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OVARIAN AND HEPATIC BIOCHEMICAL CORRELATIVE CHANGES IN THE FRESH-WATER FISH, *LABEO BOGGUT* (SYKES.)

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Biochemical contents in the ovary and liver of the freshwater fish, *Labeo boggut* have been studied during 12 months period and variations are correlated with the reproductive cycle. Ovarian lipid, protein and glycogen gradually increase from maturing phase reaching maximum during mature phase. Hence, they are directly proportional to the reproductive cycle whereas indirectly proportional to the hepatic contents. This reflects utilization of components from the liver for ovarian growth and spawning. Cholesterol increases during maturing phase and decreases in the developed ovary indicating its availability for steriod production during maturing phase for vitellogenesis.

INTRODUCTION

Labeo boggut is a commercially important fish having high protein content and taste. Although studies pertaining to the reproductive cycles of Indian freshwater fishes are available (Malhotra *et al.*, 1989), the seasonal biochemical variations correlating ovarian and hepatic contents have not been given much attention. There are a few reports on this aspect in other fishes (Verma *et al.*, 1985; Piska & Waghray, 1989). Hence, keeping in view of the commerical importance of *L. boggut* an attempt is made to study the storage and utilization of hepatic contents for ovarian growth and vitellogenesis.

MATERIAL AND METHODS

The fish *L. boggut* (14-20 cm in length and 28-46 gm body weight) were collected from Bhosga reservoir 8 km away from Gulbarga city during 1991-92. They were brought in live condition to the laboratory every month. Weight of fish was recorded and then sacrificed for further studies. Ovary and liver were dissected and their weights were taken for the determination of gonadosomatic index (GSI) and hepatosomatic index (HSI). The tissues were processed for biochemical estimations of protein (Lowry *et al.*, 1951), lipid (Folch *et al.*, 1957), glycogen (Carrol *et al.*, 1956) and cholesterol (Abell *et al.*, 1952). The results were expressed as arthematic means with their standard deviation.

OBSERVATIONS

The ovarian cycle based on gonadosomatic index, hepatosomatic index and histological observations can be divided into immature, maturing, mature, ripe and spent phases. The gonadosomatic index, hepatosomatic index and biochemical contents of ovary and liver for twelve months period is presented in Table I and II. The observations indicate that *L. boggut* has prolonged breeding period starting from February to July where development and maturation of oocytes in the ovary takes place. August and September are post-spawning months. Spent ovary was seen during October.

The hepatic and ovarian contents such as protein, lipid and glycogen increase gradually from maturing to mature phase during February to June and thus show direct relationship with reproductive stages. The hepatic contents decrease gradually from maturing to mature and, increase during immature phase exhibiting inverse relationship with the ovarian contents. This decrease in the liver may be related to utilization for ovarian growth and spawning. The cholesterol content of ovary and

Table I. Showing monthly variation in the Gonadosomatic index (GSI) and the amount of protein, glycogen, lipid and cholesterol of ovary of *Labeo boggut*.

Months	GSI	Protein	Glycogen	Lipid	Cholesterol
January	0.42 ± 0.02	29.89 ± 0.12	4.23 ± 0.08	22.50 ± 0.12	667.46 ± 10.2
February	1.22 ± 0.08	37.42 ± 0.08	4.84 ± 0.08	29.50 ± 0.08	898.42 ± 9.80
March	2.62 ± 0.16	41.98 ± 0.16	7.06 ± 0.10	50.68 ± 0.14	2798.40 ± 12.6
April	4.27 ± 0.18	62.42 ± 0.21	10.63 ± 0.10	75.62 ± 0.14	3464.52 ± 12.6
May	9.64 ± 0.28	98.94 ± 0.32	12.83 ± 0.12	105.72 ± 0.12	2906.41 ± 10.2
June	18.06 ± 0.14	136.41 ± 0.34	14.52 ± 0.08	138.21 ± 0.12	2412.40 ± 08.2
July	21.05 ± 0.16	121.64 ± 0.36	13.72 ± 0.10	121.64 ± 0.10	2098.64 ± 10.2
August	5.93 ± 0.12	86.42 ± 0.22	13.12 ± 0.12	85.71 ± 0.10	1019.41 ± 08.6
September	2.21 ± 0.08	57.42 ± 0.12	6.72 ± 0.12	65.10 ± 0.16	980.71 ± 06.2
October	1.82 ± 0.08	43.72 ± 0.16	5.07 ± 0.08	61.72 ± 0.18	742.42 ± 09.6
November	0.92 ± 0.06	31.94 ± 0.12	3.67 ± 0.07	43.64 ± 0.12	701.41 ± 12.2
December	0.32 ± 0.08	30.92 ± 0.10	4.02 ± 0.08	28.49 ± 0.10	598.72 ± 09.2

Protein, lipid, and glycogen expressed in mg/gm, wet weight of tissue and cholesterol mg/100 gm of tissue. Each value represents mean and S.D. of ten observations.

Table II. Showing monthly variation in Hepatosomatic index (HSI) and the amount of protein, glycogen, lipid and cholesterol of liver of *Labeo boggut*.

Months	HSI	Protein	Glycogen	Lipid	Cholesterol
January	2.26 ± 0.08	142.64 ± 0.24	41.13 ± 0.12	72.00 ± 0.21	3164.72 ± 10.9
February	1.87 ± 0.06	121.72 ± 0.21	35.62 ± 0.10	54.21 ± 0.20	3068.70 ± 09.8
March	0.93 ± 0.08	102.46 ± 0.22	31.11 ± 0.12	38.71 ± 0.21	2989.42 ± 10.2
April	0.79 ± 0.02	87.46 ± 0.14	27.58 ± 0.12	33.42 ± 0.22	2794.61 ± 08.8
May	0.71 ± 0.06	68.92 ± 0.20	24.65 ± 0.16	24.98 ± 0.18	2796.40 ± 06.8
June	0.52 ± 0.08	40.73 ± 0.22	24.63 ± 0.12	21.64 ± 0.12	2912.42 ± 06.2
July	0.57 ± 0.09	41.78 ± 0.12	24.89 ± 0.10	29.42 ± 0.18	2968.70 ± 08.6
August	0.87 ± 0.08	57.64 ± 0.10	24.91 ± 0.08	30.61 ± 0.14	2969.41 ± 06.9
September	0.98 ± 0.08	78.92 ± 0.18	27.57 ± 0.10	35.67 ± 0.18	2997.40 ± 08.2
October	1.08 ± 0.09	92.41 ± 0.14	27.80 ± 0.12	46.70 ± 0.12	3019.24 ± 0.8.0
November	1.85 ± 0.08	102.41 ± 0.21	35.42 ± 0.12	57.52 ± 0.22	3042.14 ± 08.2
December	2.09 ± 0.10	116.73 ± 0.18	40.98 ± 0.14	68.43 ± 0.14	3098.92 ± 09.1

Protein, lipid, glycogen expressed in mg/gm, wet weight of tissue and cholesterol in mg/100 gm of tissue. Each value represents mean and S.D. of ten observations.

liver which was almost same, however, exhibited seasonal increase during growth phase (maturing) suggesting its role in steroid hormone production needed for ovarian vitellogenesis.

DISCUSSION

It is known that the liver stores glycogen, protein, lipid and cholesterol for utilization during the reproductive cycle of the ovary (Rao, 1967). The protein level in the ovary and liver appears inversely related in *L. boggut*. The ovary has maximum content of protein during mature phase whereas in the liver it reaches minimum during mature phase. The ovarian protein is minimum during immature phase but hepatic protein is maximum at this phase. Thus it appears that hepatic synthesis of protein is for contribution to ovarian protein. Such observation are made in *Channa punctatus* and *Heteropneustes fossilis* (Verma *et al.*, 1985). Glycogen of both ovary and liver also show inverse relationship, being highest in the ovary and lowest in the liver during mature phase, lowest level in the ovary and higher level in the liver during immature and spent phases. This indicates that the carbohydrates, perhaps, synthesised from monosaccharides are depleted from the liver during the mature phase. Lipid contents of the ovary and liver show similar inverse relationship as that of protein and glycogen, maximum ovarian content during the mature phase and minimum during spent and immature phase. The low levels in the liver during mature phase indicate possible incorrporation of the hepatic lipid for synthesis of yolk. In *Salmo* Idler & Bitner (1960) found overall decrement in the hepatic lipid and subsequent increase in the ovarian content. The depletion of both glycogen and lipid at the beginning of exogenous vitellogenesis has also been observed in hepatic cells of the female zebra fish, *Brachydanio* (Peute *et al.*, 1978) thus suggesting required materials for exogenous vitellogenesis are synthesised in the liver and is transported through blood which subsequently gets incorporated into the oocytes. Ovarian cholesterol does not show any inverse relationship with liver. However, it exhibits seasonal changes, maximum content during maturing phase which reduces during the mature phase, suggesting its availability for steroid hormone production needed for oocyte vitellogenesis. Cholesterol content in the steroidogenic tissues has been shown to be associated with the production of female hormones (Premjith *et al.*, 1992). These results indicate that there is existance of positive biochemical relationship between ovary and liver for oocyte growth in *L. boggut*.

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