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Research Paper

Histopathlogical Alternation of some Organs of Snake Head Fish Channa Gachua (Hamilton) Collected from Polluted Industrial Area of Nalbari district, Assam

Biology

KEYWORDS : Histopathological alternation, organ, Channa gachua.

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ABSTRACT

Industrial waste discharge into the freshwater bodies is a major threat to the aquatic life. Wet land near DIC of Nalbari district provides a typical example of aquatic pollution due to the discharge of industrial waste. A study was undertaken during 2011-2012 to examine effects of industrial waste on a hardy fish Channa gachua. Industrial waste affects the integument, gill and several organs of this fish species especially liver and develops histopathological alternation. From the present study the changes observed in tissues of different organs of fishes were evident to show the effects of aquatic pollution.

INTRODUCTION

Histopathological alternations can be used as indicators for the effects of various anthropogenic pollutants on organisms and are reflect of overall health of the entire population in the ecosystem (Mohamed, 2009). Various chemicals and metals present in industrial effluents penetrate into the tissues of fishes and cause histopathological alternations.

The District Industries and Commerce Centre (DIC) of Nalbari district is government authorized complex of industries where different categories of small scale industries like aluminum utensil manufacturing industry, flour industry and mustered oil industry are located. These industries discharge a huge quantity of effluents containing organic as well as metal pollutant to the nearby wetland.

Previously, various workers studied on certain aspects of histopathological alternations of freshwater fishes collected from polluted water of different parts of the country. Among these, works of Jain and Mishra, (1994), Kumari and Ramkumar (1997), Kumari *et al.* (1997), Kaur and Kaur, (2006) and Ramesh and Nagaranjan (2007) were worth mentioning. But there is no any information documented from Nalbari district of Assam regarding aquatic pollution of wetlands and its effects on aquatic fauna, especially fish. As the pollution causes threat to the biodiversity of wetlands, it is therefore important to assess pollution from industries so as to understand their threats to the environment and design appropriate mitigation measures.

The present study during 2010-2011 therefore assessed the quality of effluents from different industries that discharge into nearby wetlands of DIC and their effects, especially histopathological alternations of certain tissues of pollution tolerant fish species like *Channa gachua*.

MATERIALS AND METHODS

Fish samples were collected from polluted water of wetlands near DIC for histopathological studies. *Channa gachua* was selected to study the histopathological alternations of adversely affected tissues such as integument, gill and liver.

After dissection of collected fish sample, parts of integument, gills and liver were carefully removed and prepared for histological studies. Specimens from integument, gills and liver were fixed in 10% neutral buffered formalin, dehydrated, embedded in paraffin wax and sectioned at 4-6 µ m then stained with haematoxylin and eosin examined microscopically (Bernet *et al.,* 1999).

RESULTS AND DISCUSSION

During this investigation it was observed that industrial effluents that released from different categories of small scale industries like aluminum utensil manufacturing industry, flour industry and mustered oil industry located at DIC affect the integument, gills and other organs especially liver of certain hardy fishes like *Channa gachua, Clarias batrachus* and *Anabas testudineus* that collected from nearby wetland.

Integument is the first structural form of fish that directly contact with the polluted water. During study histopathology of integument of *Channa gachua* showed erosion included edema and hyperemia of integument. Formerly several studies on histopathlogy of fish from polluted water have suggested that increased prevalence of skin lesions, such as fin erosion and fin rot, are related to pollution (Mearns & Sherwood 1974, Murchelano 1975, Ziskowski & Murchelano 1975, McDermott Ehrlich *et al.*1977).

Gill is mainly concerned with respiration and osmoregulation, since in fish; the entry of toxicants largely occurs through the gills. Observed gill histopathological lesions of mentioned fish species included degenerative and necrotic changes in epithelium of lamellae of gills. Similar histopathological alternations were observed from the gills of *Tilapia zillii* and *Solea vulgaris* reported by Mohamed (2009). The present results are in agreement with those observed in other fish species under the influence of different pollutants (Kakuta and Murachi, 1997 and Olurin *et al.,* 2006).

The organ most associated with the detoxification and biotransformation process is the liver and due its function, position and blood supply, it is also one of the organs most affected by contaminants in the water (Camargo & Martinez, 2007). During histopathological study, the liver showed fibrosis, intravascular haemolysis in blood vessels of liver.

The probable cause of the development of such changes in liver was direct toxic effects of pollutants on hepatocytes, since the principal site of detoxification of all types of toxic substances (Soufy *et al.,* 2007). Deficiency of oxygen due to gill degeneration is the most common cause of the cellular degeneration in the liver (Eder and Gedigk, 1986). Similar results observed from the histopathological investigations of *Oreochromis niloticus* reported by El-Naggar *et al.* (2009) and *Tilapia zillii* reported by Mohamed (2009).

'Figure-1 about here'

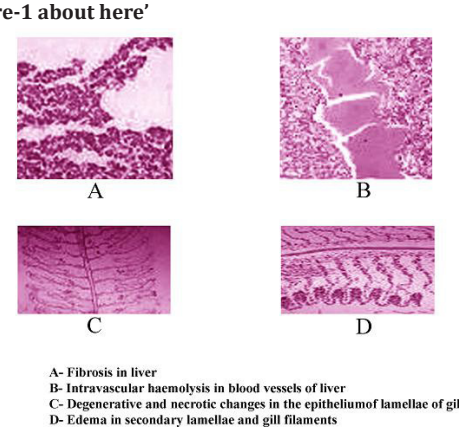

Fig.1. Histopathological alternations of various tissues in *Channa gachua* (Hamilton)

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