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RESEARCH ARTICLE

HEAVY METAL ACCUMULATION AND ASSOCIATED HISTOLOGICAL CHANGES IN THE OVARY OF *LIZA PARSIA* (HAM, 1822)

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ABSTRACT

Heavy Metals are one of the most important toxicant which destroys the aquatic ecosystem. Their natural effects are carcinogenic and mutagenic. The present study showed the concentration of heavy metals (Fe, Cu, Zn and Pd) in the ovary of *Liza parsia* from two sites of Ashtamudi lake, the Ramsar site. The heavy metals are found to be accumulated more in the site 2 than in site1. The study also demonstrates the histological changes associated with the accumulation of toxic heavy metals in the ovary thereby its reproductive potential. The histological changes in the ovary of the L. parsia include enlargement of oocytes, degeneration of egg envelope, appearance of atretic follicles, scattering of nucleoi etc.

INTRODUCTION

In the last decades, contamination of aquatic systems by heavy metals has become a worldwide problem. Heavy metals may enter aquatic systems from different natural and anthropogenic sources, including industrial or domestic wastewater, application of pesticides and inorganic fertilizers, storm runoff, leaching from landfills, shipping and harbour activities, geological weathering of the earth crust and atmospheric deposition (Yilmaz, 2007). In fish, which is often at the higher level of the aquatic food chain, substantial amounts of metals may accumulate in their soft and hard tissues (Javad and Usmani, 2011). Since diet is the main route of exposure to heavy metals, and fish represent a part of human diet, it is not surprising that polluted fish could be a dangerous dietary source of certain toxic heavy metals (Bogut, 1997). The present work therefore highlights the accumulation of heavy metal in *L. parsia* and histological changes due to accumulation with special reference to ovary.

MATERIALS AND METHODS

Ashtamudi wetland, situated in the Kollam district, Kerala (Lat 8^0 59' N Long 76^0 36' E), is the second largest wetland in Kerala with a palm shaped extensive water body and eight prominent arms. Two sites from the Ashtamudi Lake was selected for the present study and each site is about 10-12 km away from the bar mouth (Needakkara). The Ist site (Perumon), where anthropogenic influx is less and found to be comparatively less polluted. The site II (Kureepuzha), which is adjacent to the waste dumping site of Kollam district .The site has close proximity to the fishing harbour there by the oil spillage from the mechanised boats also contribute considerably to the pollution of the site. *L. parsia* (Ham,1822) belonging to family Mugilidae was collected from two sites of Ashtamudi lake during the period from December 2010 to November 2011. Content of heavy metal in ovary of *L.parsia* were estimated using Atomic Absortion Spectrophotometer (AAS). Samples which show heavy metal accumulation are subjected to histological studies. For histological studies a piece ovary were fixed in Bouin solution, dehydrated in alcohol, embedded in paraffin and sections 5-7µ thick were prepared. Sections were stained with heamatoxylin and eosin and slides were examined by microscope.

RESULTS AND DISCUSSION

The average concentration of heavy metals in ovary of *L. parsia* from two sites of Ashtamudi Lake was shown in Fig-1. The most dominant heavy metal accumulated was found to be iron, followed by zinc, copper and lead. It was noted that the second site namely Kureepuzha showed a higher concentration of all the heavy metals examined throughout the study period. Site 1 also showed the accumulation of heavy metals but it was found to be lesser comparable to site 2.

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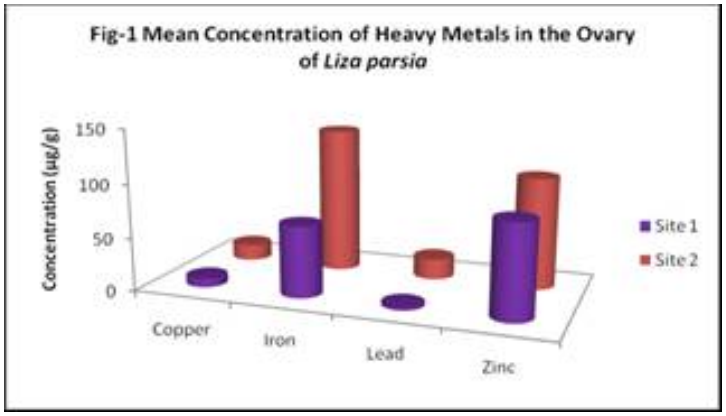


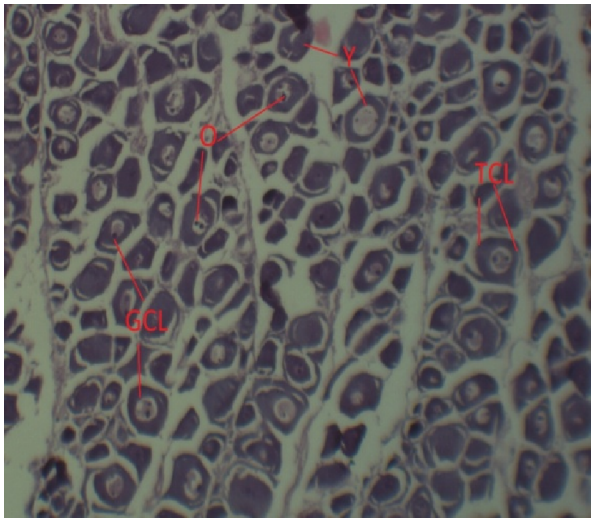


Fig 2.1Normal (Site 1) x100

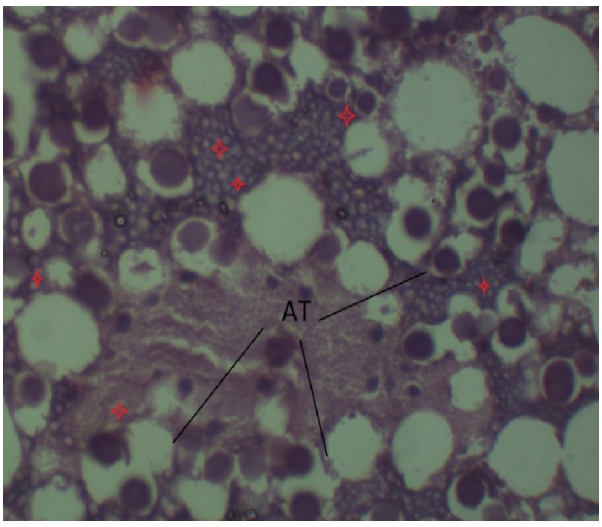
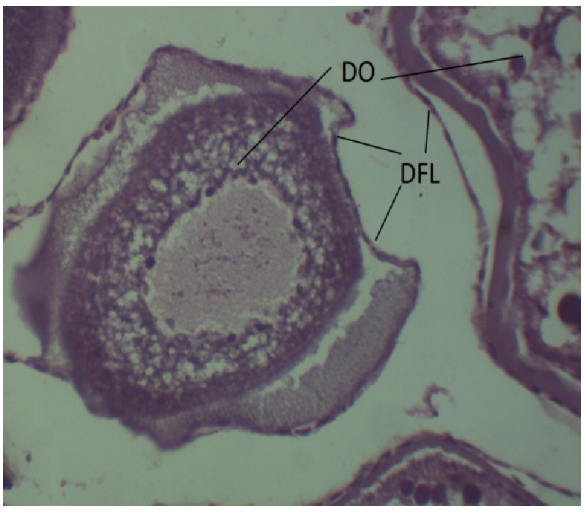


Fig 2.2 Atresia, heavy metal accumulation (site 2)x 100



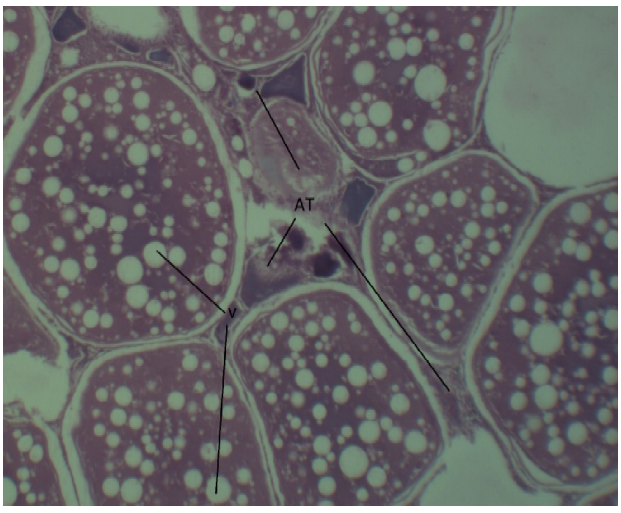


Fig 2.3 and fig 2.4 Damaged follicular lining (DFL) and Disrupted Oocytes (DO) X 200.(site 2)

Fig. 2. Pictomicrograph of T.S. of ovary of *L parsia*

Oil spillage and mechanised boats may also be the reason for the accumulation of heavy metals in the ovary of the fish. In the present study the effect of accumulation of heavy metal in ovary can be clearly demonstrated by histological studies (Fig. 2).

Ovaries of fish from site1 showed almost typical histological picture similar to that of a normal fish with a number of oocytes showing various stages of maturation (Fig. 2.1). Histological studies in the ovary of site 2 reveals the effect of heavy metals like enlargement of oocytes (Fig. 2.2 and 2.3) and appearance of atretic follicles (Fig. 2.3 and 2.4).

Many authors demonstrated that fish surviving at highly polluted areas accumulate higher levels of heavy metals than those surviving in less polluted areas of the same lake (Bahnasawy, 2001; Khalil and Faragallah, 2008). The result of present investigation was not only confirmed to Asthamudi lake, the Ramsar site but also a warning for all the water bodies in the world which facing such challenges like heavy metal pollution which leads to the decline of its fish community. The study throws light on the deleterious effects of various toxicants and if the present scenario prevails, it may affect the reproductive activity of fishes which may lead to their extinction in long run.

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