

Proximate Analysis and Nutritional Constituent of the Fresh Water Apple Snail (*Pila globosa*) from Jathi Pond, District, Chapra (Saran) Bihar

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Abstract: Jathi pond 250.88 N' Latitude 840.74 E' Longitude, Chapra town is situated on the bank of Saryu River on the Southern side near the Gandak on the Eastern side. Jathi pond located about 1 km away from Chapra Kacheri Railway Station. This pond falls on the road side and near the railway line towards Musarakh Railway Station. The whole water area of the pond is about 3 hectares and depth of water varies from 1 meter to 5 meters. During the flood and rainy season the water area is further increased. The bank of pond is made of soils only and source of water is rain and also from flood of Saryu and Gandak rivers. The nutritional constituent and mineral contents of fresh water snail *Pila globosa* from Jathi Pond, Chapra was investigated carried out using the methods outline in the Department of Zoology lab, DAVPG College, Siwan. The results obtained showed that the snail contained 76.32%±0.84 The nutritional constituent and mineral contents of the fresh water snail (*Pila globosa*) from Jathi Pond, Chapra, Bihar, was investigated. This was moisture, 10.67%± 0.15 protein, 0.06%± 0.02 lipids, 5.54% ±0.11 ash, 0.03%± 0.01 crude fibre and 7.40%± 0.06 Nitrogen free extract. The following nutrient were found to be present in the snail. These were calcium 129.18± 0.77mg/100g, potassium 71.13 ±0.51mg/100g, phosphorous 60.52 ±0.35mg/100g, iron 10.19 ±0.19, sodium 0.04± 0.01mg/100g, magnesium 31.19± 0.57mg/100g and zinc 1.31± 0.03mg/100g. This study therefore places *Pila globosa* as a good source of major and micro-elements and a good source of healthy food for proper growth and development of the body. Its production either from the wild or cultured environment could be a good source of income for the teaming population.

Keywords: *Pila globosa*, Nutritional constituent, Major and Micro element, Environment, Population etc.

1. INTRODUCTION

The water area of Jathi pond is about 3 hectares and depth of 1 meter to 10 meters. During the flood and rainy season the water is further increased (Kumari Vee, 2002). The bank of pond is made of soils and also only source of water is rain and also from food water of Saryu and Gandak rivers. Shellfishes comprise of invertebrate animals called Crustaceans such as shrimps, crabs, lobsters, crayfish and molluscs such as bivalves, squids and clams. Molluscs possess exoskeleton called shells which may be single or double over the body. Most of them are marine, although there are fresh water forms. In Chapra, there is abundance of *Pila globosa* in the fresh waters. The potential yield from fresh waters is estimated at 2000 tonnes per- annum. There has been a lot of investigation into the proximate constituent and fatty acid contents of food items (Luzai, et al., 2003). Aquatic animals contain high levels of protein (17-20%) with an amino acid profile similar to that of meat from land animals, thus making it beneficial to health in Bihar where there is high consumption of *Pila globosa*. The food deficit situation is more intense with protein and mineral deficiencies (Adesihinwa and Ogunowmodede, 1995). In a typical village, the immediate show of malnutrition is manifested by the number of children

and the aged with kwashiorkor (Idufweke, 1984). There is therefore the need to find a way of raising the protein intake of the average Bihar from 5.5g/head/day (FAO, 1988) to 35g/head/day (Idufweke, 1994). Pila is a genus of large water snails, an aquatic gastropod mollusc. However, in the state of Bihar, large fresh water snails like *Pila globosa* delicacy in some riverine areas. Fish have been found to be a major source of protein and the general population at large, as they occur abundantly in fresh waters (Tayo et al., 2008). They have also being found to be good source of protein, low in fat and calories making a very healthy choice of food (Falode, 2009). Reported that snails have a protein content of 88.42% which compares with animal protein of 82.37% Marian et. al, (2004) reported on the nutritional compositions of green crabs (*Carciunus maenas*) to be protein 80.50%, lipids 3-4.88%, carotenoid 5.1-19.2% of crab meat. Anthony et. al., (1983) also reported that shellfishes are a good source of protein, low fat and macro- minerals and trace elements such as copper, iron, zinc and manganese. Anne De La Hunty in (1995) advised in her report that eating of shellfishes is part of healthier lifestyle. Tom Pickerel (2010) reported on the nutritional components of shellfishes as good source of Vitamin B2, niacin, iron, purines, sodium, vitamin C, zinc, magnesium and Omega -3 fatty acids. According to Bahy et. al., (2010), difference in nutritional values could be attributed to species, regions and environments, therefore snails like many shellfishes have been observed to contain high concentration of iron, calcium, magnesium and zinc. No wonder pregnant women have been reported by Adeyeye (1996) of high intake of snail haemolymph. The FAO (2001) has reported that subjects who eat Crustaceans and Molluscs have reduced levels of triglycerides and blood fats that cause clogging of arteries . According to Len in Hubpages (2010), Oysters are main source of zinc which is essential for maintenance of senses of taste and smell. Oyster also is a good source of tyrosine, an amino acid used by the brain to help regulate mood and adapt to stress. It is also an aphrodisiac as it contains an amino acid that riggers increase levels of sex hormones. The zinc content of oysters aids in the production of testosterone. The abundance of freshwater snails in River Saryu and its tributaries has been studied by Omudu and Iyough (2005). This is due to the availability of food, shelter and oviposition sites along the river water body. Most of the populations along the river catch these snails for food and as a substitute to animal protein which has gone beyond the reach of the common man. Despite the views of snails in West Africa as an intermediate host of pathogenic nematodes (Wosu, 2003), humans have continued to hunt for snails for food many generations due to its nutritional and medicinal values. The aim of this work therefore is to study the nutritional composition of the freshwater snail *Pila globosa* which is common along the Jathi Pond, Chapra and how it can be popularized and incorporated in the diets of the teaming population (Fig. Suitable location of *Pila globosa*). This will go a long way to reduce malnutrition among the people and increase the economy of the area as they go fishing for snails and other aquatic animals (Fig. juvenile *Pila globosa* feeding on algae present on the lowerside of *Marsilea minuta*). Molluscs are used widely for various purposes like human consumption (Fig. *Pila globosa* crossing meadow), (Fig. (A) *Pila globosa* flesh for selling in the market), and (Fig.(B) *Pila glbosa* flesh in market.

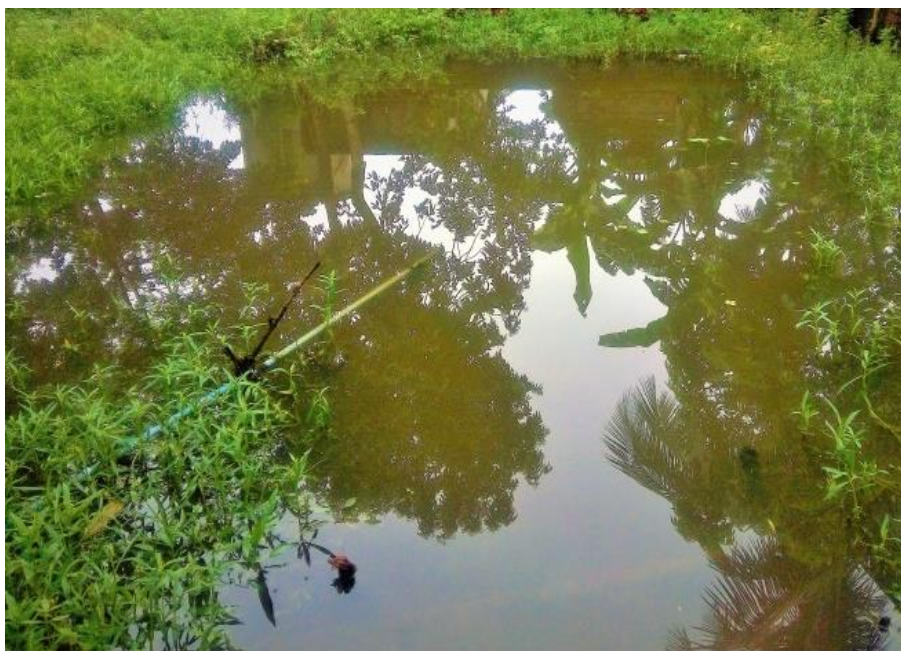


Fig.(A) Suitable Location of *Pila globosa*.



Fig.(B) Juvenile *Pila globosa* feeding on algae present on the lower side of *Marsilea minuta*



Fig. (C) *Pila globosa* crossing meadow.



Fig.(D) *Pila globosa* flesh for selling in the market.



Fig.(E) *Pila globosa* flesh in market.

Health Benefits of Snails

The common edible snails reported are *Pila globose* (Apple snail) have been collected from Jathi pond, Chapra. *Pila globosa* are edible and are obtain considered a protein– rich delicacy. Apple snail has also number of medicinal importance. The following importance are as follows:-

- (1) **Fighting of Cancer cells:-** Snails are a great source of the valuable lectin, possesses anti-cancer properties and helps in boosting the immune system and fighting against cancerous cells.
- (2) **Fighting against the Skin diseases:-** The snail slime is extremely rich in allantoin, collagen and elastin, which is beneficial for the treatment of skin diseases and broken bones. The secretions also have a copper peptide, which is regarded as the only source of a substance manufactured for creating creams that are useful in minimizing scars and wounds.
- (3) **Protection against Parkinson’s diseases:-** The venom extracted from the ocean snail is highly beneficial for people suffering from addictions, depression and Parkinson’s disease. This substance produces a synthetic version of the toxin that blocks or stimulates receptors, which release chemicals in the brain.
- (4) **Helps in Neuron diseases:-** In addition, toxins excreted by snails are valuable in stimulating dopamine, found lacking in people with neurological diseases.
- (5) **Anti viral:-** Its flesh have anti viral character. People suffering with small pox are suggested to use its flesh as carry in food at least twice or thrice per year to check small pox. Oyster juice is also reported to have anti-viral activity.
- (6) **Ophthalmic:-** In case of conjunctivites having considerable pain with discharge the water of small molluscs are put. According to *Bodding*(2001) people of Santhal Pargana District of Jharkhand also use these freshwater snails for various eye disease.
- (7) **Hazy vision:-** People who have hazy vision during day time and are unable to see far in this case also water of small snail are used.
- (8) **Night Blindness:-** In the case of people suffering in the night blindness are suggested to use water of these small snail. *Bodding*(2001) also reported its use along with raw turmeric and tobacco.
- (9) **Sore on the Sole of the foot:-** In this case long molluscs is used as medicine.
- (10) **Syphilis on the neck and chest “Le callier de Venus”:-**Flesh of small snails are cooked in mustard oil and are smeared on the sore.(*Bodding*,2001) .
- (11) **Asthma and Fever:-** The flesh of the *Pila globosa* is suggested to be used as curry for the cure of asthma and fever. Jamir and Lal(2005) also reported that Nagaland tribes use them in case asthma.

2. MATERIAL AND METHODS

The snail (*Pila globosa*) was bought from fishermen in the Chapra market. The samples were washed and taken to the Zoology Department of Zoology, D.A.V.P.G. College, Siwan. Under Jai Prakash University, Chapra, Bihar. The soft tissue which is the meat was separated from its shell through the use of drilling pin. This mass of tissue with the haemolymph was lyophilized and dehydrated in an oven at 60°C for 24hrs (Ebenso, 2003). The dried sample was ground into powder in an electric blender. 2grams of the samples were taken for analysis where the moisture, ash and protein, crude fibre were analyzed by the methods described by AOAC (1990). The protein was determined by the Micro-kjeldahl method. Fat content was determined by Bligh and Dyer method. The mineral content was determined by dissolving the ash obtained from the sample in standard flask with distilled de-ionized water. A few drops of concentrated hydrochloric acid were added. The mixture was warmed and evaporated on Bochy water bath and filtered using a filter paper. The aliquots were taken for estimates of calcium, phosphorus, iron, sodium and potassium following the methods of AOAC (1990).

3. RESULTS

The proximate composition of the tissue of *Pila globosa* are as shown in Table I. The mean moisture content was 76.32% + 0.84, the crude protein was 10.67% + 0.15%, the lipid content was 0.06% + 0.02, while the ash content was 5.54% + 0.11 and the nitrogen free extract was 7.40% + 0.06. The mineral compositions obtained from *Pila ampullacea* are as shown in Table 2. The mean calcium content was 128.35mg/100g + 0.35, the iron content was 10.57mg/100g + 0.19, sodium was 0.03mg/100g + 0.01, phosphorus was 60.24mg/100g + 0.03, and potassium was 70.40mg/100g + 0.51 while magnesium was 30.45mg/100g + 0.51.

Table (1) Mean Proximate constituent pf Flesh of *Pila globosa*

Parameters	% Composition
Moisture	76.32 + 0.84
Crude Fibre	10+0.15
Lipids	0.03+0.01
Ash	5.54+0.11
Nitrogen Free Extract	7.40+0.15

Table (2) Nutrient material of Flesh of *Pila globosa*

Nutrient Material	Main Composition(mg/100gm)
Calcium	129.077
Potassium	71.13+0.51
Phosphorus	60.52+0.35
Iron	10.90+0.19
Sodium	0.04+0.01
Magnesium	31.19.+0.03
Zink	1.31+0.03

4. DISCUSSION

The results obtained from this study showed that *Pila globosa* an aquatic snail appears in the river between the months of May – September. The moisture content of 76.32% + 0.84 obtained from the snail falls within the range of 73.67 – 99.20% that has been reported on snails by Wosu (2003) and Eneji et. al., *Pila globosa* (85.5%) and Whelk (66.17%) found in Europe, Asia and Africa. These variations could be due to the effect of environment as reported by Osibona et. al., (2006). The protein content of 10.40% of *P. globosa* is lower than that of fresh water fishes and the giant land snail *Archchatina maginat*, however it is still comparable to values obtained in other livestock (FAO 2001). Bender (1992) has responded that the amino acids in the protein of snail could be used to compliment the cereal sources of protein making good their relative deficiency of lysine. The crude fibre content of 0.01% falls within the range observed by Eneji et. al., (2008) of 0.50-1.50% for land and water snails. It has been observed that the low crude fibre of *P. globosa*, an aquatic snail is due to swimming activity of the snails in water which is more strenuous than crawling on land. Thus aquatic snails are tougher than land snails (Eneji et. al., 2008). The ash content of 5.84% is similar to what was observed by Akinusi (1998) and Abwoa (1995). This value can be attributed to the fact that the aquatic snails absorb more minerals from the

water as rivers serve as effluent to some industries whose chemical waste discharge into the water body may increase the absolute minerals in the water. The lipid count of 0.09% is low compared to other species of animals (Judith and Jenny, 1987). This attest to the extensive use of snails for treatment of hypertension, and other related ailments (Adegbola, 1998). The low value is because aquatic snails require more energy for its physiological activities such as swimming which require more energy from lipids. This could be related to location and origin of the snails too (Abua, 1995 and Lee, 1994). The nitrogen free extract value of 7.66% was observed for *Pila globosa* which falls within the range observed by Eneji et. al., (2008) but it could depend on cooling time (Imeubore and Ademosum 1998). The ash content and subsequent qualities of the mineral components of *Pila globosa* agrees with the work of Eneji et. al., (2008) who have observed that aquatic snails had higher

mineral contents than land snails. The phosphorus content of 60.58mg/100g is below that recorded for beef (156), liver (313), eggs (218) and milk (95) mg/100g (Fox and Cameron, 1980), therefore making snail not to be a good source of phosphorus. However, the calcium content of 129.0mg/100g observed for *Pila globosa* was high when compared to values for beef 7, liver -6, egg -54 and milk -120. This lends credence to the richness of snail meat with calcium as observed by (Babalola and Akinsoyinu, 2009). Calcium is known to be involved in bone and teeth calcification, nerve function and blood clotting. Therefore *Pila globosa* meat can be used as supplement in feeds for humans and other animals. Potassium content of 70.58% in the *Pila globosa* is high which agrees with the work of Eneji et. al., (2008). Potassium is good for help in fluid balance and regulation of nerve impulse conduction, regular heart beat and cell metabolism therefore according to Fagbwano et. al., (2006), the consumption of snails will definitely increase the level of these major elements in the body.

The iron content of 10.65mg/100g observed in this work falls within the range of 6.79 – 11.0mg/100g obtained by Wosu, (2003). This element is important for red blood formation, therefore aquatic snail can be recommended for pregnant women and children. Magnesium content of *Pila globosa* was found to be 30.89mg/100g. The zinc content was found to be 1.21mg/100g which fell within the range observed by Eneji et. al., (2008) and Fagbuaro et. al., (2006) in other aquatic snail species. These important minerals found in this study shows that snail is a good source of these minerals which are vital for healthy growth of the body, helping muscles, nerves and proper metabolism of body, therefore should be incorporated in the diets of man and its animals particularly the growing ones.

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