

SEX STEROIDS IN FEMALE *DIPLODUS SARGUS* IN EGYPTIAN MEDITERRANEAN WATERS

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Abstract

The annual reproductive cycle and variations in plasma sex steroids levels were studied in female white seabream, *Diplodus sargus*. The gonadosomatic index (GSI) and the plasma testosterone (T), progesterone (P) and estradiol (E2) levels were measured monthly. The steroids were correlated positively with the GSI, with the maximum values to be attained at the spawning season.

Keywords: Sparidae, *Diplodus sargus*, Reproductive cycle, Sex steroids

Introduction

Sex steroids are very important hormones regulating the gonadal function in teleosts. The present study determined the seasonal cycle in gonadosomatic index (GSI) and sexual plasma testosterone (T), estradiol (E2) and progesterone (P) levels in the female white seabream, *Diplodus sargus*. The purpose of the present investigation was the identification of sex steroids hormones in the blood plasma for further elucidation of the mechanism of hormonal regulation of reproductive function in *D. vulgaris*.

Materials and Methods

Fish used in the present study were captured alive three times a month from the Mediterranean Coast near Kayet Bey Castle at Anfoushy region, Alexandria, Egypt. Sampling took place during September 1996 to August 1997.

Blood samples for hormone assay were collected from the caudal vessels. After centrifugation, the plasma was drawn off and stored at -20 °C until steroid analysis. Following blood sampling, the gonads were excised and weighed in order to determine the GSI (GSI = 100 x gonad weight / body weight). Hormones were determined by radioimmunoassay (RIA) using the procedures depending on using radioactive iodine I¹²⁵ by kits assembled in U.S.A. by diagnostic system laboratories.

Results and Discussion

The levels of androgens and estrogens exhibited clear variations throughout the annual reproductive cycle (Fig. 1). A positive correlation was found between the GSI and the serum T levels in female white seabream (P<0.001). Their values increased gradually in the pre-spawning period, reaching the maximum values during the spawning season in February, followed by a decline in the spent and recovery periods. This observation is in general agreement with what has been observed for female of several other species, e.g. *Oblada melanura* (1), *Mugil cephalus* (2) and *Diplodus vulgaris* (3).

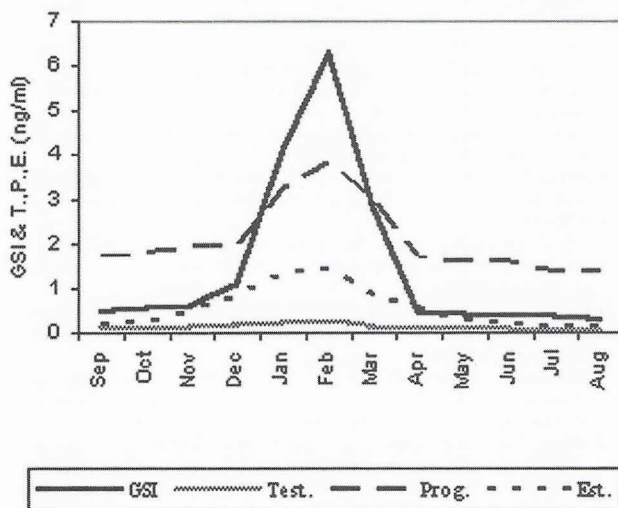


Fig. 1. Monthly gonadosomatic index (GSI) and serum concentrations of testosterone, progesterone and estradiol in female *Diplodus sargus*.

For P, an increase was recorded from September to December, followed by a sharp increase in January (P<0.005). The highest levels were observed during the spawning season with a maximum value recorded in February. After spawning, a sharp decrease was observed until it reached the minimum value, in August (P<0.001). This is similar to the results of several other species, e.g. *Chanos chano* (4), rainbow trout (5) and *Salvelinus leucomoenis* (6). In several species, oocyte maturation and ovulation are regulated by progestins and corticosteroids as reported (7).

The present study also showed monthly variation in serum E2 level throughout the annual reproductive cycle. It is clear that the highest values were within the breeding season. The E2 levels increased gradually from the maturation stage to reaching the maximum value during the pre-spawning period. The maximum values were recorded in February, i.e. just before the onset of the spawning process (P<0.001). A sharp significant decrease was recorded during March and April (P<0.0001), i.e. after the starting of the spawning process. After April, E2 levels continued to decrease and reached its minimum value in August. Plasma E2 levels of female white seabream was correlated with the GSI. The results of E2 in the present study, were similar to those for other species, e.g. *Oblada melanura* (1), *Diplodus vulgaris* (3), *Rhabdosargus haffara* (8), where the levels of E2 reached a maximum value in the pre-spawning period, then decreased throughout the spawning season to reach a minimum value in spent female.

References

- 1 - Zaki M.I., Assem s.s., and Abu-Shabana M.B. 2001. Gonadotropin and steroid hormones in the plasma and pituitary gland of *Oblada melanura* at various stages of maturation. *Rapp. comm. int. Mer Médit.*, 36: 337.
- 2 - Zaki M.I., El-Gharabawy M.M. and Kamil S.A. 1995. Seasonal changes in the Gonadotropic and sex steroid hormones in the blood serum of the Grey Mullet, *Mugil cephalus*, in the sabkhet el Bardawil of the Mediterranean sea. *Jour. of Ichthy.*, 35(3).
- 3 - Abdallah M. 1996. Reproductive biology and physiology of *Diplodus vulgaris* in the Mediterranean Sea. Ph. D. Thesis, Faculty of Science, Tanta University.
- 4 - Marte C. L. and Lam, T. J. 1992. Hormonal changes accompanying sexual maturation in captive milkfish *Chanos chano* (Forsk.). *Fish Physiol. Biochem.*, 10 (4): 267-275.
- 5 - Campbell C. M., Fostier A., Jalabert B. and Truscott B. 1980. Identification and quantification of steroids in the serum of rainbow trout during spermiation and oocyte maturation. *J. Endocrinol.*, 85: 371-378.
- 6 - Kagawa H., Takano K. and Nagahama Y. 1981. Correlation of plasma 17 β - Estradiol, progesterone levels with ultrastructure and histochemistry of ovarian follicles in the white spotted char, *Salvelinus leucomoenis*. *Cell Tissue Res.*, 218: 315-329.
- 7 - Jalabert B. 1976. *In vitro* oocyte maturation and ovulation in rainbow trout, *Salmo gairdneri*, northern pike, *Esox lucius*, and goldfish, *Carassius auratus*. *J. Fish. Res. Board Can.*, 33: 974-988.
- 8 - EL-Boray K. F. 1997. Reproductive biological studies on *Rhabdosargus haffara* in different water fish farms. Ph. D. Thesis, Faculty of Science, Zagazig University.