



## BIOCHEMICAL COMPOSITION OF DIFFERENT TISSUES OF *NOTOPTERUS NOTOPTERUS* (PALLAS, 1769) DURING PREPARATORY PHASE

**K P. Khaparde<sup>1</sup>, S. C. Masram<sup>2</sup>, U. R. Sonparote<sup>3</sup>,  
P. C. Sonarghare<sup>4</sup> and V. V. Baile<sup>2</sup>**

<sup>1</sup>M.B. Patel Arts Commerce and Science College, Sakoli, Dist. Bhandara

<sup>2</sup>PGTD of Zoology, RTM Nagpur University, Nagpur-440033, India.

<sup>3</sup>S.M.M. College of Science, Nagpur-440009, India.

<sup>4</sup>Sindhu Mahavidyalaya, Panchpaoli, Nagpur-440017, India.

kancha6211@gmail.com

### Abstract:

In the present study for the biochemical composition of fish *Notopterus notopterus* collected from Nagpur region. During the preparatory phase protein contents in the ovary, testis and serum are lowest. Liver it has a highest protein content of all tissues studied. Muscles proteins are also high in preparatory phase but it is high as compared to other tissues except liver.

**Keywords:** - *Notopterus notopterus*, preparatory phase, protein.

### Introduction

Water constituents about 71% of the earth's surface and has always been an important actual and potential source of food. There is an increasing demand for aquatic resources and fish products as dietary protein source around the World. (Feldhusen, 2000).

Biochemical studies on fish tissues have drawn the attention of several research because tissues are major source of protein carbohydrates and have high calorific value (Joshi *et al.*, 1979). Study of seasonal variations in biochemical constituents of fish, forms an important and interesting aspect of biochemical studies. Biochemical composition of fish varies from species to species and within the same species from one and another (Stansby, 1962). Seasonal variations in biochemical composition of the fresh water fishes have also been reported by earlier workers (Jafri and Khawaja, 1968; Sreenivasan *et al.*, 1963; Bano, 1977).

Fish is a rich source of protein, carbohydrates, minerals and vitamins etc. Protein are the most important characteristics of living matter and are also the principal constituents of protoplasm which form the material basis of life (Jain and Singh, 1981). Fish proteins contain all the essential amino acids (not synthesized and need to be provided in the diet) in the required proportion and hence have high nutritional values which contribute to their high biological value. The molecular weight of protein varies from about 12000 Daltons (bovine insulin) to several millions. Cell contain a very large number of proteins the number may be vary from 1000-2000 in the smallest bacteria to as many as 100000 different proteins in human cells. Proteins as with all other cellular

constituents are in a state of continuous turnover.

The reproductive function in fishes is primarily the job of the reproductive system. The components of the system are the sex glands or gonads, ovaries in the female and testis in the male and their ducts. The endocrine system plays an important regulatory role in reproduction (Lagler, 1977)

The liver is much in proteins because of metabolic potential being oriented towards it and is the seat for the synthesis of various proteins besides being the regulating centre of metabolism. (Nagaraju and Venkata Rathnamma, 2013).

The bulk of fish, other than its skeleton is formed by the striated muscles. Of the skeleton segmental muscles is also predominant in all jawed fishes. An axial muscle is the principal means of locomotion and contributes importantly to form (Lagler *et al.*, 1977). Plasma protein in fish have various function and are especially important for the regulation of water balance (Wideeyed *et al.*, 1977).

Fishes which are consumed as food by local people include the Carps, Catfishes, and some Clupeids etc. Fish selected for the present study is *Notopterus notopterus*. *N. notopterus* are the teleosts belonging to the order clupeiformes. The production of *N. notopterus* is comparatively very less than the carp, as the culture practices are not carried out on large scale because of non availability of fish seed. *N. notopterus* matures in the one year of its life.

In India, the data available on the biochemical composition of the fish is mainly related to their nutritive value. The present

study has been undertaken to correlate the variation in biochemical composition of ovary, testis, liver, serum and muscles in freshwater fish *N. notopterus* to its reproductive phase. This attempt has been made to find out whether the biochemical constituents i.e., protein content of *N. notopterus* at different times could be related to the reproductive cycle.

### Material and Methods

*Notopterus notopterus* fish selected for biochemical study of protein content in the preparatory phase of the reproductive cycle. The source of collection of fish from Futala lake of Nagpur region. Fishes were available throughout

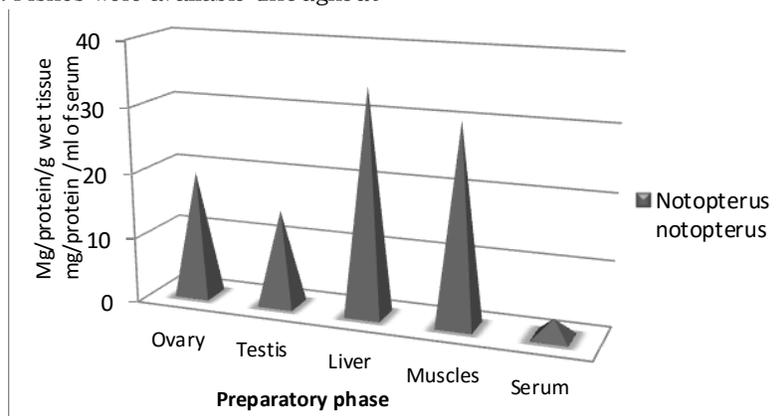
the period of practical work. The fish were killed by decapitation and serum, gonads (testies and ovaries) liver and muscle were dissected out and fixed in Ringers's solution.

The gonads, liver and muscles were estimated for the total protein contents by using the standard methods.

Estimation of total protein content by Lowry *et al.* Method (1951).

### Observation

The present work focuses is on Variation in protein content of different tissue and serum sample during preparatory phase in *Notopterus notopterus* (Figure 1)



**Figure 1:** Variation in protein content of different tissue and serum sample during preparatory phase in *Notopterus notopterus*

### Discussion

When the protein is quantitatively estimated in different tissues in the preparatory phase of the reproductive cycle lowest protein is found in the serum. Substantially very high amount of proteins is observed in the liver in all of them followed by muscles. Liver in all the species studied has highest amount of proteins compared to other tissues. Liver is the hormonal target as was as the site of synthesis of yolk precursor protein in *Platichthyes flexes* (Emmerson *et al.*, 1979).

Such a high amount of protein in liver can be due to the fact that the gonadal preparation for maturation has just begun in the preparatory phase and the liver protein or still not utilized in maturation of gonads. The seasonal cycle of protein and nitrogen fraction also seen to be influenced by maturation cycle and depletion of gonads. (Azam *et al.*, 2004).

The most remarkable activity takes place in liver where synthesis of yolk protein (vitellogenin) is initiated under the influence of estrogen. Increased metabolic activity in liver is accompanied by a rise in liver protein.

In the present study the preparatory phase muscles also have a high amount of proteins in both the males and females. In Powan (*Coregonus lavaretus*) a Salmonid fish also the percentage of protein in muscles is high than in any other compartment of the fish body (Doruca, 2000). Bigger fish have more protein in muscles.

Compared to liver and muscle, gonadal proteins are gradually lower in *Notopterus notopterus* studied seasonal pattern of protein and lipid demand of the gonads are studied by measuring fluctuation of protein fats and water in muscles in Cod, *Gadus morhua* (Love, 1970).

Serum protein when estimated in the preparatory phase is found to be lowest in quantity compared to other selected tissues. In some fish species, total serum proteins (Brooke, 1964) and calcium concentrations increased during spawning periods. Frequently these concentrations have been great enough to determine the sex of the individuals, where female levels of these blood constituents were two to three times those of the males. Serum total protein values during spawning season of Striped bass did not show elevated levels among either sex with female's levels. However, serum

calcium was much higher in females during spawning season than in males.

### Conclusion

The result suggests that the protein content of fish greatly varies during the different season. Biochemical studies of fish tissues are of considerable interest for their specificity in relation to the food values of the fish and for the evaluation of their physiological needs at different periods of life. Studies it can be conclude that the protein was used for body building during different phases of maturation. This fish is the most preferable food for human consumption because of its relatively high value of protein content in the fish.

### References

1. Azam K, Ali M.Y, Asaduzzaman M, Basher M.Z. and Hossain M.M. (2004) J. Biological Sci, 4 (1): 9-10.
2. Bano Y. (1977). Seasonal variation in the biochemical Composition of *Clarius batrachus* (L) Proc. Indian Acad. Sci. 85B3, 147-155.
3. Brooke H.F. (1964). Blood serum protein and calcium levels in yearling Brook trout. Progr. Fish-Cult. 26:107-110.
4. Dorucu M. (2000). Changes in Protein and Lipid content of muscle liver and ovaries in relation to *Diphylobothrium spp. (Cestoda)*. Infection in Powan (*Corgonus lavaretus*) from Loch Lomand, Scotland. Turk J. Zool. 24, 211-218.
5. Emmersen J., Karsgaard B. and Petersen I. (1979). Dose response kinetics of serum vitellogenin by estradiol 17 $\alpha$  in male flounders *Platichthys flessus* L. Comp. Biochemical Physical. 63, B1-6.
6. Feldhusen F. (2000). Microbe infection, 1651-1660.
7. Jafri A. K., and Khawaja D.K. (1968). Seasonal changes in the biochemical composition of the fresh water murrel *Ophiocephalus punctatus* (Bloch) Hydrobiology. Vol. 33 (3-4):497-506.
8. Jain K. K., and Singh C.P. (1981). Seasonal variations in the protein content of the muscles of fresh water teleost *Labeo gonius* (Ham). Ind J. Zool. 9(2), 75-79.
9. Joshi B.D. Gupta D.K. and Chaturvedi L.D. (1979). Biochemical Composition of some tissues of a fresh water fish *Heteropneustes fossilis* during winter months Matsya 5:47-49.
10. Lagler K.F., Bardach J.E., Miller R.R. and May Passino D.R. (1977). Ichthyology 2e. John Wiley and Sons
11. Love R.M. (1970). The Chemical Biology of fishes. Academic Press London and New York 547pp.
12. Lowry, O.M., N.J. Roserrough A.L., Farr and R.F. Randall (1951). Protein measurement with the foline phenol reagent-Jour. of Biology and Chemistry. 193:265-275.
13. Sreenivasan A. and Soundara Raj S. (1936). Variation in Chemical composition of freshwater fish *Labeo fimbriatus* Madras. J. Fish. 1:427-428.
14. Stansby M.E. (1962). Proximate Composition of fish. Fish in Nut r Britain. By Brikheen and Rudal Kronze Fishing News (Books) Ltd. Ludgate 110, London E.C.4 England.
15. Wedemeyer G.A., Yasutake W.T. Clinical Methods for the assessment of the effects of environmental stress on fish health. U.S. Fish and Wildlife Service Washington D.C. 1977.