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Biochemical analysis of proteins & inorganic ions Ca^{++} & Mg^{++} in a freshwater crab *Sartoriana spinigera* (Wood Mason, 1871)

Ravi Rahul Singh* & Shiny E.C. Kachhap

University Department of Zoology, Ranchi University, Ranchi, Jharkhand, India

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Abstract : *Sartoriana spinigera* is a freshwater edible crab of Jharkhand. The exoskeletons of many freshwater crabs have so many medicinal effects such as hypo cholesterol, anti cancerous antioxidative effects in the society. The meat of freshwater crab is generally consumed whereas the carapace is thrown. *Sartoriana spinigera* is of great ethno biological significance as it is consumed by the tribal's of Jharkhand for treatment of various ailments. The present work includes the study of protein components and inorganic ions Ca^{++} and Mg^{+} concentration of the carapace in order to pass on the information to pharmaceuticals and cosmetic industries for exploiting the nutritious value.

Keywords : ***Sartoriana spinigera,*** **carapace, protein, Ca^{++}, Mg^{+}, Biuret method, ICP-OES**

INTRODUCTION

Crustaceans constitute a widespread class of organisms of both marine and freshwater species. They possess an exoskeleton which consists of an organic matrix along with inorganic components. The carapace is composed of a variety of protein, the macromolecules of matrix (protein), the glycoprotein (protein with carbohydrates as prosthetic group) and proteoglycans (an aggregate of protein that forms the core and long polymeric sacred chains that constitute the bulk. They are the major components of extracellular matrix and play an important role in the regulation of mineralization (Addadi and Weiner, 1985)[1]. Even though the carapace of crustacean has such rich compositions, they are thrown as waste products and only the meat of crustaceans are consumed. This study throws light on the utilization of carapace of crab *Sartoriana spinigera*. *Sartoriana spinigera* is a freshwater edible crab of Jharkhand found in ponds lakes and paddy fields during rainy seasons. *Sartoriana spinigera* is a local delicacy of Jharkhand great ethno biological significance as is consumed by local people of Jharkhand for treatment of bacterial infections, gastrointestinal disorders, eyes infection, and arthritis etc. Protein is an important component of every cell in the body. Hair and nails are mostly made of protein. Our body uses protein to build and repair tissues. It's an important building block of bones muscles cartilage skin and blood. It plays crucial role in almost every biological process in living organism. Besides providing structural support they are responsible for and ample variety of physiological functions such as catalysis, transport and sensing in all living systems. Mineralization of proteins occurs in exoskeleton of crustaceans. Some minerals are essential from nutritional point of view. Mineral components such as calcium, sodium, potassium, magnesium, iron, phosphorus are important for human nutrient (Sikorski *et al.* 1990)[2]. Crabs are a prominent source of essential macro and micro-elements like potassium, phosphorus, calcium, magnesium, copper, manganese and zinc (Nackz *et al.* 2007)[3]. In the present

*Corresponding author :
Phone : 9204582391
E-mail : ravirahul1990@gmail.com

study the protein content and calcium and magnesium concentration of carapace of *Sartoriana spinigera* was studied and the importance of exoskeleton of crustaceans has been established.

MATERIALS & METHODS

Healthy live specimen of freshwater crab *Sartoriana spinigera* were purchased from local market and brought into the laboratory of Zoology Department of Ranchi University, Ranchi. Crabs were put in aquarium in laboratory and were acclimatized for 7 days. During acclimatization period they were fed with snail meat and wheat flour dough. Body weights of all crabs were measured in 10 batches, each batch containing 25-27 crabs. After 7 days, crabs were killed by removing their chelate legs. Carapaces of all crabs were obtained. Wet weight of carapace was measured and noted. Carapaces were dried in oven till a constant dry weight was obtained. Dry weight of carapaces were measured and noted.

Protein estimation: Protein estimation was done using Biuret method (Raymont *et al*. 1964)[4]

Mineral estimation: It was done using ICP-OES (Inductively Coupled Plasma Optical Emission Spectrometer)

CALCULATION

The protein concentration in g/dl was calculated by the formula given below:-

$$\textit{Total protein in g/dl} = \frac{\textit{Absorbance of Test}}{\textit{Absorbance of Standard}} \times 6$$

STATISTICAL ANALYSIS

Quantitative data of protein and mineral content were analyzed and compared by calculating standard deviation and Student's t test to determine the composition of *Sartoriana spinigera* carapace.

RESULTS & DISCUSSION

The present investigation shows average total protein in the carapace of freshwater crab *Sartoriana spinigera* to be 2.12 gm/dl or 21.2%. The present study corroborates with the studies conducted by Balasubramanian and Suseelan (2001)[5] in which the protein value of crab *Podophthalamus vigil* was found to be 15.75- 20.16%. The present study also showed higher protein content in *Sartoriana spinigera* then *Procambarus clarkii* which was found to be only 4.87%. According to Naczk *et. al*. 2007[3] the protein content of green crab *Carcinus maenus* shells was found to be 4.31- 7.06 % depending on harvesting site. Higher value of protein content then *Sartoriana spinigera* shell was found in *Charybdis smithii* (59.8-71.1%)

The estimated Calcium concentration in carapace of *Sartoriana spinigera* was found to be 3207± 21 mg/100g or 32.07% . Whereas the estimated magnesium content in the carapace of *Sartoriana spinigera* was found to be 231±8 mg/100g or 2.31%.The present result corroborates with the study conducted by Greenaway, 1976 according to which the Ca and Mg percentage was found to be 23-25% and 1% respectively. Higher concentration of Calcium and magnesium was found in *Sartoriana spinigera* than in *Carcinus maneus*. An extremely high degree of calcium was found in *Cancer paragus* with 93% in claws which appeared more heavily mineralized than the rest of the exoskeletons. Calcium content in shell of *Calinectus pallidus* was found to be 38161.68 ± 0.99 mg/kg whereas magnesium content was found to be 57241.46 mg/kg. Calcium and magnesium content in shell of crab *Cardisoma armatum* was found to be 15812.32±.74 mg/kg and 14010.89±1.31 mg/kg respectively (Elegbede, 2013)[6].

CONCLUSION

Based on the study the carapace of freshwater crab *Sartoriana spinigera* of Jharkhand is a rich source of protein i.e 21.2% and calcium and magnesium content (32.07% and 2.31% respectively). Such significant presence of proteins and inorganic ions determines the utility the carapace as it can achieve demands of proteins in the field of pharmacy thereby replacing synthetic products. This study identifies opportunities to develop value added products from crustaceans carapace which would otherwise been thrown as a waste.

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