



Biochemical Profile, in *Lamellidens Corrianus* and its Nutritional Attributes

KEYWORDS

Lamellidens corrianus, Biochemical Profile, Cerebralectomy and Adductor Muscle

Dr SANGEETA B.DONGRE

DEPARTMENT OF ZOOLOGY, GOVERNMENT VIDARBHA, INSTITUTE OF SCIENCE AND HUMANITIES
AMRAVATI.M.S.

ABSTRACT *Bivalves are highly esteemed sea food and considered a delicacy throughout the world. All the cells of the body need a supply of chemical energy (in the form of glucose or fatty acids) which comes ultimately from food. Structural proteins, fats and mineral compounds (as in bone) are formed from the raw materials provided by the diet. Enzymes and their cofactors contain vitamins and mineral elements. The aim of this study is to highlight its nutritional importance. Biochemical composition and nutritional attributes in soft body tissues adductor muscle of bivalve's meat are discussed. Proximate composition, free fatty acid and total amino acid, glycogen, proteins lipids and cholesterol content were determined in soft body adductor muscle of freshwater bivalve *Lamellidens corrianus*. As a bonus, fish and shellfish are healthy foodstuffs, low in calories, and rich in proteins and super unsaturated fats. The present study emphasis on, Biochemical profile of bivalve, *Lamellidens corrianus* and its nutritional attributes, with its correlation with cerebralectomy.*

INTRODUCTION:

Bivalves have been exploited worldwide for food, ornamentation and pearls through, out human history. Freshwater mussels are distributed worldwide in lotic and lentic habitats. As filter feeders, freshwater mussels are ecologically important; they control seston, recycle nutrients and provide a trophic link between primary producer and predators, (Lewandowski, and Gardner and Malczyk,1991). Phylum Mollusca is the second largest phylum of animals. Nudibranch mollusks, which often are very colorful, are not protected by a shell and are named sea slugs, have attracted strong interest for their secondary metabolites, which are active in chemical defenses against predator. These compounds exhibit a large variety of chemical structures and have been shown to possess ichthyotoxic, feeding-deterrent and cytotoxic properties, to have antibacterial activity, to act as sexual pheromones and are responsible for various bioactivities, such as antitumor, anti-inflammatory and antioxidant activities.

A wide range of molluscs is eaten by man, including bivalves such as mussels, oysters and scallops, gastropods such as winkles and whelks, and molluscs that have lost their external shells but retain an inner pen - the squids and octopuses. The true shelled molluscs are often eaten whole after boiling, and sometimes raw. The flesh is very muscular, with low levels of fat, the mineral levels are usually higher than in true fish, and the vitamin levels are low. Fish and shellfishes have been found to be a major source of protein to both riverine and the general population at large, as they occur abundantly in the brackish and 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). The different species of these shellfishes are periwinkles (*Tympa-notomus* spp), oysters, prawns, snails and clams. The fresh water snails commonly harvested by the artisanal fishers are *Lanistes* spp, *Nucella* spp, *Bulinus* and *Pila*. Although, it has been found that shellfishes have high cholesterol, it is low in saturated fat which is not dangerous to human health. The land snail *Anchanchatina marginata* according to Orisawiyi (1989) is a high quality food rich in protein, low in fats and a good source of iron. Imebore and Adem-

oso (1988) also reported that snails have a protein content of 88.42% which compares with animal protein of 82.37% for pork and 92.75% for beef.

Molluscs are generally filter feeders and accumulate trace elements, both essential and contaminant, from the seawater. They are also very prone to contamination from pathogenic organisms in the water, and most countries have regulations about the sites where molluscs can be taken, and some require the animals to be "rested" in unpolluted water for a period before sale. Usually only the muscular mantles of squids and octopuses are eaten, after cooking. One of the greatest problems facing the world today is that of providing sufficient food of adequate quality for its teaming population. The food deficit situation is more intense with protein and mineral deficiencies (Adesihinwa and Ogunowmodede, 1995).

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. 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 and this has been attributed to the omega-3 content of these shellfishes. According to Len in Hubpages ,(2010).

The aim of the present research is therefore to study the nutritional composition of the freshwater bivalve *Lamellidens corrianus* which is abundant in freshwater Nandrabad pond near Aurangabad and how it can be popularized and incorporated in the diets of the teaming population. 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. As there is very little literature available in relation to role of cerebral gan-

glia in Biochemical profile content in adductor muscle of bivalve, *Lamellidens corrianus* and its nutritional attributes hence the present research has been undertaken.

MATERIALS AND METHODS

The adult freshwater bivalve mollusc, *Lamellidens corrianus* 95 -110mm in shell length were collected and were stocked in reservoirs water in laboratory for about 2-3h and immediately after bringing the animals to laboratory, the shells were brushed to remove the fouling algal mass the mud and other waste material. The bivalves were acclimatized in laboratory conditions and subsequent experimentation without food. After 24h acclimatization the animals were arranged in three groups, each group containing 10L of aerated reservoirs water. The first group were served as (a) control with intact ganglia and other two were experimental i. e. (b) unilateral cerebral ectomized group and (c) bilateral cerebralectomized group. The removal of cerebral ganglia was performed by keeping a wedge 45mm thickness, between two valves of the shell, with the help of fine sterilized forceps the ganglion is removed unilaterally and bilaterally, with minimum injury within 30seconds. The experiment was carried after 7days; the physico-chemical parameters were also measured. In each group 5 animals were selected, after the lapse of 7 days the animals were dissected and the soft body parts like anterior adductor muscle were removed and dried in oven at 80°C to prepare the powder for biochemical analysis of protein, lipids, glycogen, total free fatty acid, total free amino acid and Cholesterol. The glycogen content was estimated according to method proposed by DeZwann and Zandee (1972), using glucose as standard. The total Lipid was estimated by the vanillin reagent method of Barnes et al. [1973]. The quantitative determination of lipid by sulpho-phosphovanillin method depends on the reaction of lipids (extracted from the sample using chloroform:

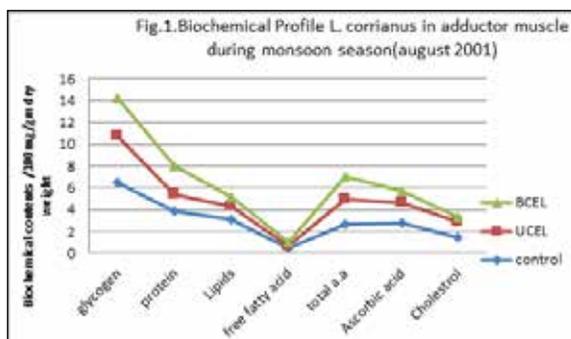
methanol) with sulphuric acid, phosphoric acid and vanillin to give a red colour complex. The total proteins were estimated by using standard method given by Lowery's method.(1951).Cholesterol is estimated by the method of Rudel and Morris (1973). Standard cholesterol in the range of 10–50 µg/ml is taken to which ferric chloride and sulphuric acid are added to develop colour. Absorbance is read at 560 nm and a standard curve is made. Fatty acid analysis by Fatty acids methyl esters (FAMES) were obtained by the method described by Metcalfe et al. (1966). Estimation of amino acids The experimental samples were finely ground for estimating the amino acids in the HPLC (Merck Hitachi L-7400) following the method of Baker et al. The results are expressed as milligram per 100mg of dry tissue. Triplicate values of glycogen, protein, Lipids, Free fatty acid Total Amino Acid and Colesterol content were subjected for confirmation using student's 't'; test Dowdeswell (1957).

Results and Discussion:

In matured animals of *L.corrianus*, the Glycogen content was determined in anterior adductor muscle of the bivalve which varied from 3.487±0.0560 (August 2002) to 6.5384 ±0.0560. In the experimental animals the content was significantly decreased as compared to control animals (Table 1). The protein content varied from 1.5146 ± 0.484 1to 3.9080 ± 0.1106. The lipids content varied from 0.877±0.4964 to3. 0888±0.0496 .In *L.corrianus* the cholesterol content varied from 0.3527± 0.1244 to 1.5078 ± 0.1254. The Ascorbic acid content 1.0584±0.0788 to 2.7854±0.0788, the free amino acid content varied from 2.1080±0.0498 to2.7007±0.0546.As the biochemical profile content when compared with the control animal the contents was significantly high in bilaterally cerebralectomized animal group in monsoon season in adductor muscle(Fig.1)

Table No. 1.The biochemical profile content in adductor muscle in *L.corrianus* during monsoon season August-2001 as compared with control group animal with experimental. (UCEL-unilaterally cerebralectomized animal., BCEL-bilaterally cerebralectomized group animals.)

Sr. no	Biochemical Profile(mg/ gm dry /100gm weight)	Control group Mean ±S.D	UCEL-group Experimental Mean ±S.D	BCEL-group Experimental Mean ±S.D
1	Glycogen	6.5384±0.0560	4.2004±0.0560	3.487±0.0560
2	Protein	3.9080±0.1106	1.5146±0.4841	2.6527±0.1180
3	Lipids	3.0888±0.0496	1.1934±0.1314	0.8775±0.4964
4	cholesterol	1.4191±0.2509	1.5078±0.1254	0.3527±0.1244
5	Ascorbic acid	2.7854±0.0788	1.8947±0.0787	1.0584±0.0788
6	Total free amino acid	2.7007±0.0546	2.2666±0.0548	2.1080±0.0498



Molluscs are delicious and protein rich food among the sea foods (Jagadis, 2005). The bivalves in the coastal line

could form an important source of food, raw materials for village industries, indigenous medicine, etc., and it is widely used as a cheaper food source for coastal area people. Shellfish such as mussel, clam contains approximately 20 to 28% calories of fat. Shell fish also provide high quality protein with all the dietary essential amino acids for maintenance and growth of the human body for this reason, shell fish should be considered a low fat, high protein.

Seasonal changes in biochemical composition (protein, glycogen, and lipid content) may be of great importance in relation to energy metabolism necessary to growth and reproduction (Jayabal & Kalyani 1986, and Lodeiros et al. 2001). Most of the living organisms derive their energy by the metabolic breakdown of carbohydrate. The chief reserve in the tissue is glycogen, which is release glucose, an utilizable sugar

by glycogenolysis according to the physiology demands of the organism. Any change in environment is known to have effects on the nervous system which in turn induce alteration in biochemical processes, especially those concerning carbohydrate metabolism, (Prosser, 1984). Seasonal changes in biochemical have been reported by , many workers, Ansell et.al (1964), De Zwann and Zandee (1972), Gabbott and Bayne (1973) determine seasonal changes in biochemical composition of adductor muscle ,mantle, siphon, and foot in *Mercenarid mercenarid* and *Mytilus edulis*. From India relatively few investigator such Bidarkar (1975) on *Crassostra cucullata*, Dhamane (1975) on *Paphia laterisuka*, Nagabhusanam and Mane (1975, 1978), *Mytilus viridis* ,Vedpathak (1989), *Lamellidens marginalis* ,Shaikh (2011) and *Lamellidens corrianus* and *Bellamya bengalensis*, Kamble and et al. (2012),

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 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. The primary goals of this study were to characterize the biochemical profile and the and its nutritional attributes hence the research has been undertaken in freshwater mussel *Lamellidens corrianus* , collected from Nandrabad pond near Aurangabad. Lipid composition and metabolism have been extensively studied in 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. As mentioned before, there were not much more studies on fatty acid composition of freshwater bivalve tissues. Among the known studies, only some of the freshwater bivalves ,,*Carunculina texasensis* (Hagar and Dietz, 1986),*Diplodom patagonicus* (Pollero et al., 1981), *Ligumiasubrostrata* (Dietz and Graves, 1981), *Diplodondelodontus* (Pollero et al., 1983), *Dreissenapolyomorpha* and *Unio* sp. (Dembitsky et al., 1992) and *Dreissena siouffi* (Ekin et al., 2008) have been reported, but very little attention is given on the role of cerebral ganglia in regulating the lipid metabolism hence the present investigation has been undertaken to study the impact of removal of cerebral ganglia unilaterally and bilaterally in freshwater bivalve mussel *Lamellidens Corrianus* during different season.

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