



SEASONAL VARIATIONS OF PROTEIN IN THE OVARY OF FISH *CHANNA GACHUA*

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Abstract

The present study was carried out in the breeding seasons from 2004 to 2006. The ovary of fresh water fish *Channa gachua* was analyzed for its protein content during period of four different phases of reproductive cycle, in *Channa gachua* i.e. preparatory, pre-spawning, and post-spawning. Protein content found in preparatory phase was non-significant, and significantly increased from pre-spawning to spawning and declined in post-spawning (mg/g wet weight of ovary).

Key Words: Protein content, ovary, *Channa gachua*.

Introduction

Fish protein contains all essential amino acids which are easy to digest. The protein digested and assimilated is mostly incorporated in to muscles of the fish. Fats, on the other hand, have a high calorific value and stored in muscles, liver, intestine and gonads.

In the breeding season, the fish draws up from muscles protein and used and for the growth and development of the reproductive organs.

Knowledge of biochemical composition of fish is of great help in evaluating its nutritive value (Kingston and Venkataramani 1994). Though lot of work on biochemical composition has been undertaken very few (Bailey et al; 1952; Idler and Bitners, 1958; Brown, 1957; Gupta and Raina Sujata, 1977) have correlated with reproductive cycle. The protein content was studied in number of teleosts such as *Oreochromis mossambicus* (Pathan and Baile 2005), *Heteropneustes fossilis* (Hunge and Baile 2003), *Channa orientalis* (Saksena & Sexena 1999), *Claris batrachus* (Bana, 1977), *Garra mullaya* (Khan & Mehrotra 1991), *Schizothorax richardsoni* & *Glyptothorax pentinopterus* (Singh & Nauriyal, 1990). Reproduction in fishes depends upon co-ordinated actions of various hormones associated with brain-pituitary-gonadal axis (Evans, 1998). The hypothalamic-pituitary-gonadal level concerning the possible biochemical interaction in teleost was along this axis

(Pathan and Baily, 2005). In the present study, ovary has been selected to establish the possible correlation of metabolites and reproductive cycle.

In India, the data available on the chemical composition of fish, especially the fresh water fish, related mainly to their nutritive value. The present study has been undertaken to correlate the variations in biochemical composition of ovary in fresh water fish, *Channa gachua* to its reproductive phases. This attempt has been made to find out whether the biochemical constituents i.e. protein of *Channa gachua* at different times, could be related to reproductive cycle of ovary.

Materials and Methods

Live species of *Channa gachua*, were collected from Kham river near Aurangabad. Fishes were collected during the period of early March to late September. They were brought to Laboratory, weighted, scarified after pithing, to take out their ovaries. The ovaries were observed in each case and reproductive cycle was noted. Protein was estimated by drying ovary for 24 to 36 hours in an oven maintained at 68°C. This ovary was processed for their biochemical estimations of protein (Lowry et al, 1951).

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Result and Discussion

The values of protein obtained in female *Channa gachua* There two years data were given in table No.1. Protein content was found highest during spawning phase and attained peak values were (34.944 ± 4.023 , 38.0608 ± 1.8304 and 36.0042 ± 0.3426) and lowest in preparatory phase were (9.094 ± 0.549 , 8.5386 ± 0.7058 and 9.8674 ± 0.6704) mg/g.

Table No 1: Seasonal variation in the protein in ovary of *Channa gachua* (mg/g wet weight of ovary)

Sr. No.	Phases of Reproductive Cycle	Parentage of protein		
		2004	2005	2006
1	Preparatory Phase	9.094 ± 0.549 NS	8.5386 ± 0.7058 NS	9.8674 ± 0.6704 NS
2	Pre spawning Phase	17.357 ± 0.956 **	16.2332 ± 0.3998 **	17.7212 ± 0.8439 **
3	Spawning Phase	34.944 ± 4.023 ***	38.0608 ± 1.8304 ***	36.0042 ± 0.3426 ***
4	Post spawning Phase	16.385 ± 0.733 *	15.4335 ± 0.2335 *	16.9705 ± 0.7645 *

± SD Standards Deviation, NS-Non Significant

*=P<0.1, **=P<0.05, ***=P<0.01

In (early March to early June) preparatory and pre-spawning phases the low level of protein might be due to its active utilization by ovaries during the process of vitellogenesis. Observations in the present study correlates positively to the observations of Love, (1970) who stated that, the building up of gonad is always accomplished at the expense of body protein. Similar results have been reported by John and Hameed, (1995).

During spawning phase (i.e. late June to July) protein found to be increased and reaching maximum in spawning phase was attributed to low metabolic activity Bano, (1977), Macay & Tunison, (1936), Jafri, (1968) also noted the increased protein content in muscle and they also attributed in increment with gonad maturity. Increase in protein content of muscle with maturation of gonads which was the result of active feeding in pre-spawning phase.

Shreni (1980) stated that the protein cycle in fishes can be synchronized with maturity of fishes than feeding. The efforts have been put forth by Damberg (1964) and noticed a decline in muscles protein of *Gadus morhua* during growth of gonads.

During the present study it was noticed that ovarian protein started declining in August to early September i.e. period of post spawning phase Jafri and Khawaja (1968)

reported protein cycle in of *Ophicephalus punctatus* and showed correlation between feeding and spawning. Muscle protein started declining gradually during spawning and post-spawning phases. This decline of muscle protein can be attributed to its transfer in to ovaries to meet energy requirement of fish during spawning and postspawning phases. Decline of protein has also been reported by Srikar et. al. (1979) in *Clarias batrachus*; Somavanshi, (1983) in *Garra mullya*; and Luzzana et. al., (1996) in *Coregonid bondella*.

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Reference

- Bailey B.E. Carter N.M. and Sioain L.A. (1952). Marine oils with particular reference to those of Canada Bull fish. Res. Board Canada 89: 413p.
- Bano Y. (1977). Seasonal variation in the biochemical composition of *Claris batrachus* L. Proc. Ind. Acad. Sci. 85B3 147- 155.
- Brown M. E. (1957). The physiology of fishes Academic press, New York, N.Y. 447 P.
- Damberg (1964). Extraction of fish muscle, 4 seasonal variations of fat, water, soluble protein and water in Cod (*Godus morhua* L) filets. J. Fish Res. Board Can. 21 703-709.
- Evans D.H.(1998). The physiology of fishes 2nd ed. CRC Press.Boca roton, New York pp. 441-464.
- Gupta K. and Raina Sujata (1977). Seasonal Biochemical variations in the ovary of *Channa gachua* (Hem) (137-142). Advan. Fish. Wild life Ecol. Biol.
- Idler D.R. and Bitners I. (1958). Biochemical studies on *Sockeye salmon* during spawning migration cholesterol, fat, protein and water in flesh of standard fish. Con. J. Biochemical. Physiol., 36: 793-798.
- Hunge T.R. and Baile V.V. (2003). Annual variation in a protein glycogen and cholesterol; in liver and testes of cat fish. *Heteropneustes fossilis* (Bloch). Trends Life Sci. (India)18 (2): 111-116
- Hyder M. (1970a). Histological studies on testis of pond specimens of *Tibapia nigra* (Gunther) Pisces: (ichlidae) and the complications on the pituitary

- testis relationship. Gen. Comp. Endocrinol, 14:198-211.
- Hyder M. (1970b). Gonadal and reproductive patterns in *Tilapia leucoatica* (Teleostei: Cichlidae) in an equatorial lake Naivasha (Kenya). J. Zool. Land 162:179-195.
- Jonh T. Sophy and Hameed M. Shanul (1995). Biochemical composition of *Nemipterus japonicus* and *Nemipterus leptilepis* in relation to maturity cycle. Fishery Tech Vol.32(2): 102-107
- Jafri A. K. & Khawaja D. K. (1968). Seasonal changes in biochemical composition of fresh water murrel *Ophiocephallus punctatus* (Bloch). Hydrobiologia, 32 (1-2): 206-218.
- Khan E.A. and Mehrothra P.N. (1991) Variation of liver protein and RNA in relation to egg maturation in a hill stream teleost *Garra millaya* (Sykes). J. Reprod. Biol. Comp. Endocrinol. 3 (1): 47-52.
- Kingston S. David and Venkataramani V.K.(1994) Biochemical composition yellow stripe scad, *Selaroides leptolepis* as a function of maturity stage and length fishery Tech. Vol 31 (2): 159-162.
- Love R.M. (1970) "The chemical Biology of fishes" Academic press, London.
- Lowry O.H. Rosebrough N., Farr A.L. & Randall R.J. (1951). Protein measurement with Folin Phenol reagent. J. Biol. Chem. 193; 265-285.
- Luzzana U. Serrini, G. Moretti V.M. Grimaldi P. Paleari M.A. and Valfre F. (1996): Seasonal variations in fat content and fatty acid composition of male and female *Coregonid bondella* from Lake Maggiore and Land locked shad from Lake Cemo (North Italy). J. Fish Boil. Vol. 48, No.3 352-366.
- Macay M. and Tunison A.V. (1936): Cortland Hatchery Report No. 5. N.Y. State Cons. Deptt. Us Bur of fish and Cornell Univ.
- Pathan J.G.K. & Baile V.V. (2005). Protein variation in relation to the reproductive cycle in male *Tilapia*, *Oreochromis mossambicus* (Peters). Nat. J. Life, Sci. 2 (1-2), 1-10.
- Saksena D.N. & Sexena M. (1999). Event of biochemical intergration during the reproductive cycle found in murrel *Channa orientalis* (Lin) In Ichthyol. Res. Advan. 345-354 oxford & 1BH publishing.com. Pvt. Ltd. New Delhi.
- Shreni D. Kalpana (1980). Seasonal variations in the chemical composition of cat fish. *Heteropneustes fossilis* (Bloch). Proc. Ind Acad Sci. (anim. Sci.), Vol 89, No. 2. P 191-196.
- Singh H.R. & Nauriyal B.P. (1990). A comparative study of some biochemical constituents in the reproductive cycle of hill stream teleosts. *Schizothorax richardsonii* (Gray) & *Glyptothorax pectinopterus* (Meleod). Proc. Natl. Acad. Sci., India 16B 117-123.
- Somvanshi (1983). Seasonal changes in biochemical composition of Hill stream fish *Garra mullya* Ind. J. Fish. Vol. 30 (1).
- Srikar L.N., Keshavanath P. Peter M. (1979). Changes in biochemical composition of *Claris batrachus* in before and after spawning, Mysore J. Agr.