Uttar Pradesh J. Zool. 32(1) : 137-139, 2012 ISSN 0256-971X

SEASONAL VARIATION IN PROTEIN CONTENT OF MUSCLES OF FRESHWATER CATFISH *NOTOPTERUS NOTOPTERUS* (PALLAS) IN RELATION TO SEX AND MATURITY CYCLE

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The present paper deals with the seasonal variations in the biochemical composition of muscles of the catfish *Notopterus notopterus* (Pallas). This fish is one of the commonest catfishes of India. It occurs throughout the country and forms the mainstay of inland fishery in many parts of India. It is a popular item of diet amongst the poor class of people and is sold rather cheaply. Among the catfishes, the nutritive value of *N. notopterus* is higher than that of other cat fishes. Many authors have studied the proximate biochemical composition of the muscle of catfishes (Airan, 1950; Natarajan & Sreenivasan, 1962; Kamal *et al.*, 2007; Jafri, 2011). Except for a recent study on biochemical contents of brain in the freshwater catfish, *N. notopterus* in relation to sex (Shahana Banu *et al.*, 2010), there has been no detailed account on the seasonal variation of biochemical constituents of various tissues of *N. notopterus* from Maharashtra, India.

Key words : Protein content, maturity cycle, *Notopterus notopetrus*.

INTRODUCTION

Fish can form a very nutritious part of man's diet, it is rich in most of the vitamins he requires, it contains a good selection of minerals and the proteins contain all the essential amino acids in right proportions. These amino acids are essential in the human diet for the maintenance of good health. Furthermore, if a diet is to be fully and economically utilized, amino acids must not only be present but must also occur in the correct proportions. Two essential amino acids called lysine and methionine are generally found in high concentrations in fish proteins, in contrast to cereal proteins. Thus fish and cereal protein can supplement each other in the diet. Fish protein provides a good combination of amino acids which is highly suited to man's nutritional requirements and compares favorably with that provided by meat, milk and eggs.

It has been well established that most of the biochemical constituents of fishes are subject to marked seasonal changes, which have been attributed to factors such as maturation, spawning, age, growth and feeding (John & Hameed, 1995). Many internal organs contribute to the development and maturation of gonads. Among these liver is the most important, since it synthesizes and releases a large number of substances according to physiological need of the animal. Nutrients for reproductive needs may also been drawn from the body musculature (Idler & Bitness, 1958). In the cat fishes, the body musculature is the main protein depot (Muhammad Yousaf *et al.*, 2011).

Notopterus notopterus (Pallas) is a one of the largest catfishes, whose culture is gaining importance in Indian subcontinent. It is abundantly found in Bhima river and constitutes the favorite items of the diet of local people. Information on the protein

content changes in relation to sex and maturity cycle is meager. The present research work is an attempt to evaluate the variations in protein content in the muscles in relation to sex and maturity.

MATERIALS AND METHODS

The fresh and healthy fishes were collected from Bhima river near Bhigwan, Pune District for biochemical estimation during the period January to December 2008. The fishes were washed thoroughly and the surface moisture was removed by blotting. The total length, body weight, sex and stage of maturity were determined based on findings of Nikolsky (1963).

The muscles were carefully removed, weighed to nearest mg using digital one pan balance, placed in vials and dried to constant weight in a hot air oven at 80^0C for 48 hrs. The dried samples were powered and stored in a dessicator for further protein analysis. The proteins in the muscle tissues were determined by the method of Lowry *et al.* (1951) using bovine serum albumin as the standard. Results were expressed as percentage of protein in dry tissue.

RESULTS AND DISCUSSION

The reproductive cycle of *Notopterus notopterus* can be divided into four phases: preparatory, prespawning, spawning and post spawning phase. The study showed the gonads were in the preparatory phase during January to March, prespawning phase from April to June , spawning phase from July to October and postspawning phase during November to December. Analysis of protein content from muscles during the different phases of maturity cycle showed that these molecules are actively synthesized and utilized for gonadal maturity. The mean values for each phase were calculated and the results are expressed as percentage of protein and given in the Table I.

The maturation of gonads of *Notopterus notopterus* under study was accompanied by considerable changes in protein content of various tissues. The protein content in both the sexes were low during the preparatory phase and increased during prespawning phase. The rise in protein content of male and female occurred simultaneously but decreased

Table I : Protein content of muscles of *Notopterus notopterus*

SR	Month	Percentage protein content	
		Male	Female
1	January	37%	28%
2	February	87%	75%
3	March	72%	127%
4	April	173%	89%
5	May	23%	27%
6	June	121%	92%
7	July	152%	89%
8	August	82%	53%
9	September	24%	98%
10	October	23%	153%
11	November	45%	124%
12	December	87%	123%

much earlier in female than the male. This difference might be due to mobilization of protein to ovary for the formation of yolk during vitellogenesis. The protein requirement of spermatogenesis may not be as demanding in the early phase and hence decline in the muscle was probably delayed in male. In males lowest protein was recorded in spent fishes, which might be due to heavy loss of energy during spawning. The observations are in concurrence with the earlier findings of Rao & Rao (2002) and Pawar & Mane (2006). In the present investigation protein content in the muscles of females were more than the males, which may be attributed to high feeding intensity in females than in the males.

Certain conclusion can be derived for better understanding of the nutritive value of *N. notopterus* and its dietary significance. The muscles of female showed higher protein content than the male. During maturation the protein content increases in the muscles. The protein content in the muscle was at maximum level in the late stages of maturation. These observations are in concurrence with the findings of Kumthekar (1988) in *Cirrhina reba*. Hence large sized fish during maturation, which have high protein content in the muscle, are at the optimum stage for use as food.

ACKNOWLEDGEMENT

The authors are thankful to the Principal, T.C. College, Baramati for providing necessary facilities. Author ANS is also thankful to the BCUD University, Pune for sanctioning a Project for 2008-2009.

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