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Nutritional Analysis, in the Freshwater Bivalve Mussel, *Lamellidenscorrianus* when, subjected to Cerebralectomy.

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Abstract:

Glycogen, lipids and Proteins are the major macronutrients which have a significant nutritional and physiological role in all metabolic activity by providing an efficient source of energy and essential fatty acids. As the freshwater bivalves are the filter feeder the role of gills are very efficient. The impact of, endogenous and exogenous factors alter life processes. In freshwater bivalves gills are the most efficient organ requires for energy and is control by various ganglion such as cerebral, visceral and pedal. hence the present investigation was undertaken to study the impact of cerebral ganglia on the macronutrient content in gills of freshwater mussel *LamellidensCorriamus*.

Key Words: *LamellidensCorriamus*, macronutrients, Cerebralectomy and seasons.

Introduction:

Bivalves have been subjugated universal for food, beautification and pearls through, out human the past. Freshwater mussels are distributed worldwide in lotic and lentic habitats. As filter feeders, freshwater mussels are ecologically important: they control, reutilize nutrients and provide a trophic relationship between primary manufacturer and pillagers. (Lewandowski, and Gardner and Malczyk, 1991). The nervous systems is primeval type and consist of three ganglia, cerebral, visceral and pedal ganglion which regulate growth, reproduction and all metabolic activity in bivalves (Joosse and Gerearts, 1983; Sokolove et al. 1984; Flari and Edwards, 2003). Glycogen is a reserved energy food in bivalves. The various factors such as temperature, starvation and pollution had change in the glycogen content, de zawan and Zandlee 1972, Dongre S. B. 2016. Lipids are major sources of metabolic energy and essential compounds for the formation of cell and tissue membranes and they are important in the process of egg production. They also



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provide energy for growth during conditions of limited food supply, when carbohydrate levels are low while lipid composition and metabolism have been extensively studied in marine mollusks. a few investigations have been carried out on freshwater forms and even less on seasonal variations in the fatty acid composition of freshwater species. A detailed account of fatty acids of freshwater prosobranch mollusks from Russia, USA and India have been published The lipid composition of the mollusks can be affected by external (exogenous) factors, such as fluctuations in the environmental conditions (temperature and food availability), or by internal (endogenous) factors, such as metabolic and physiological activities. The lipid composition of freshwater gastropods from India has been studied to some extent. Proteins are the body building elements which are essential and growth and development, it has major role to play, in bivalves. Proteins are most abundant intracellular macro-molecules and constitute over half the dry weight of most organisms. They occupy a central position in the architecture and functioning of living matter. They are intimately connected with all phases of chemical and Physical activity that constitutes the life of the cell. Therefore they are, essential to cell structure and cell function. The interplay between enzymatic and non-enzymatic proteins governs the metabolic harmony they are also involved in major physiological events to maintain the homeostasis of the cell. Therefore, the assessment of the protein content can be considered as a diagnostic tool to determine the physiological process of the cell, The primary goals of this study were to characterize the glycogen, lipid and protein composition in the gills of the freshwater mussel *Lamellidenscorrianus*, during the summer season, collected from Nandrabad pond near Aurangabad. Among the known studies, only some of the freshwater bivalves ..*Carunculatexasensis* (Hagar and Dietz, 1986).*Diplodompatagonicus* (Pollero et al., 1981). *Ligumiasubrostrata* (Dietz and Graves, 1981). *Diplodondelodontus* (Pollero et al., 1983). *Dreissenapolymorpha* and *Unio*, sp. (Dembitsky et al., 1992). Dongre S.B. 2016 and *Dreissenasiouffi* (Ekin et al., 2008) have been reported, but very little attention is given on the role of cerebral ganglia in regulating the macronutrients such as glycogen, lipids and proteins metabolism hence the present investigation has been undertaken to study the impact of removal of cerebral ganglia unilaterally and bilaterally in freshwater bivalve mussel *LamellidensCorrianus*.during summer season.

Material Method:

The freshwater bivalve molluscs, *Lamellidenscorrianus*, inhabits in the Nandrabad pond situated in Khultabdaluka 19km away from Aurangabad. During summer season the collection of 15 individuals of the shell length 95-110 mm were selected and were acclimatized to laboratory condition for 7 days. Surgical operations were performed so as to remove cerebral ganglia unilaterally and bilaterally within 30 seconds after lapse of 2 to 3 hours in the laboratory condition. The animals were divided into 3 groups non-operated, served as control and other two were experimental. In each group 5 animals were selected and after lapse of 7 days the animals were sacrificed and the gills, were dissected and dried in the oven to



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prepare the powder for estimation of glycogen, proteins and Lipids content in gills by using standard method such as Anthrone reagent for estimation of glycogen de Zwann and Zandee 1972, vanillin reagent method of Barnes et al. [1973] for lipid estimation and Lowey's method 1955 for protein analysis.. The value of estimate was subjected to statistical analysis.

RESULTS AND DISCUSSION:

Huge research work is accessible on the toxicity of heavy metals, organ pesticides and insecticides etc. in different aquatic animals related to effect on biochemical constituent levels in different tissues of animals but not so far on seasonal variation. Hence the present study was carried out to evaluate the changes during the summer season variation on nutritional value of glycogen, lipids and proteins the macronutrients in gills *L. corrianus*, when subjected to cerebralectomy. The present investigation also showed that these bivalves' exhibit total glycogen, protein, and lipid comparison with the three macronutrient the lipids, were maximum, in all the three group of animals due to favorable environmental condition. The glycogen content in gills in control group was significantly increased as compare to the experimental group, 2.5175 ± 0.0296 , 1.08425 ± 0.0084 and 2.040 ± 0.0120 respectively. Lipids: In the gills of control mussel, the Lipid level was observed in summer the content was 7.75 ± 0.04 showed a significant increase as compared to experimental mussels. In unilateral group mussel the content was 5.68 ± 0.14 and in bilaterally cerebralectomized mussel the gills content 5.03 ± 0.04 was observed. The proteins in the gills were the least, among the three macronutrient comparison, during summer in control group 0.05783 ± 0.0110 , in unilateral group it was 0.4645 ± 0.0222 and in bilateral cerebralectomized group the contents was 0.5471 ± 0.0110 respectively.

The results of the experiments were shown in Table. 1. The physico-chemical parameters of the water used in the experiments during summer season were also studied day length 13.07 temperature was 33°C ; pH 7.7; Dissolved Oxygen content 4.40 mg/L/h and Chlorides 17.89 mg/l.

Impacts of cerebralectomy were studied to determine the biochemical macronutrients glycogen, lipids and proteins content in gills of freshwater bivalve mussel, *Lamellidenscorrianus*. The mussel gills were analyzed to observe the effect of cerebralectomy unilaterally and bilaterally respectively. The data were exposed to various statistical analysis. Student's test was used to find out significance. The level of significance was used in the present study ($p < 0.001$, $p < 0.01$ and $p < 0.05$).

Lipid is an important dietary constituent, serve as reserve energy when food supply is scanty. In stressful environmental conditions, after glycogen and lipid is use as energy source (Shigmates and Takeshita, 1959) Lipid composition and storage strategy in mollusc, particularly of bivalves and gastropods have been studied since lipids constitute a major fraction of Mollusca tissues (Voogt, 1983). Almost concern the entire organism and only a few reports on the tissue distribution of fatty acids are available (Hagar and Dietz, 1986; Wenne and Polak, 1989). Seasonal variations in lipid and fatty acid compositions



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have been reported for several marine bivalve molluscs, including *Pecten maximus*, *Crassostrea gigas*, *Tapes decussatus*, *Tapes philippinarum*, *Scaphareinae quivalvis* (Pazos et al., 1996, 2003). Some of the other studies on bivalve fatty acids were concerned with analyses of whole animal (Watanabe and Ackman, 1974; Trider and Castell, 1980; Misra et al., 1985; Alkanani et al., 2007; Ekin et al., 2008). Furthermore, analyses on fatty acid composition of tissues were usually related to seasonal variations, sexual development and growth metabolism of marine bivalves, a few investigations have been done on freshwater forms (Pollero et al., 1981, 1983; Dembitsky et al., 1992, 1993; Ekin et al., 2008) and even less on organs and tissues of freshwater species have been reported. Proteins are most abundant intracellular macro-molecules and constitute over half the dry weight of most organisms. They occupy a central position in the architecture and functioning of living matter. They are intimately connected with all phases of chemical and Physical activity that constitutes the life of the cell. Therefore they are essential to cell structure and cell function. The interplay between enzymatic and non-enzymatic proteins governs the metabolic harmony they are also involved in major physiological events to maintain the homeostasis of the cell. Therefore, the assessment of the protein content can be considered as a diagnostic tool to determine the physiological process of the cell but very few literature is available on impact of cerebralectomy, hence the study was undertaken.

Conclusion:

Thus it might be concluded that the impact of removal of cerebral ganglia unilaterally and bilaterally has an inhibitory effect on macronutrient content metabolism. Thus, it can be concluded that cerebral ganglia may play an important role, mostly inhibitory one, in regulation of metabolic rate and organic reserve from gills. On general experiment showed that the effect was pronounced in unilaterally cerebralectomized group animals, these biochemical contents can be utilized for freshwater aquaculture to develop at commercial purpose in provision of adequate nutrition for growing population.

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Figure 1. The Macronutrient, contents in gills, of freshwater bivalve mussel, *Lamellidens corrianus*, during summer Season when subjected to cerebralectomy.



UCEL Unilateral Cerebralectomized animal group., BCEL -Bilateral Cerebralectomized animal group



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Table.1. The Macronutrient content, in gills, of freshwater bivalve mussel, *Lamellidens corrianus*, during summer Season when subjected to cerebralectomy.

Summer Season	Control group mussel	Unilaterally cerebralectomized group mussel	Bilaterally cerebralectomized mussel.
Lipids	7.75 ± 0.04	5.68 ± 0.14	5.03 ± 0.04
Proteins	0.5783 ± 0.0110	0.4645 ± 0.0029	0.5471 ± 0.0110
Glycogen	2.5175 ± 0.0296	1.8425 ± 0.0842	2.040 ± 0.0120



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