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Protein estimation of some edible coastal fishes of Ganjam district, Odisha, India

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Abstract
Fishes are excellent sources of easily digestible proteins. Ganjam district of Odisha, India has been bestowed with coast line providing distinctive prospect for marine fishing. The rivers like Rushikulya, Dhanei, Bahuda, Ghodahada are also the sources of fresh water fishes. In the current study, proteins were extracted from muscle and liver tissues of some selected edible fresh water and marine fishes of Ganjam district of Odisha coast. The comparative protein profiles of both muscle and liver tissues were studied. All the samples were repeated five times. The average protein content of 1gm muscle tissues of freshwater fish ranged from 68-110 mg and in liver tissues 68-76 mg and those of marine fish muscle tissues ranged from 44 mg to 94 mg and in liver tissues ranged from 50-82 mg respectively. More protein content is observed in fresh water fish muscle and liver tissues in comparison to marine edible fishes. The variation of concentration may be attributed to feeding behavior and climatic factors which influence the general biochemical composition of fish. Further in silico characterization and homology modeling of these proteins may shed more light on their adaptive radiation correlating nutritive value.

Keywords: fresh water, marine water, fish, protein, muscle, liver

Introduction
Fish proteins are rich in all the essential amino acids in contrast to most proteins from plant sources, which lack adequate amounts of one or more essential amino acids. The nutritive value of fish proteins is equal to or better than that of casein and red meat proteins because of their favorable essential amino acid pattern (Hoffman and Falvo, 2004) [1]. There are no significant differences in the amino acid composition of freshwater and marine fish. In the current study an attempt has been made to observe the protein presence level in the selected few species of marine and fresh water fishes commonly found in the district of Ganjam, Odisha.

Materials and Methods
Twenty species of living marine and fresh water edible fishes were collected from fish market of Berhampur city which belong to different places of Ganjam district. Specimens collected from all the captured species were brought into laboratory on to dissecting tray and were cut on the ventral side displaying all its organs. Then fresh sample of total liver and required amount of muscles were taken out from the fresh cut opened fishes on the whatman filter paper for drying. Soon after then required amount of samples of muscle and liver were taken for protein estimation. This was usually done at low temperature in order to maintain the original composition and prevent it from degradation and other environmental factors. Samples taken different species of different size and weight are selected for analysis. Required muscles and liver of fresh samples were taken. Protein was estimated by the method adopted by Lowry and coworkers (1951) [2]. Freshly weighed (50mg) tissues of muscle and liver of each species were homogenized with distilled water and were dissolved on 5ml of 5% TCA. Then it was cool centrifuged at 3000 rpm for 15 minutes. The supernatants were discarded and the residue was dissolved in 1N NaOH. From the above residue mixture 0.1ml of sample was taken in test tube, made to 0.5ml with distilled water and left for 5 minutes. 5ml alkaline copper solution (BR reagent) was added and was shacked well in a vertex for mixing thoroughly and left for 10 min. Then 0.5ml of (1:1) Folin phenol reagent was added and thoroughly mixed. The concentration of protein was estimated by ratio of optical density of sample to the optical density of standard. All the samples were examined five times.

Results and Discussion
In the current study proteins were extracted from muscle and liver tissues of some selected edible marine and fresh water fishes of Ganjam district of Odisha coast. The comparative protein profiles of both muscle and liver tissues were studied amongst different freshwater and marine species (Table 1 & 2).

Table 1: Protein composition of fresh water fish muscle and liver tissues

Sl. No.	Species	Protein Content in 1gm. Muscle tissues (mg)	Protein Content in 1gm. liver tissues (mg)
1	*Anabas testudineus*	68	76
2	*Channa punctatus*	80	68
3	*Channa straiatus*	84	68
4	*Channa orientalis*	70	68
5	*Clarias batrachus*	110	76
6	*Heteropneusstes fossilis*	82	76
7	*Mystus vittatus*	100	70
8	*Notopterus notopterus*	110	68
9	*Labeo rohita*	78	66
10	*Catla catla*	74	70

Table 2: Protein composition of marine water fish muscle and liver tissues

Sl. No.	Species	Protein Content in 1gm. Muscle tissues (mg)	Protein content in 1gm. Live tissues (mg)
1	*M.cephalus*	62	64
2	*R.kanagurta*	84	82
3	*S.indicus*	44	50
4	*S.gibbosa*	74	74
5	*T.kempi*	84	78
6	*M.cyprinoides*	86	80
7	*O.tardoore*	94	78
8	*P.arentenus*	87	76
9	*M.subviridis*	75	70
10	*P.pangasius*	62	62

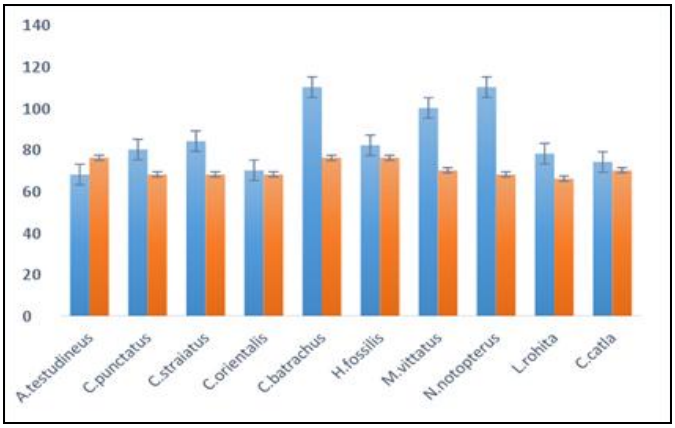

Fig 1: Approximate protein composition in fresh water fish muscle and liver tissues

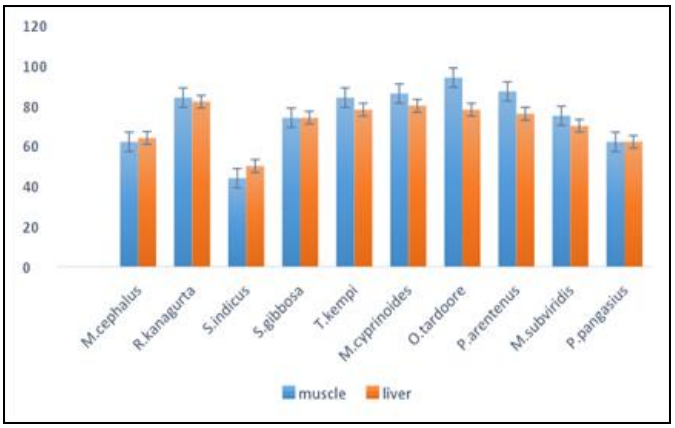

Fig 2: Approximate protein composition in marine water fish muscle and liver tissues

The average protein content of 1gm muscle tissues of 1gm muscle tissues of freshwater fish ranged from 68-110 mg and in liver tissues 68-76 mg and those of marine fish muscle tissues ranged from 44 mg to 94 mg and in liver tissues ranged from 50-82 mg respectively. (Fig.1 & 2). More protein content was observed in fresh water fish muscle and liver tissues in comparison to marine edible fishes. The variation of concentration may be attributed to feeding behavior and climatic factors which influence the general biochemical composition of fish (Boechat and Giani, 2000) [3]. Fresh water fishes could be recommended as a less expensive substitute for marine fish, particularly in combating protein malnutrition in early childhood, preventing heart diseases and in cases of deficiency of minerals and vitamins. Further in silico characterization and homology modeling of these proteins may shed more light on their adaptive radiation correlating nutritive value.

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