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VARIATION IN GLYCOGEN OF *GLOSSOGOBIUS GIURIS* (HAMILTON) FROM SADATPUR LAKE IN RELATION TO SEX AND MATURITY

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Variation in glycogen content in the gonads, liver and muscles of *Glossogobius giuris* from Sadatpur lake near Pravaranagar found to be influenced by breeding cycle and feeding intensity. During maturation the glycogen contents increased in the gonads and liver while decreased in the muscles. In the muscles, glycogen content increase during spent condition indicates high feeding intensity. In general the glycogen content was more in the gonads, liver and muscles of females as compared to males.

Key words : Glycogen, maturity cycle, *Glossogobius giuris*.

INTRODUCTION

The seasonal changes have been attributed to various physiological and other factors such as maturation, spawning and feeding (Jaquot, 1961). Many internal organs contribute to the development and maturation of gonads. Among these liver synthesizes and releases a large number of substances according to physiological need of the animal. The use of muscle tissues as an energy source has been well documented in Salmon (Idler & Bitners, 1958).

The gobiid fish *Glossogobius giuris* is quite abundant in Sadatpur lake near Pravaranagar, and it forms subsistent fishery. This fish is one of the favorite items of the diet of local people. Information on the glycogen content changes in *G. giuris* in relation to maturity cycle is scanty. The present investigation was undertaken to study the variation in glycogen in different body tissues like gonads, liver and muscles in relation to sex and maturity cycle in *G. giuris*.

MATERIALS AND METHODS

Monthly samples of *G. giuris* were collected from fishermen catches of Sadatpur lake near Pravaranagar in Maharashtra during June 1999 to September 2000. After brining them to laboratory, the total length, body weight, sex and stage of maturity were determined following methods of Nikolsky (1963).

The fishes were washed thoroughly and surface moisture was removed by blotting. The muscular, hepatic and gonadal tissues were dissected, weighed to nearest 1 mg using digital balance (Precisa-310 M), placed in separate vials and dried to constant weight in a hot air oven at 80^0C.

The dried samples were powdered and stored in a dessicator for glycogen analysis. The

optical density of the colour deveioped for glycogen was measured using spectrophotometer (Elico, SI 171 mini spec). The glycogen content was estimated according to Kemp & Kitz (1954) using D-glucose as the standard. Results were expressed as mg/ 100mg dry tissue. The results were subjected to statistical analysis and were expressed as arithmetic means with their standard deviation. The student 't' test was applied to determine the differences between the successive phases (Biradar, 1988).

RESULTS AND DISCUSSION

On the basis of gonadosomatic index, the maturity cycle of *G. giuris* can be divided into four phases : preparatory, prespawning, spawning and postspawning phase. Fluctuations in the glycogen content of gonads, liver and muscle have been studied in both the sexes in relation to maturity cycle. The mean values of glycogen for each phase were calculated and the results were expressed in mg of glycogen/ 100mg of dry tissue (Fig. 1; Table I).

The maturation of gonad of *G. giuris* under study was accompanied by considerable changes in the glycogen content of various tissues. The glycogen content in the gonads of both the sexes increased from preparatory to spawning phase and decreased during post spawning phase. According to Grecne (1921) and Yanni (1961) the glycogen and glucose accumulate in the ovary during maturation. But the changes in the carbohydrate reserves of the fish seen mostly to reflect the requirements of the developing ovaries. In the present investigation the glycogen content also increased in the gonads during maturation. The glycogen content in the ovaries was found to be more than the testis.

The glycogen content in the liver of both the sexes increased from preparatory to prespawning and decreased during spawning and postspawning phases. Similar results were also obtained by Dawson & Grimm (1980) in *Pleuronectes platessa*. Podroschko *et al.* (1985) in *Blennius pavo* and John & Hameed (1995) in *Nemipterus japonicus* and *N. mesoprion*. The glycogen content in the liver of female was higher than the male.

Love (1970) stated that carbohydrates play an insignificant role as energy reserves in aquatic animals. In both the sexes, decrease in glycogen content in the muscles from preparatory to spawning phase, might be due to increased movement of fishes during pre-

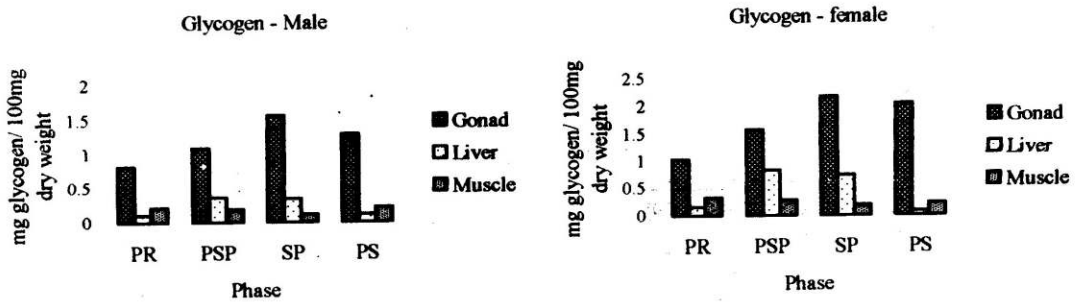

Fig . 1 : Variations in the glycogen (mg/ 100 mg dry weight) content of various tissues of *G. giuris* during different phases of breeding cycle.

Table I : Variations in the glycogen content of various tissues of *G. giuris* during different phases of breeding cycle. Values represent amounts in mg/ 100 mg of dry weight.

S. No.	Phase	Male			Female		
		Gonad	Liver	Muscle	Gonad	Liver	Muscle
1.	Preparatory (PR)	0.822 ± 0.05	0.108 ± 0.02	0.218 ± 0.01	1.040 ± 0.03	0.166 ± 0.01	0.331 ± 0.01
2.	Prespawning (PSP)	1.093^{NS} ± 0.49	0.366^{NS} ± 0.0.25	0.188^{NS} ± 0.09	1.575^{NS} ± 0.64	0.831^{NS} ± 2.38	0.282^{NS} ± 0.19
3.	Spawning (SP)	1.567^{NS} ± 1.04	0.349^{NS} ± 0.22	0.122^{NS} ± 0.10	2.172^{NS} ± 2.21	0.749^{NS} ± 0.02	0.197^{NS} ± 0.04
4.	Postspawning (PS)	1.289^{NS} ± 0.33	0.121^{NS} ± 0.02	0.221^{NS} ± 0.04	2.051^{NS} ± 1.69	0.085*** ± 0.01	0.229^{NS} ± 0.07

All values are expressed as mean ± S.D.; NS : Non significant; *** : $p < 0.001$.

spawning and spawning phase, where glycogen serves as primary fuel for explosive works (Schul'man, 1974). Depletion of muscle glycogen content during maturation period indicates great amount of energy required by the fish during maturation cycle (Rao & Rao, 2002). During postspawning, a gradual rise in glycogen content was observed in both the sexes, which might be due to increased feeding rate after spawning. Similar results were also reported by Sonawane *et al.* (2001) in *Cyprinus carpio* and Shendge & Mane (2005) in *Cirrhina reba*. In general muscles of females showed higher glycogen content than the males.

A critical appraisal of the data reveals that during gonad maturation, the glycogen content increases in the gonads and liver while decreases in the muscles. Overall study showed that glycogen content in the gonads, liver and muscles was higher in females than the males.

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