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STRUCTURAL CHANGES IN ULTIMOBRANCHIAL GLAND OF *TILAP IN* RESPONSE TO INCREASED ENVIRONMENT SALINITY

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ABSTRACT

The present study has been planned to observe the effects of different salinity on the ultimobranchial gland and carpus stanious cells 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 specially in calcium regulatory organs. Very little data is available (shukla, 1993 and 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 specially on calcium regulatory organs. Since not much work is available on this aspects is was planned to explore this line with an ervhaline 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 a stock was maintained for a continuous supply of these animals.

KEYWORDS: Fish *Tilapia, (O.mossambicus)* Ultimobranchial Gland, Carpous Stnious Cells, Chemicals, and Salt Concentration.

INTRODUCATION

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).

MATERIAL 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-spawing, 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 fish 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.

1. 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% salt solution it was found highly he that with very high rate of mortality in *Tilapia.* It was noted that 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

Table 1: Changes in ultomobranchial tissue of *Oreochromis mossambicus.*

S.N.	Conct. %	Days/Hrs.	During pre-spaw. period	During spawning period	During post-spaw. period
1	1.0 % Saline Solution	41 days	Follicles were observed with slightly granular cytoplasm. The nuclei are enlarged.	The smaller follicles are clearly observed. Slightly granular cytoplasm with smaller nuclei can also be seen.	In the ultimobanchial tissue in discreet follicles are observed. Slightly granular cytoplasm with smaller nuclei were also noted.
2	1.5%	12 days	Cytoplasm is almost opaque. The cell wall is ruptured and the nuclei are indistinct and reduced in size.	The ultimobanchial gland possesses deformed follicles. Cytoplasm is slightly granular cell wall is ruptured and the nuclei are reduced in size follicle cells are large in size.	The ultimobanchial tissue possess in distinct follicular structure. Poorly granular cytoplasm was observed. Nuclei are reduced in size compared to that of pre-spawing and spawning phases.
3	2.0%	15 days	Follicle are Comparatively smaller. The smaller nuclei are also visible in few follicle.	The follicles are very small when compared to earlier concentration. Smaller nuclei are observed at few places in the follicles. Poorly granular cytoplasm is seen.	In ultimobanchial tissue, the follicles becomes very small in size. Enlarged nuclei were clearly observed in follicular cells. Opaque cytoplasm was evident.
4	2.5%	8 days	The follicle are not clearly observed. Enlarged nuclei are seen. Poorly cytoplasmic grnulation was also noted	In the ultimobranchial tissue, follicles are distinct, poorly granular cytoplasm was evident while the size of the follicles were large, smaller nuclei can also be observed.	In ultimobanchial tissue, the follicles cannot be clearly observed. Enlarged nuclei with poorly granular, cytoplasm were noted.
5	3.0%	15-20 hrs.	Ultimobranchial tissue was highly compact, cytoplasm was poorly granular, while nuclei could not be observed.	In the ultimobranchial tissue, the highly vascularised follicles were observed but the whole glavel is in very compact form. Cytoplasm become poorly granular. Small nuclei can clearly be observed.	In ultimo gland, highly deformed follicles are seen while the whole gland is in compact form. cytoplasm is poorly granular while very few nuclei can be observed.
6	3.5 %	4-5 hrs.	The fish do not survive beyond this duration. Important changes were observed. The cell wall was ruptured and follicles get deformed. The nuclei are small in size. Cytoplasmic vacuolization is very clear.	Cell wall is ruptured and follicles get deformed. Shrunken nuclei were not observed. Cytoplasmic vacuolization is clearly seen.	Follicles can be clearly observed. Shrinked nuclei were seen. Poorly granular cytoplasm was also noted.
7	2.5 m.mol 1^{-1} Calcium	1 week	In the ultimobranchial gland, the follciles are clear with indistinct boundaries.	In the ultimobranchial gland, the follicles were clearly observed with	In the ultimobranchial gland, the follicles were clearly observed but size of the

	Solution		Poorly granular cytoplasm with large nuclei were also seen.	distinct boundaries, slightly granular cytoplasm with large nuclei were also noted.	follicles is small.
8	5.0 %	1 week	In the ultimobranchial gland, the large and distinct follicles were clearly observed. Slightly granular cytoplasm with large nuclei were also noted.	In ultimobranchial gland, normal follicles are observed with slightly granular cytoplasm. Centrally placed and smaller nuclei were also seen.	In the ultimobranchial gland, large follicles were clearly observed. Poorly granular cytoplasm with enlarged nuclei can also be seen.
9	7.5 %	1 week	In ultimobranchial gland, distinct follicles with enlarged nuclei were observed when compared to the control group.	The ultimobranchial gland is distinct and large follicles with centrally placed nuclei were observed. Cytoplasmic vacuolization is very prominent.	Distinct follicles with comparatively smaller nuclei were observed. While in the cytoplasm remain vacuolar.
10	1.0 %	1 week	In ultimobranchial gland, the highly enlarged follicles with prominent nuclei can be seen.	The ultimobranchial gland possesses very large and distinct follicles. Normal nuclei with vacuolized cytoplasm were clearly observed.	In the ultimobranchial gland, indistinct follicles with centrially placed nuclei can be seen. Size of follicles is small compared to the spawning period. Degranular cytoplasm was also noted.

In our 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 % 3.5 %, the follicular wall becomes indistinct with large nuclei.

In Calcium exposure, there was no effect when the concentration was 2.5 m mol 1^{-1} and 5.0 m mol 1^{-1}. As the concentration increased to 7.5 mol 1^{-1}, the nuclear size as well as follicular cell size increase but at the time maximum concentration i.e:, 10 mol 1^{-1} the follicles becomes enlarge 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 oxposure, whereas the gland in control group is highly active during late pre-spawning than post-spawning period.

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