled with high rate of application of fertilizers and herbicides on farmlands within the town, the assessment of trace metals in edible materials should be done regularly. This is to prevent the ever increasing population of the town to being exposed to harmful level of these metals. A situation, which if not checked, may threaten the health of man and animals.

REFERENCES

Ajayi, D., M. Tewe and J. Awesu, 1978. Observations on the Biology and Nutrition values of the giant African Snail *Achatina marginala*, East Wildlife J., 16: 85-95.

Allen, E.S., Grimshaw, J.A. Parkinson and C. Quarmby, 1974. *Chemical Analysis of Ecological Materials* Blackwell Scientific Publications Ox ford London, pp: 69-89.

Amusan, A.A., 2002. Copper and lead on the growth, feeding and mortality of terrestrial gastropod *limicolaria faminea*. Afr. J. Biomed. Res., 5: 47-50.

Awofolu, O.R., 2005. A survey of Trace Metals in vegetables, oils and lower animals along some selected major Roads in metropolitan city of Lagos. Environ. Monitoring and Assessment, 105: 431-447.

Beady, A. and S.L. Eaves, 1983. Short term changes in Pb, Zn and Cd concentrations of the garden snail *Helix aspersa* (*mullex*) from a Central London car park. Environ. Pollut. (series A,)., 30: 233-344.

Lin, E., 2006. Bioaccumulation of heavy metals (Cu, Zn, Fe) in freshwater snail *Pila Ovata* from Ikpoba River of southern Nigeria, J. Aquatic. Sci., 4: 23-28.

Moore, J.A., 1996. Biological Science; an inquiry into life. 3rd Edn, pp: 78-79.

Nuembang, H.W., 1984. Bio-accumulation of heavy metals by bivalves from Lemfford, (North Adriatic sea), J. Marie Biolog. Sci., 81: 177-180.

Paul King, 2008. The Snail Shelter; File://E:/*Achanturia achatina*-species [pet snail].htm.

Robert, H. Cowie, 2006. Global invasive species Database Centre conservation Research and training University of Hawaii.