International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 3 Number 11 (2014) pp. 308-312**
http://www.ijcmas.com

Original Research Article

Structural changes in response to increased environmental salinity and calcium on ultimobranchial gland of teleost fish *Tilapia (O. mossambicus)*

Mukesh Kumar Napit*

Department of Zoology, Swami Vivekanand Government College, Berasia, Bhopal (M.P.), India
**Corresponding author*

A B S T R A C T

The present study has been planned to observe the effects of different salinity on the ultimobranchial gland in an eryhaline teleost fish Tilapia (*O. mossambicus*), cytophysiological studies along with some biochemical observation. Therefore, it is planned to study the effect of increased salinity concentration at different time of year especially in calcium regulatory organs. Very little data is available (shukla, 1993; Singh, 1997) on this physiological aspect of catfish in our Country. It is interesting to study the effects of increased salinity at different phases of its reproductive cycle i.e., during pre-spawning, spawning and post-spawning periods especially on calcium regulatory organs. Since not much work is available on this aspects it was planned to explore this line with an eryhaline teleost fish Tilapia. Due to its easy availability and also tenacity, the eryhaline fish Tilapia, was selected. Work on eryhaline is almost rare in this animal with exposure to external stress. This fish was procured during the different periods of the year and a stock was maintained for a continuous supply of these animals.

Keywords

Fish *Tilapia* (*O. mossambicus*), Ultimobranchial gland, Chemicals and Salt concentration.

Introduction

In *Tilapia* (*O. mossambicus*), the gland is located in between the heart and oesophagus. It is situated in the connective tissue mass dorsal to oesophagus and posterior to sinus venosus. Several attempts using either ultimobranchialectomy or calcitonin injection, failed to produce a consistent effect on hypocalcemic regulation in teleosts (Yamauchi, 1978). Ahmad and Swarup (1988) recognised seasonal changes in the functional morphology of ultimobranchial gland in relation to the reproductive cycle and changes in serum, calcium level of a fresh water female cat fish, *Mystus vittatus* (Bloch).

Previous workers have shown some definite function to the ultimobranchial gland in fish (Fenwick, 1991). The ultimobranchial gland present in all jawed fishes, is known to be homologous with the calcitonin cells of mammals and is rich source of calcitonin, (swarup et al., 1984).

Materials and Methods

The eryhaline fish *Tilapia, (Oreochromis mossambicus)* was obtained from upper Lake Bhopal (M.P.) during different phases of its reproductive cycle i.e., pre-spawning, spawning and post-spawning period.

The nature specimen, ranging 15–20 cm in length, were placed in tap water aquarium to control bacteria and other outbreak. Healthy fish were selected for experimental work. Four fishes were selected in each aquarium which contains 12 litres of tap water. They were acclimatized for about a week before starting the experiment and during this period fish were fed with dried shrimps and live earthworm. However, the fishes were not fed throughout the experimental period and the water of each aquarium was renewed twice a week.

Experiment with different salinity and calcium concentration

Experimental salinities were fixed at different levels, i.e., 1.0%, 1.5%, 2.0%, 2.5%, 3.0% and 3.5%. The salinity concentration used in our experiment was based on the general fact and also considering the total salinity percentage with that of seawater. 3.0% and 3.5% salt concentration were found lethal as the rate of mortality was noted after 14 hours. At 3.0% and 3.5% salt solution it was found highly he that with very high rate of mortality in *Tilapia*. It was noted that fish died just after a short exposure i.e., within 3-5 hours.

The experiments were set in following groups.

1. Direct transfer in different concentration of saline solution during pre-spawning period.
2. Direct transfer in different concentration of saline solution during spawning period.
3. Direct transfer in different concentration of saline solution during post-spawning period.
4. Direct transfer (each step lasted for a week) in different concentration of calcium during pre-spawning period.
5. Direct transfer (each step lasted for a week) in different concentration of calcium during spawning period.
6. Direct transfer (each step lasted for a week) in different concentration of calcium during post-spawning period.

Results and Discussion

In this experiment of *Tilapia*, (*Oreochromis mossambicus*) with different salinity, it was observed that size of the nuclei of ultimobranchial gland partially increased with the increase in salinity concentration i.e., from 1.0% to 2.5% during pre-spawning and spawning periods but decrease during post-spawning period. During the spawning and pre-spawning periods in 3.0% and 3.5%, the follicular wall becomes indistinct with large nuclei.

In calcium exposure, there was no effect when the concentration was 2.5m mol l^{-1} and 5.0m mol l^{-1}. As the concentration increased to 7.5m mol l^{-1}, the nuclear size as well as follicular cell size increase but at the time maximum concentration i.e., 10m mol l^{-1} the follicles becomes enlarged with moderately large nuclei and degenerated cytoplasm. These changes indicated that in experiment group the gland shows hyperactivity during pre-spawning and spawning periods and gland is active during post-spawning period also in both salinity and calcium exposure, whereas the gland in control group is highly active during late pre-spawning than post-spawning period.

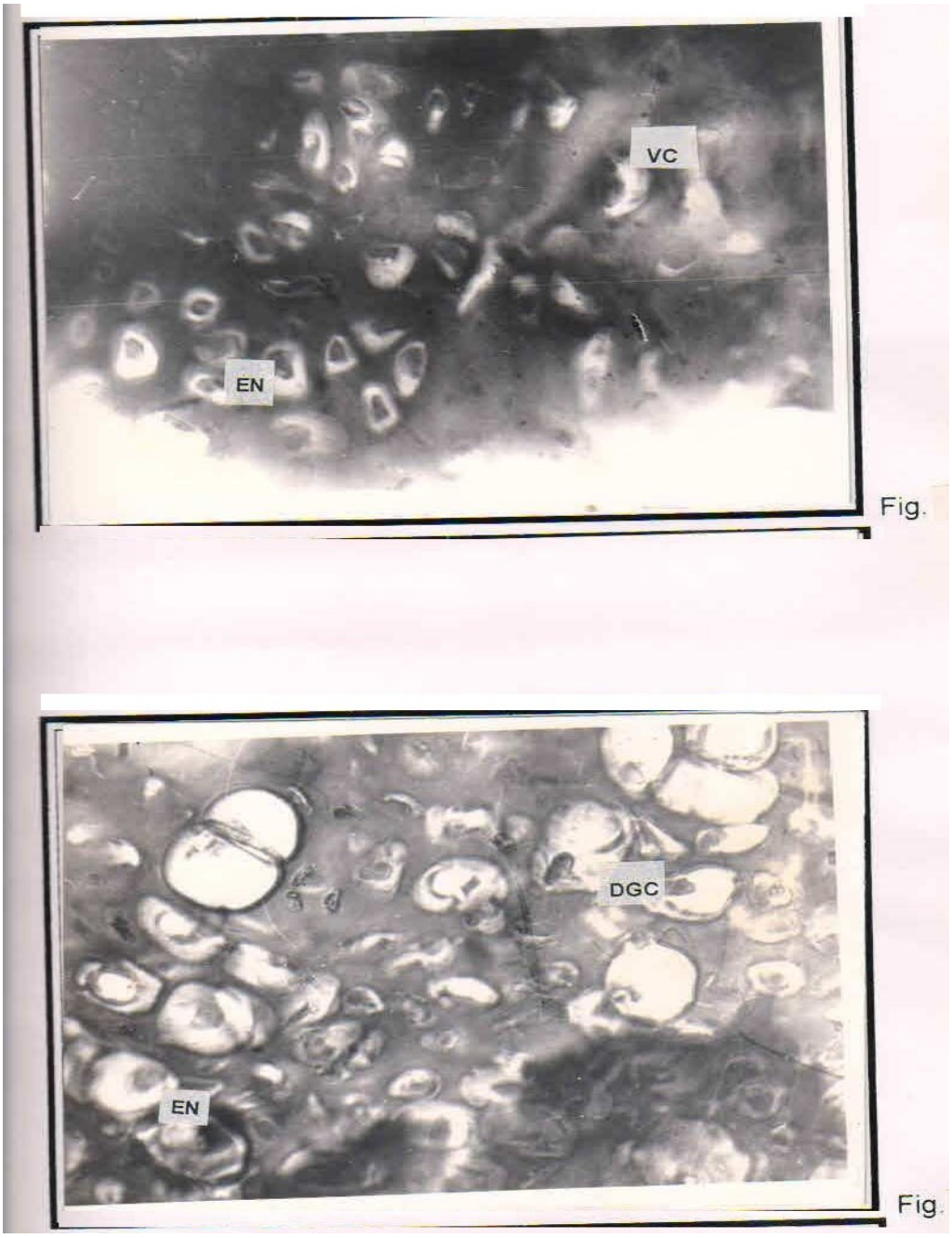

Fig.1 Showing salinity concentration

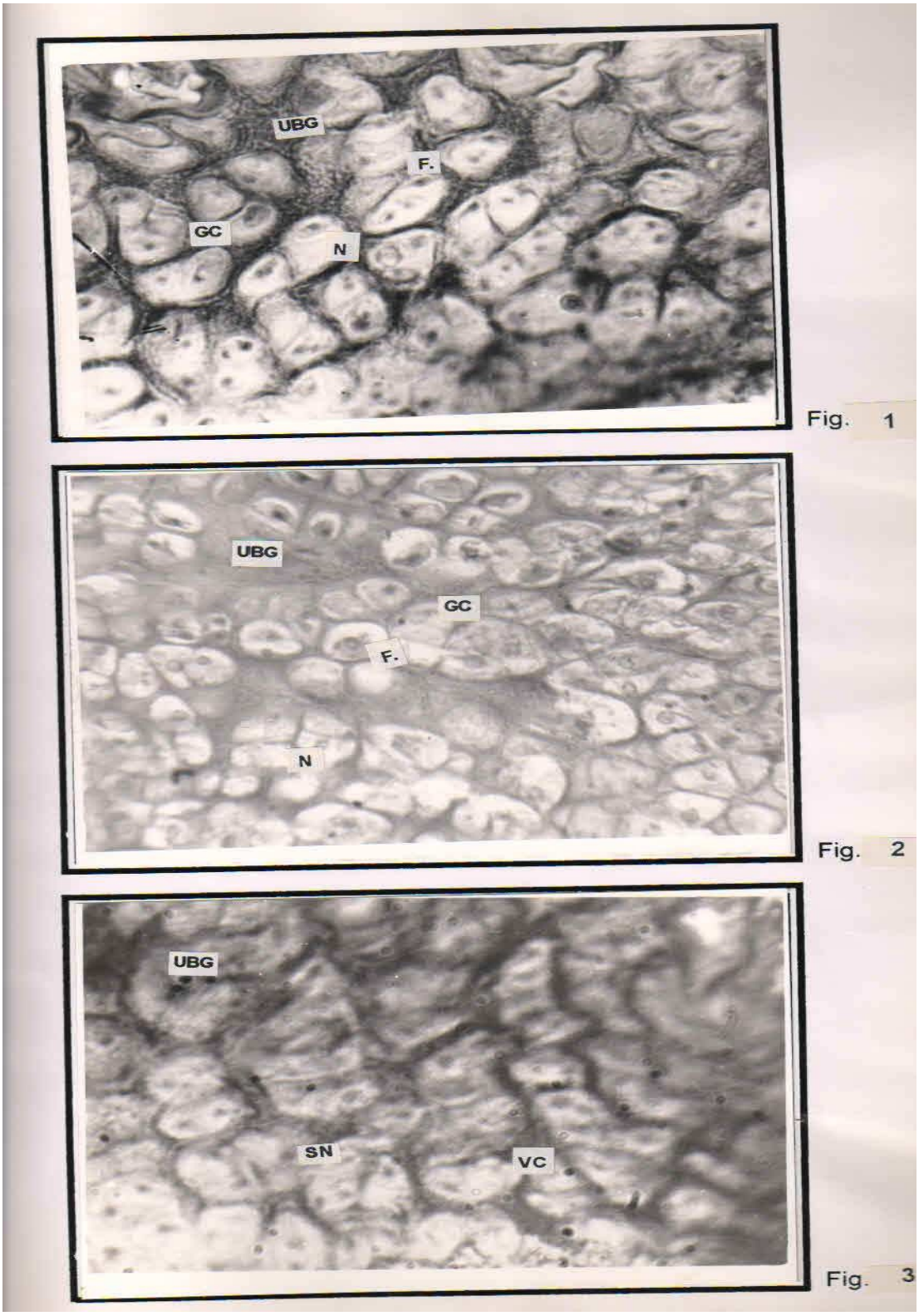

Fig.2 Showing effect calcium exposure

References

1. Ahmad, N., Swarup, K. 1988. Seasonal changes in the functional morphology of ultimobranchial body in relation to the reproductive cycle and changes in serum calcium level of a fresh water female catfish, *Mystus vittatus (Bloch). Proc. Nat. Acad. Sci India*, 58, Sec. B (III): 359–363.
2. Fenwick, J.C. 1991. Effects of stanniectomy and experimental hypercalcemia on plasma calcium levels and calcium influx in American eels, *Anguilla rostrata, Lesueur. Gen. Comp. Endocrinal*, 82(3): 459–465.
3. Shukla, R. 1993. Ph.D. Thesis: Dr. H.S. Gour Vishwavidhyalaya Sagar, (Unpublished Data).
4. Singh, S. (1997), Ph.D. thesis: Dr. H.S. Gour Vishwavidhyalaya Sagar (Unpublished Data), Sagar, M.P.
5. Swarup, K., shrivastava, S.P. 1984. Structure and behaviour of ultimobranchial gland in response to vitamin D_3 induced hypercalcemia in male *Clarias batrachus, Archives d' Anatomie microscopique*, 73(4): 223–229.
6. Yamauchi, P. 1978. Calcitonin and ultimobranchial gland in fishes. *J. Exp. Zool*., 178: 89–100.