

ABSTRACT

The fish species chosen for present studies is an important warm water major carp, *Catla catla* of 18-29 months of age. This study is first of its kind in Pakistan, describes the integrated role of environmental and hormonal changes during first maturational cycle of catla. No comprehensive study has been reported to date, even from other countries of world, on dynamics of serum steroids during the its first sexual cycle. The correlative study, involving both histological and environmental factors shows that photoperiod, air and water temperatures play a key role in control of sexual maturity. Increasing photoperiod and temperatures accounted for the initiation of testicular development which reached its peak in June when their values were maximum. Serum profiles of testosterone, 11-ketotestosterone and estradiol-17 β also exhibited markedly high values in June. However, 11-ketotestosterone showed its peak in May (7.04 ± 0.00 ng/ml), directing towards its important role in later process of spermatogenesis and spermeiogenesis. On the other hand, gradual increase in testosterone concentration from March till June with its peak in July (0.67 ± 0.10 ng/ml) indicated towards its main role in initiation of testicular activity and its further developmental advancement. Serum concentration of estradiol- 17 β coincided with testosterone profile, indicating its possible role in late mitotic activity of testes. However, cortisol profile showed a negative correlation with those of sex steroids which were found to modify pituitary- interrenal axis, thus inhibiting the cortisol synthesis. Cortisol was found to be involved in strong correlation with gross body growth of fish. On the basis of GSI data, spawning time seemed to lie between mid-June and mid-July, but no spawning was observed in the pond, where fish were kept. Absence of any free running specimen and very little volume of thick milt released on pressing the abdomen confirmed the previous studies reporting lack of spawning in this species, in pond culture. However, like wild fish, heavy rainfalls of monsoons in July appeared to act as the final cue for spawning (although not observed in pond conditions) and commencement of testicular regression period. In postspawning period (late July-August), serum concentrations of sex steroids dropped, pointing towards regressed testicular activity. However, peak of testosterone in July might be because of its slow clearance from blood circulation. In September a slight increase in

concentrations of all these sex steroids, coinciding with a minor rise in GSI value showed the start of spermatogonial proliferation before the onset of winter seasons, when testes encountered low temperatures and photoperiod, resulting in the completely regressed testicular development. Overall, both environmental and endocrine factors collectively entrain the annual gonadal cycle in male *Catla catla* as observed in many teleosts.