

GONADOSOMATIC INDEX OF *TERAPON PUTA* (FAMILY TERAPONIDAE) FROM KARACHI COAST, PAKISTAN

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ABSTRACT

In this study, Gonadosomatic index (GSI) was investigated to find the spawning season of *Terapon puta* from Karachi coast, Pakistan. For this purpose, samples of *T. puta* were collected from Karachi fish harbour (January 2013-December 2014). The results of present research disclosed that *T. puta* had a prolonged spawning period with two distinct peaks in April and November.

Key Words: Reproductive biology, spawning period, Gonadosomatic index (GSI), Pakistan.

INTRODUCTION

The study on Gonadosomatic Index (GSI) helps to identify the spawning season of fish (Musarrat-ul-Ain *et al.*, 2015). The increase in GSI specifies the pre-spawning period, slowly declines in GSI shows the spawning period, then sharply falls in GSI indicates the post spawning period and progressively increase in GSI designates the preparatory phase of fish for next spawning period (Ghanbahadur *et al.*, 2013). Reproductive biology of several Teraponids have been studied outside Pakistan waters. Miu *et al.* (1990) described the reproductive biology of *T. jarbua* from Tamshui River, Taiwan. Chang *et al.* (2008) investigated the reproductive biology of *T. jarbua* off Taiwan. They studied the fecundity, Gonadosomatic index, sex ratio, histological and macroscopic examination of gonads and reported February to July as spawning season of *T. jarbua*. Nandikeswari *et al.* (2014) explained the fecundity and Gonadosomatic Index of *T. jarbua* from Pondicherry coast, India. Nandikeswari and Anandan (2013) studied the Gonadosomatic Index and fecundity of *T. puta* from Nallavadu coast, Pondicherry. Nandikeswari *et al.* (2013) examined the sex ratio of *T. puta* from Puducherry coast, India. Alam *et al.* (2013) from Malaysia have investigated the variability of energy condition and their relationship to the maturity stages of *T. theraps*. Veale *et al.* (2015) have described the population dynamics and reproductive characteristics of *Pelates octolineatus* from Australia.

MATERIALS AND METHODS:

To find out the spawning period, the gonadosomatic index of females and males of *Terapon puta* was studied in the present study. The samples of *T. puta* (213 males and 409 females) were collected from Karachi fish harbour during January 2013-December 2014. For the estimation of gonadosomatic index, the body weight of fish and weight of gonads were weighed to the nearest 0.1g. Following equation was used to calculate the Gonadosomatic Index (Zin *et al.*, 2011; Musarrat-ul-Ain *et al.*, 2015).

$$\text{Gonadosomatic Index} = \frac{\text{Weight of gonad}}{\text{Weight of body}} \times 100$$

RESULTS AND DISCUSSION

In general, investigations of GSI values from the present study specified the maturation of *Terapon puta* throughout the year with a peak during April and November (Table 1-2). During 2013, GSI values of female *T. puta* was observed higher during different months with a peak during April (16.62) and November (16.82). The GSI values of males showed a similar trend as that of females. The GSI values were found to be higher during most of the month with a peak during April (12.39) and November (11.24) (Table 1). During 2014, GSI values of female *T. puta* was noticed higher during April (17.03), June (16.57) and November (16.10). For male *T. puta*, GSI values were observed remained the same throughout the year with a peak during April (12.00) and November (11.24) (Table 2).

During the present research, it was observed that *T. puta* spawns almost throughout the year with peak maturation in April, June, September, and November. Nandikeswari and Anandan (2013) have reported that spawning season of *T. puta* prolonged during the period March to October at Nallavadu coast, Pondicherry. This pattern of prolonged spawning is significant for fishes, so they can produce many eggs. Furthermore, an extended period of breeding prevents eggs and larvae from predation and saves the proper food for larvae and juveniles (Shamsan and Ansari, 2010). The prolonged spawning is a kind of environmental adaptation in short-lived fishes to save their population from extinction (Mousavi-Sabet *et al.*, 2012). Understanding that the patterns in GSI values represent spawning periods of the fish (Golikatte and Bhat, 2011) allows managers to better understand the spawning seasonality and manage the fishery during spawning periods in an effort retain a healthy breeding population (Solomon *et al.*, 2011).

Table 1. Gonadosomatic index of *Terapon puta* during January 2013 to December 2013.

Month	Average body weight of females (g)	Average weight of female gonads (g)	G.S.I of females (%)	Average body weight of males (g)	Average weight of male gonads (g)	G.S.I of males (%)
January	25.14	3.07	12.21	22.23	2.15	9.67
February	33.38	3.43	10.28	29.60	2.60	8.78
March	30.35	3.65	12.03	26.50	2.38	8.98
April	29.57	4.91	16.62	18.83	2.33	12.39
May	20.50	2.13	10.37	17.50	0.98	5.57
June	21.50	3.00	13.95	23.50	2.50	10.64
July	20.78	2.54	12.25	20.00	1.80	9.00
August	29.56	2.54	8.61	29.50	1.69	5.72
September	16.00	2.27	14.19	16.63	0.93	5.56
October	41.65	3.35	8.05	30.25	2.75	9.09
November	19.54	3.29	16.82	17.80	2.00	11.24
December	17.12	1.47	8.59	18.80	0.96	5.11

Table 2. Gonadosomatic index of *Terapon puta* during January 2014 to December 2014.

Month	Average body weight of females (g)	Average weight of female gonads (g)	G.S.I of females (%)	Average body weight of males (g)	Average weight of male gonads (g)	G.S.I of males (%)
January	24.43	2.79	11.42	21.64	2.09	9.66
February	33.54	3.46	10.32	30.29	2.35	7.76
March	29.98	3.28	10.94	25.16	2.32	9.22
April	30.00	5.11	17.03	25.00	3.00	12.00
May	20.08	2.08	10.34	17.40	0.98	5.63
June	22.63	3.75	16.57	23.50	2.00	8.51
July	21.00	2.41	11.47	19.25	1.83	9.48
August	29.44	2.54	8.64	30.80	1.70	5.52
September	15.67	2.28	14.55	15.71	0.91	5.82
October	41.86	3.36	8.03	31.50	2.67	8.47
November	19.74	3.18	16.10	17.80	2.00	11.24
December	17.45	1.36	7.81	19.50	1.00	5.13

Conclusion

It was concluded that *Terapon puta* spawns almost the whole year with two distinct peaks in April and November. The spawning activity continued throughout the year in *T. puta*, can be supposed as a type of adaptation which serves the availability of food for juveniles and protects them from predation. Therefore, it can be concluded that these patterns of spawning in *T. puta* protect them from extinction and save their population along the Pakistan coast.

REFERENCES

- Alam, L., M.A. Ghaffar and M. B. Mokhtar (2013). A study on the variability of calorific values and their relationship to the maturity stages of demersal fish species. *World Applied Sciences Journal*, 24(7): 889-894.
- Chang, L-M., S-J. Joung, C-C. Wu, W-C. Su and L-J. Wu (2008). Reproductive Biology of Thornfish *Terapon jarbua* from the Southwestern Waters off Taiwan. *Journal of the Fisheries Society of Taiwan*, 35(4): 335-350.
- Ghanbahadur, A. G., G.R. Ghanbahadur, R. Ganeshwade and Y. K. Khillare (2013). Study of gonadosomatic index of fresh water fish *Channa gachua*. *Science Research Reporter*, 3(1): 07-08.
- Golikatte, R. G. and U. G. Bha, (2011). Gonado-somatic index of the whipfin silver biddy *Gerres filamentosus* from sharavati estuary, central west coast of India. *World Journal of Science and Technology*, 1(2): 26-28.
- Miu, T. S., S. C. Lee and W. N. Tzeng (1990). Reproduction biology of *Terapon jarbua* from the estuary of Tamshui River. *Journal of the Fishery Society of Taiwan*, 17(1): 9-20.
- Mousavi-Sabet, H., A. Kamali, M. Soltani, A. Bani and H. Rostami (2012). Age, sex ratio, spawning season, gonadosomatic index, and fecundity of *Cobitis faridpaki* (Actinopterygii, Cobitidae) from the Siahруд River in the southeastern Caspian Sea basin. *Caspian Journal of Environmental Sciences*, 10(1): 15-23.
- Musarrat-ul-Ain, R. Y. Farooq and Z. Masood (2015). Gonadosomatic index of a Teraponid species, *Terapon jarbua* (Forsskal, 1775) (Family: Teraponidae) of Karachi Coast, Pakistan. *International Journal of Biology and Biotechnology*, 12 (4): 575-578.
- Nandikeswari, R., M. Sambasivam and V. Anandan (2013). Study on sex ratio of *Terapon puta* (Cuvier, 1829) from Puducherry coast, India. *Journal of Environmental Science, Computer Science and Engineering & Technology*, 2(4): 1396-1400.
- Nandikeswari, R., M. Sambasivam and V. Anandan (2014). Estimation of fecundity and gonadosomatic index of *Terapon jarbua* from Pondicherry coast, India. *International Journal of Biological, Veterinary, Agricultural and Food Engineering*, 8(1): 67-71.
- Nandikeswari, R. and V. Anandan (2013). Analysis on Gonadosomatic Index and Fecundity of *Terapon Puta* from Nallavadu Coast Pondicherry. *International Journal of Scientific and Research Publications*, 3(2): 1-3.
- Shamsan, E. F. and Z. A. Ansari (2010). Studies on reproductive biology of Indian sand whiting *Sillago sihama* (Forsskal). *Indian Journal of Marine Sciences*, 39(2): 280-284.
- Solomon, S., M.R. Ramprasanth, F. Baby, B. Pereira, J. Tharian, A. Ali and R. Raghavan (2011). Reproductive biology of *Puntius denisonii*, an endemic and threatened aquarium fish of the Western Ghats and its implications for conservation. *Journal of Threatened Taxa*, 3(9): 2071-2077.
- Veale, L., P. Coulson, N. Hall, A. Hesp and I. C. Potter (2015). Age and size compositions, habitats, growth and reproductive characteristics of a teraponid (*Pelates octolineatus*) in coastal waters. *Marine and Freshwater Research*, 66(6): 535-548.
- Zin, T., A. A. Than and T. T. Naing (2011). Fecundity (F), gonadosomatic index (GSI), hepatosomatic index (HSI), condition factor (K) and length-weight relationship (LWR) in *Channa orientalis* Bloch & Schneider, 1801. *Universities Research Journal*, 4(2): 47-62.

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