



Toxic effects of copper on the ovary of *Heteropneustes fossilis*

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Abstract

Matured and acclimatized specimens of *Heteropneustes fossilis* were exposed to 30 ppm cupric chloride. The fish were sacrificed on 15th day of ovaries and were excised out. Histological preparation by the method of OFG staining was studied. Histological observations were observed that there yolk investment appeared cracked and broken due to the treatment with various reagents during paraffin impregnation. The young ova proliferated from stroma appear quite small and without a distinction of core. Most of ova were showed quite thick encapsulation. Vitellogenesis was much pronounced and delayed in liberation of ova was expected.

Keywords: Copper, *Heteropneustes fossilis*, ovary, toxic effect

Introduction

A few years back a short collection of reports was published which include reports on pesticides metal and many more toxic agents. It is well known that industrial application and medicinal as well as other chemical over popularities of substance may spread the substance largely among population. So essential trace elements deserve to studied of their toxicological influence because it is not always very certain that in environment even such trace elements would remain as trace only. The chances are fair that a time they may rise beyond. Their harmless limits may some time raise the head of endangerment to really threatening level. Lately the books like Encyclopedia of toxicology (Wexler, 1998) running over three volumes have come and this is an example in it self that magnifies the need of studying not only lethal doses but also sub lethal doses. Davis (2000) reported slight (<18%) decrease in T4 level in post menopausal women exposed to 0.68 mg/zinc/kg/day as zinc glucomate and did not attain statistical significance in free T3 or TSH level. Yadav and Singh (2011) observed the effect of 2,4 dichlorophenoxyacetic acid (2,4 D) on a ovary of a freshwater catfish, *Heteropneustes fossilis*.

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Material and methods

Live and mature specimens of both sexes of the *Heteropneustes fossilis* were obtained from local fish market and put for acclimatization to the laboratory condition at room temperature for four weeks. Aquarium containing 20 litres of water was used for maintaining the fish. Prior to experiment feeding was stopped. The acclimatized fish were exposed for 15 days in 30ppm of cupric chloride after completion of the experimental exposure the fish were dissected live, wash thoroughly and were put to the dehydration. After complete dehydration the tissue sample were cleared in toluene/xylene and were process for preparation of Paraffin section cut at 6-8 micron thickness. The Paraffin section of these ovaries was stained in AF, OFG specified in Drury *et al.* (1976).

Results and Discussion

Copper exposed ovaries showed large inter ovum spaces and in most of the cases linear rows of ova were observed (fig.1) which possibly indicated that the ova were delayed to be set free. Thus it seems that an excess of copper might cause delay in the reproductive process. The yolk investment of the large ova observed (fig.2) crack and broken at various places but this might be an attribute to be the nature yolk that becomes harder due to the treatment of various reagents during paraffin impregnation. The young ova proliferated from the stroma and they appear quite small and without a

distinction of the core. Therefore the copper has interfered at various stage of the development of normal ovary. However it is a matter of further investigation as to which stage is chronologically most sensitive to go towards irregular growth. The different species of fish are supposed to have at least some variation in their cyclic activities therefore to rule out the variation, the widely studied species, *Heteropneustes fossilis* was selected as model. Seasonal changes in the gonads of common Indian cat fish, *Heteropneustes fossilis* was observed by Ghosh *et al.* (1952). It is well known that the resting phase of ovary has a thick tunica albuginea in case of copper exposure the ovaries appeared in activated but without a thickened tunica albuginea. This thin layer indicates the partial degeneration of endocrinological responses of ovary.

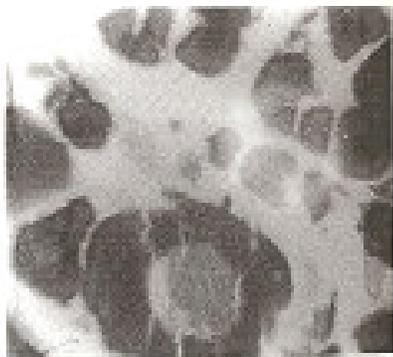


Fig.1 Photomicrograph of a part of cross-section of ovary of *Heteropneustes fossilis* to copper X100

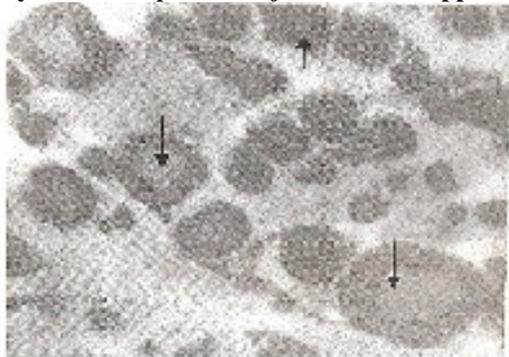


Fig. 2: Photomicrograph of a part of cross-section of ovary of *Heteropneustes fossilis* exposed to copper X100

The ova are distantly distributed and enclosed in columns. That indicates the failure of ovarian differentiation. The Zebra fish, *Branchyoclonio rario*, when held in water containing 5 ppm of zinc for a days period, the gametes were maturing showed delayed in spawning (Speranza, *et al.* 1977).



Fig.3: Photomicrograph of a part of longitudinal section of ovary of *Heteropneustes fossilis* X28 (Control) 38a. Mature oocytes

Copper is widely distributed in nature and is an essential heavy metal several workers Gupta *et al.* (1994), Stein *et al.* (1997) worked out that it is very toxic to fish affecting their growth as well as reproductive capacity. Ovaries are appeared in activated but without a thickened tunica albuginea ova are distantly distributed in the membranous elements in form of elongated columns. This indicated the failure of ovaries differentiation the receptor component and responses component has failed to maintain its normal behaviour and hence oogonial density and the thickness of tunica albuginea remain much less than that of normal ovary. On account of foregoing discussions it is concluded that copper is expected to be more deleterious for aquatic fauna.

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