



ISSN : 0973-7057

## Effect of body weight on protein concentration in muscle of freshwater edible crab *Sartoriana spinigera* (Wood-Mason, 1871)

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Received : 13<sup>th</sup> December, 2016 ; Revised : 9<sup>th</sup> February, 2017

**Abstract:** - Studies on the nutritional value of crab have reported that crab is high in protein but low in fat contents. Present study deals with estimation of total tissue proteins of the leg muscle of the freshwater edible crab *Sartoriana spinigera*. The result showed the value of average percentage of protein concentration in leg muscle of freshwater crab *S. spinigera* (55.5-78.85 g) during summer season (20°C-26°C) was 14.31±3 mg/100mg and showed a positive correlation (b=0.39; r=0.96) between body weight and protein concentration whereas during winter season (15°C-18°C) was 8.66±1.2 mg/100mg and showed a positive correlation (b=0.1108; r=0.78) between body weight and protein concentration. The difference observed in protein concentration in summer season and winter season was statistically analysed and found significant at 1% level (p<0.01). Study revealed that *S. spinigera* provide a cheap source of protein and important means of livelihood for the indigenous tribal people of Jharkhand.

**Keywords :** *S. spinigera*, Muscle extract, Protein value, t-test, correlation coefficient.

### INTRODUCTION

Biochemical and nutrients play a vital role on physical growth & development, maintenance of normal body function, physical activity and health. Knowledge of the biochemical composition of any edible organism is extremely important since the nutritive value is reflected in its biochemical contents (Nagabhushanam *et al* 1978). The freshwater crab are good source of food, medicinal values and plays an important role in the food chain of aquatic ecosystem (Cobb *et al* 1975; Fang *et al* 1992). More than 6,700 known species of Brachyuran crabs and over 1,300 true freshwater crabs were identified along in the world. These freshwater crabs are found in more or less all freshwater ecosystems such as fast flowing mountain, rivers, slow flat rivers, freshwater marshland, sluggish and rice fields. Some freshwater crabs also live

in caves (Balian *et al* 2008). The nutritional quality of the crab proteins were compared to muscle of mutton, chicken, duck and fish (Derosier, 1963; Zaitsev *et al* 1969). Due to crabs food value and its various commercial and medicinal uses, it is necessary to study biochemical composition of these crabs.

*Sartoriana spinigera* a commonly known freshwater edible crab is widely distributed in ponds, puddles, rivers and wetlands of Jharkhand. It is most popular among tribal community of Jharkhand because of its meat quality (high protein), nutritional and medicinal value. It is robust and adapts itself to various aquatic conditions. This crab is used as aquaculture and is an economical species for tribal people of Jharkhand. Regarding nutritive value of this freshwater crab *S. spinigera*, there is no clear cut information. Biochemical composition of *Scylla serrata*, marine crab has been reported by Zafer *et al* (2004) but the seasonal changes in biochemical composition is still

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lacking. Therefore, the present investigation is to estimate the total tissue protein of the leg muscle of *S. spinigera* in different season.

**MATERIALS AND METHODS**

Live specimens of freshwater crab *S. spinigera* of different weight group were collected from Patratu dam brought to Zoology Department Laboratory of Ranchi University. The crabs were then allowed to get acclimatized

in the laboratory conditions for one week in large aquaria filled with little water, sand and fed with fish meal.

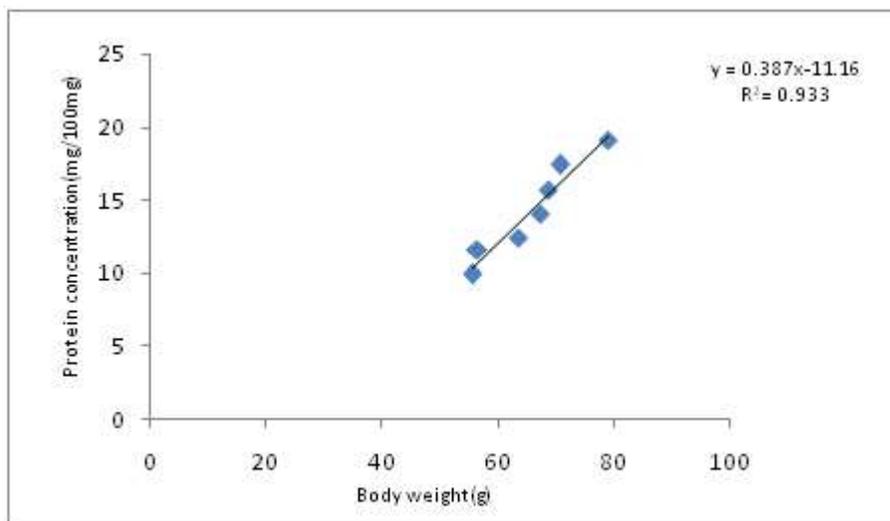
Before estimation of total tissue protein of the leg muscle, the crabs were weighed and narcotized. Chelate leg was taken out and leg muscle was dissected out and weighed. Protein estimation was done by Lowry Assay Method (1951). The O.D. was read at 660nm.

The protein concentration will be calculated using the following formula:

$$\frac{O.D. \text{ of unknown}}{O.D. \text{ of Standard}} \times \frac{\text{Concentration of standard}}{1000 \text{ (conversion to mg)}} \times \frac{\text{Volume of homogenate}}{\text{Volume of homogenate taken for analysis}} \times \frac{1000}{100}$$

**Table1:- Estimated value of protein (mg/100mg) in wet weight of tissue of chelate leg muscle of crab (55.5-78.85 g) during summer season (20°C-26°C).**

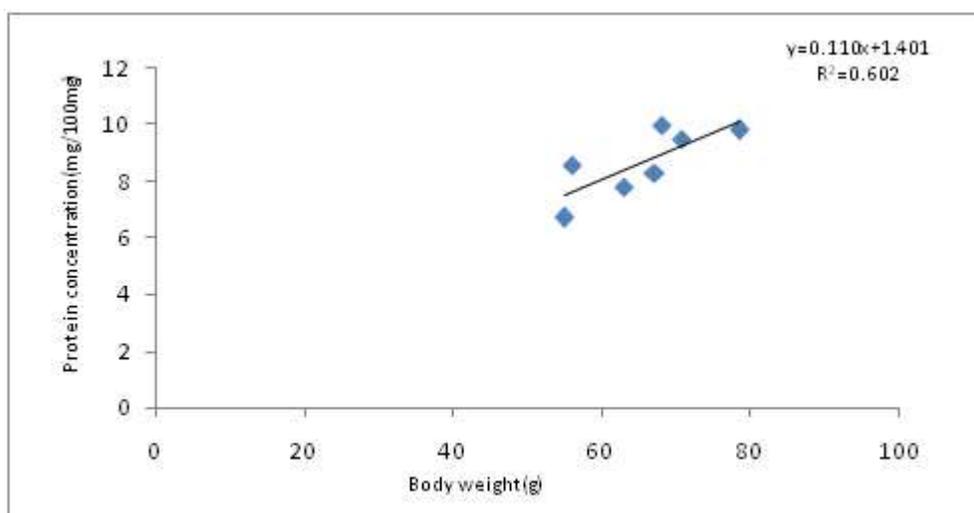
Sl.No	Body Weight (g)	Protein Concentration (mg/100mg)
1	55.5	9.925
2	56.35	11.575
3	63.51	12.4
4	67.175	14.05
5	68.5	15.7
6	70.67	17.4
7	78.85	19.1
	Mean	14.30714
	SD	±3.043691
	r	.96



**Fig-I Correlation Between Body Weight (g) Vs Protein Concentration (mg/100mg) in *S. spinigera* during Summer Season (20°C-26°C).**

**Table 2:- Estimated value of protein (mg/100mg) in wet weight of leg muscle of crab (55-78.5 g) during winter season (15°C-18°C).**

Sl.No	Body Weight (g)	Protein Concentration (mg/100mg)
1	55	6.7
2	56	8.55
3	63	7.8
4	67.1	8.3
5	68	9.95
6	70.7	9.5
7	78.5	9.8
	Mean	8.657143
	SD	±1.182662
	r	.78



**Fig-II Correlation Between Body Weight (g) of Crab Vs Protein Concentration (mg/100mg) in *S.spinigera* during Winter season (15°C-18°C).**

## RESULTS

Table:- 1 Showed the value of protein concentration in chelate leg muscle of Crab (55.5-78.85 gm) during summer seasons (20°C-26°C) in the month of July when crabs were in growing phase. Average protein concentration was  $14.31 \pm 3.043$  mg/100mg. Fig. I: Showed the correlation between body weight and protein concentration. They showed a positive correlation ( $b = 0.39$ ;  $r = 0.96$ ).

Table:- 2 Showed the value of protein concentration in leg muscle of crab (55-78.5 gm) during winter season (15°C-18°C) in the month of February was  $8.66 \pm 1.182$  mg/100mg only. Fig. II: Showed the correlation between body weight and protein concentration in leg muscle of

crab ( $8.66 \pm 1.2$  mg/100mg) during winter season, which also showed a positive correlation ( $b = 0.1108$ ;  $r = 0.78$ ).

The difference observed on protein concentration in Summer Season (20°C-26°C) and Winter Season (15°C-18°C) was statistically analysed using t-test and found significant at 1% level of significance ( $p < 0.01$ ) that might be due to various physiological and effect of environmental factors.

## DISCUSSION

In present observation during winter muscle protein was only ( $8.66 \pm 1.2$  mg/100mg) and in summer ( $14.31 \pm 3.043$  mg/100mg). Statistical analysis showed the

difference on protein concentration was significant at 1% level ( $p < 0.01$ ). It advocates that the difference observed might be due to various physiological and effect of environmental factors. During winter this crab shows hibernation, when feeding and other metabolic activities are decreased. But during summer these crabs are quite active and show high metabolic rate, movement, feeding, growth and reproduction also. They showed increased concentration of protein.

Zafar *et al* (2004) studied the muscle protein concentration in marine crab *S. serrata* and reported that in the month of December it was highest (20.10%) and lowest was found in May (14.00%), Khan (1992) found 11.60% protein in body meat of male *S. serrata* and 9.92% protein in female body meat of *S. serrata*.

According to MUSAIGN *et al* (2005) edible crab, *Portunus pelagicus* muscle contain a good level of protein i.e. 17.5-18.8%. Dutra (2007) studied the seasonal variations in the biochemical composition in *Hyalella curvispina* (crustacean, Amphipoda) and reported that male and female stored protein and utilized them in summer, whereas male stored proteins especially in spring and used them in winter.

Mohammed *et al* (2004) studied the biochemical composition of *Scylla serrata* and reported that average protein in male was  $17.69 \pm 2.14\%$  and in female  $19.39 \pm 1.29\%$  in wet weight. The highest protein estimated was 20.10% in male in December and for female in February it was 20.43%. The lowest protein content for male was in May (14.00 %) and in female it was lowest in August (17.20%).

Babu (1984) studied the biochemical composition of the muscles and hepatopancreas in various stages of molting in crab, *Menippe rumpii* and reported that animals store its reserve food materials in the hepatopancreas to a greater extent and in the muscles to a lesser extent during the intermoult period. He also reported that in muscles, protein content varied between 14-21% in wet weight of muscle.

#### ACKNOWLEDGEMENT

The authors are thankful to the P.G Department of Zoology, Ranchi University for providing laboratory facilities.

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