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# STUDY ON THE GONOSOMATIC INDEX OF *OREOCHROMIS* MOSSAMBICUS (FEMALE) COLLECTED FROM THE RIVER OF SHAHDOL DISTRICT.

Zoology

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## ABSTRACT

Study on Gonosomatic index (GSI) of female fresh water teleost *Oreochromis mossambicus* fish were studied during one year January 2019 to December 2019. Fish samples were collected from river of Shahdol district. In teleost fishes the gonadosomatic index is the basic indicator of gonadal functioning. The experiments were conducted during all three seasons of fish reproduction, pre-spawning, spawning and post-spawning. After measuring morphometric parameters, gonads were dissected out and preserved in bouin's fluid for 24 hours for further experiment. Simultaneously GSI was also calculated using formula of Khallaf and Authman. After observation we concluded that GSI values in females of this species were lowest in March (1.30g) and steadily increased to a peak in August (5.639g). The GSI value showed a declining trend from September onward and reached the lowest during October and after that the GSI value increased with a peak in January (5.031). Two peak spawning period occurring August and January, This means that female fish could breed more than once in a year.

## KEYWORDS

Gonosomatic index (GSI), *Oreochromis mossambicus*, Reproduction, Spawning.

## INTRODUCTION

The *Oreochromis mossambicus* also know as Mozambique tilapia, mouth brooder, Kurper or mud bream (South Africa). Mozambique is polygynous mating system, sexually dimorphic, maternal mouth brooder. The typical size range (TL) reported for adult male is 30-40 cm from tropical/ subtropical regions where conditions are within the species normal tolerance ranges. Adult females are smaller and under similar condition, range approximately in size from 25-33 cm. Mozambique tilapia consumes a wide range of food items, although it is predominantly a benthic feeder on plant material including filamentous and unicellular algae, water weeds, terrestrial plants and organic detritus.

The highly invasive *O. mossambicus* has been implicated in the decline or disappearance of resident species from freshwater, estuarine and marine habitats in several countries following its introduction. Mature males aggregate at the start of breeding season in shallow margins of water bodies and establish courtship arenas. Reproduction is regulated by temperature with spawning thresholds for the species reported between 18 and 25c. The major regulation factor in gonadal development in tilapia, as in other warm water fishes appears to be temperature. During the colder months, spermatogenesis in males may be slowed down and Vitellogenesis in females completely inhibited, i.e., the spawning threshold appears more to be related to temperature effects on gonad development in female then in males.[3,5,6]

Studies have demonstrated that overcrowding by exotic fishes, including tilapias, can have debilitating effect on native species.[2, 4,8,10] Significant decreases in the size of native fishes caught and overall contribution to fish production in several lakes and reservoirs in India and Sri Lanka were reported following the introduction of *O. mossambicus*.[1, 3, 8, 9] Both male and female *O. mossambicus* are territorial and aggressive during the spawning season.[6,7]

## MATERIALS AND METHODS

Experimental fish *Oreochromis mossambicus* were collected from river of Shahdol. Sampling started in January to December 2019. The samples were carefully transported to the laboratory. The experiments were conducted during all three seasons of fish reproduction, pre-spawning, spawning and post-spawning. After measuring morphometric parameters, gonads were dissected out and preserved in bouin's fluids for 24 hours for further experiment.

In laboratory before dissection and removal of gonads total body weight in gram (g) and length of fishes in centimeter (cm) were recorded. After measurement an incision was made on ventral side of the abdomen and gonads were separated carefully. Immediately the weight and length of gonads also were measured.

Gono-somatic Index of fish was calculated according to the formula of Khallaf and Authman (2010).

**GSI= g/G×100**

Where, g = Weight of gonad, G= Weight of Fish

## RISULTS & DISCUSSION

### Body weight

At the start of experiment in January the mean body weight was (79.10g) the body weight started increasing gradually and reached (88.30g) in august, when the ovaries were fully developed (**Table 1**)

### Gonad weight

The weight of Ovary (1.30g) was the lowest in March and October (2.01g), while the highest values (5.639g) were encountered in August and January (5.031g) (**Table 1**)

### Gonadosomatic index (GSI)

The GSI showed monthly variations and GSI increases with the maturation of fish, being highest during the peak period of maturity and declines after the spawning. In present study, the female index values were lowest in March (1.870g) and steadily increased to a peak in August (5.639g). The GSI value showed a declining trend from September onwards and reached the lowest during October and after that the GSI value increased with a peak in January (5.031g). The GSI values reached at peak in the month of May to August and November to January. The monthly distribution of Gonosomatic index (GSI) of female *Oreochrimis mossambicus* is given in Table-1 and Figure-1.

The Ovary of *Oreochromis mossambicus* is bilobed organ lying just ventral to the air bladder and is attached to the body cavity by a thin membrane mesovarium. The spindle shaped ovary on the left side is slightly greater in length than that of the right side and they remain separated from one another throughout their length, at about two third of their length, both the ovaries fuse to form a thin walled oviduct which opens outside through the genital pore. The last one-third part of the ovary of each side behind the oviduct remains as a posteriorly extended sac. The matured ovary is orange yellow in colour with distinct granular appearance. Ova are visible through the ovarian wall, to naked eyes.

The GSI, which is indicative of the breeding season of the fish, was calculated from January to December. There was a spectacular rise in the values in May to August and November to January. The highest gonado-somatic index of female *Oreochromis mossambicus* was 5.639 in August and the lowest was 1.30 in March. The present experiment indicated that the fish spawn once in year during May to August with a peak in August and November to January with a peak in January.

**Table No.1**

| Month | Water Temperature | Average Weight of Female fish (gram) | Average Weight of Ovary in (gram) | Average GSI of Female fish % |
|---|---|---|---|---|
| Jan. | 21.3 | 79.10 | 3.98 | 5.031 |
| Feb. | 22.4 | 70.20 | 2.30 | 3.276 |
| March | 22.9 | 69.51 | 1.30 | 1.870 |
| April | 23.7 | 68.30 | 1.33 | 1.941 |
| May | 23.9 | 72.12 | 1.56 | 2.163 |
| June | 24.5 | 75.40 | 2.20 | 2.917 |
| July | 24.6 | 78.50 | 3.10 | 3.949 |
| August | 24.8 | 88.30 | 34.98 | 5.639 |
| Sept. | 23.9 | 76.50 | 2.11 | 2.758 |
| Oct. | 23.5 | 74.19 | 2.01 | 2.694 |
| Nov. | 22.9 | 77.89 | 2.11 | 2.708 |
| Dec. | 21.5 | 78.10 | 2.95 | 3.777 |

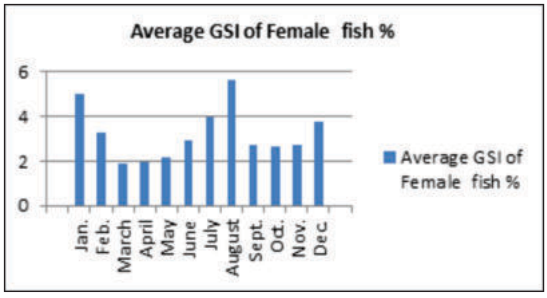


**Fig.1; Histogram showing, GSI of female fish during month of experimental year**

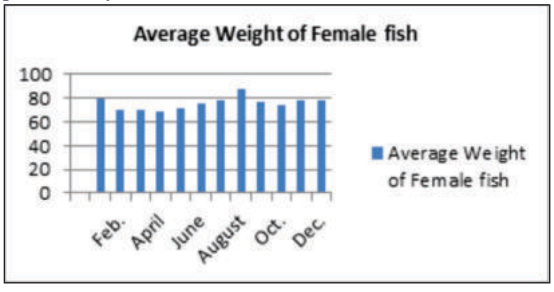


**Fig.2; Histogram showing average weight of female fish (gm) during different month of experimental year**

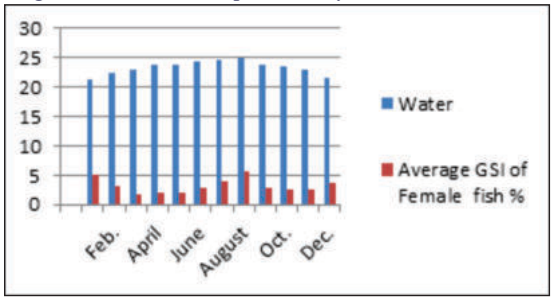


**Fig.3; Histogram showing average water temperature during different months of experimental year**

**Fig.4; Photograph of *Oreochromis mossambicus* showing its external features**

**Fig.5; Photograph of *Oreochromis mossambicus* showing its gonad**

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