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A STUDY ON GILL, LIVER AND KIDNEY OF FRESH WATER FISH ANABAS TESTUDINEUS (BLOCH)

Ajmal Perwaiz
Research Scholar , L.N.M.U, Darbhanga .

ABSTRACT :

The acidity of mine water usually makes it poisonous to most species. Bloch fish that are found in acidic water of an unused lignite mine (pH2-4), Li District, province of Lamphun, Thailand were examines and compared with farmed fish, the gills, kidneys and livers of Anabas testudineus Bloch were examined. Both examined organs noticed tissue anomalies. Gill filaments have been deterred and telangiectasized. Hemorrhages, blood congestion and necrotic cells with mononuclear inflammation have been revealed by the liver tissue. Moreover, aneurysms of the renal tubules and the glomeruli in the Bowman's capsule were found with hypertrophy of the renal tubular epithelia's of reduced lumens. For study of recovery pattern in tissues, viz, the fishes were scarified for 1, 4, 8, 12, and 15days. The liver, muscle, kidney, gill, and brain have been shown to have the toxins regenerated by fish after 15 days.

KEYWORDS : *Anabas testudineus, liver,Bloch, gill, intestine, kidney.*

INTRODUCTION :

A variety of physiologic and biological improvements in fresh water species have taken place in pesticides and associated chemicals. Pesticides are not only the target organism but also the non-target organism as the most toxic substance. The pesticides are valuable agricultural and forestry resources but cannot neglect their contribution to progressive deterioration of the aquatic environment. The marine ecosystem is also facing the challenge of a decreasing genetic base and biodiversity as a major component of the natural environment. Higher concentrations of pesticides have a documented reduction in fish survival, growth and reproduction (MCkim et al, 1975) and many noticeable impacts on fish (Johnson, 1968).Important organs including the ovary and testis are impaired as a result of the effect of pesticides (chlorpyrifos 5% + cypermethrin 5% EC). Until other methods of pest control, such as integrated pest management, are replaced by pesticide use in crop farming it is advisable to use toxic pesticides in the lowest dosages necessary. In both the invertebrates and the vertebrates (Gowlan et al., 2002) and vertebrate ones (Das and Mukherjee 2003), the effects of cypermethrin are dramatic. The synthetic pyrethroid cypermethrin is highly toxic in fish and is used as an insecticide in large commercial farm applications as well as in domestic consumer goods.A recent study at Xuzhou Medical College in China revealed that cypermethrin can have a reproductive system toxic impact in male rats. Both androgen receptor levels and serum testosterone concentrations were substantially decreased after 15 days of continuous dosing. The crystalline insecticide is Chlorpyrifos. It was founded by the Dow Chemical Company in 1965 and is known by trade names such as Durshan and Lorsban. It influences the nervous system by inhibiting acetylcholinesterase in insects. Chlorpyrifos is moderately toxic to humans. Neurologic symptoms, developmental disabilities, and fish in particular have been associated with prolonged exposure.

MATERIALS AND METHODS:

The experimental Anabas *testudineus* fish have been captured and brought into the laboratory from local paddy fields. For a fifth, they have been acclimated. The population dynamics of endoparasites, particularly nematodes, were performed after blood samples of experimental fish. The blood has been measured from the perfectly lean and dry plastic syringe of the cauda dorsalis of fish. EDTA was used as a syringe-contained anticoagulant to gather blood, as the time of coagulation was very screaming in fish.

Haemoglobin concentration was measured in gm/100 ml of blood by Darmady and Davenport (1954) and by Blaxhall and Diasley (1973) in a Sahli Acid-Haematin system, and by routine haematological processes in fish blood.

1. Gill:

Anabas *testudineus*' gill-arches from the control group showed regular primary and secondary lamellae arrangements. The secondary lamellas are projected on the lateral sides of the main lamellas. A delicate layer of a simple squamous epithelium, the active pillar cells, was used to cover the surface of the secondary lamellae. A rigid weight of cartilage tissues, which were remnants of vascular channels, was located in the centre of the primary lamellae (Figure 3A & B).

2. Muscle:

There were bundles of muscle fibres in a transverse segment of Anabas testudineus skeletal muscle. It is composed of long, multi-nucleic, oval-innerved muscle fibres with peripheral nuclei. Striated muscle presence was attributed to light and dark bands alternate arrangements. The whole muscle was rounded by a thick, epimysical sheath and the muscle fibre bundle was present in control fish with the endomytic perimysium and individual muscle fibre (Figure 3E & F). In pollutant-affected fish, muscle fibres were degenerated and cells infiltrated into the cells (Figure 3G & H). There were several muscle fibres with less sarcoplasm and pycnotic nuclei and differences in size and shape.Anabas testudineus also registered edemas between muscle bundles and muscle fibre divisions, when compared to the usual muscle tissue architecture of the control fish.

3. Liver:

The general histology of the organ of the control group was exposed by a portion of the liver under the microscope. The standard parenchymatic appearance was shown. Each tube had a very thin connective tissue capsule that stretched a trabecular to the lobes' body, separating them into uneven lobules. Hepatocytes in the liver were polygonal with the middle of the sphere. In the sinusoidal segment (Figure 3I & J) the cells have been arranged as irregular cord-like structure. Diffuse changes in the hepatic parenchyma of Anabas *testudineus* were observed in the histomorphology of liver specimens exposed to aquatic toxicants from the Buckingham canal. The degeneration of the cell membrane resulted in massive vacuoles in the cytoplasm. Haemorrhages resulting in severe hepatic cell necrosis have also been observed (Figure 3K & L)

4. Kidney:

Lesions of the affected kidney Anabas testudineus have been found in histological studies. Renal cell hypertrophy, changes to nucleic structure, vacuolation, necrosis and renal part degeneration have been reported. In the tubular epithel (Figure 3Q & R), hyperplasia was observed. Severe oedema and congestion of sinusids revealed to parenchymotic cells. Hypertrophy and reduced inter-tubular spaces were presented in renal tubules. The necrotic modifications of the tubular epithelium in the nuclei of the infected cells are characterised by caries and karyolysis. Invariable expansion of the lumen of the tubules. In comparison with control fish, Interstitium was substantially infiltrated with mononuclear cell (Figure 3S & T).

5. Intestine:

Anabas Testudineus' histopathological examinations showed degenerative improvements in serosa, mucosa, litudinal, circular layers of muscle and submucosa. The epithelial cells of the columns at the base and extremities of the villi were degenerated into a syncytial mass. Mucosal cells, which secreted goblets, showed that there were an increase of their size. Mucus plug was used to fill the lumen of the intestines (Figure 3M & N). In contrast to regulating fish the villi also showed degeneration and necrosis on their tips (Fig. 3o & P)

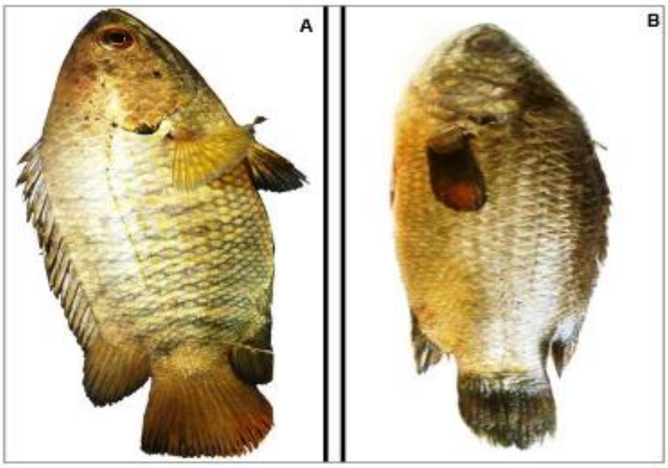
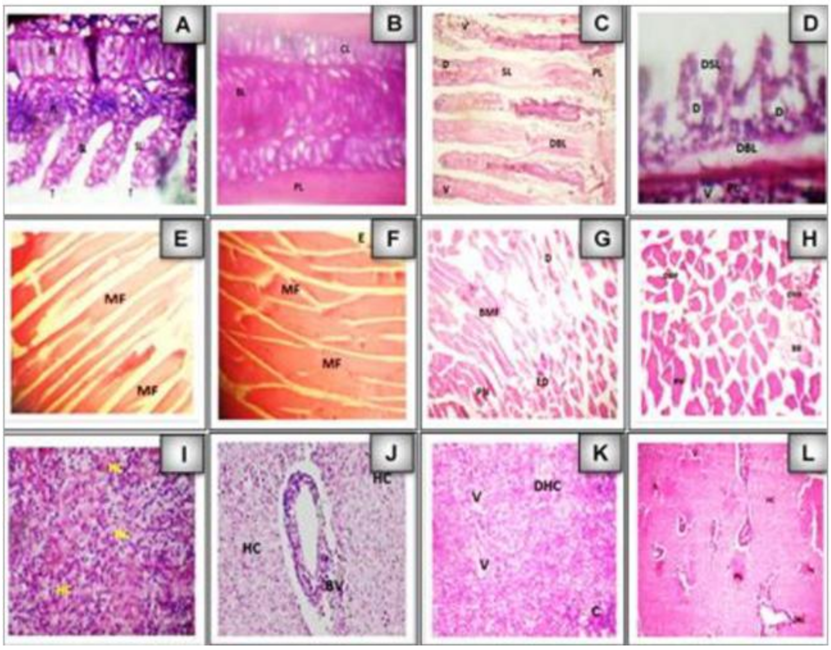


Figure 1: *Anabas testudineus.* A: control; and B: experimental



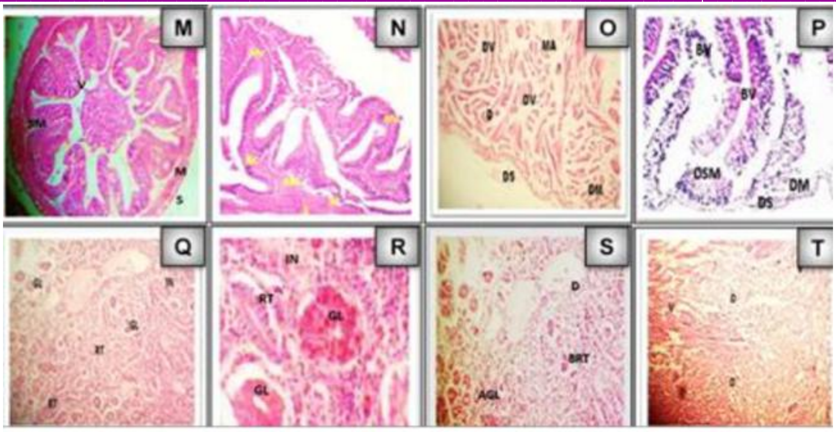


Figure 2: *Anabas testudineus*. DBL-Degeneration of Blood Vessel. M & N: Intestine-control,SL-Secondary Lamellae, BL-Blood Vessel, T-Tip of Secondary Lamellae, D-Degeneration, V-Vacuolation, DSL-Degeneration of Secondary Lamellae. E & F: Muscle-control, G & H: Muscle-treated. MF-Muscle Fibre, D-Degeneration, A & B: Gill-control, C & D: Gill-treated. PL-Primary Lamellae,ED-Edema, PN-Pyknotic Nuclei, DBL-Degeneration of Blood Vessel,DMF-Degeneration Muscle Fibre. I & J: Liver-control, K & L: Liver-treated. HC-Hepatocytes, DHC-Degeneration of Hepatocytes, BV-Blood Vessel, V-Vacuolation, N-Necrosis, PN-Pyknotic Nuclei, DBL-Degeneration of Blood Vessel. M & N: Intestine-control, O & P: Intestine-treated. M-Mucosa, SM-Sub-Mucosa, S-Serosa, V-Villi, GC-Goblet Cell, NV-Necrosis of Villi, DV-Degeneration of Villi, MA-Mucus Accumulation. Q & R: Kidney-control, S & T: Kidney-treated: GL-Glomerulus, RT-Renal Tubule, IN-Interstitium, AGL-Affected Glomerulus, D-Degeneration, DRT-Degeneration of Renal Tubule, V-Vacuolation.(All magnifications at 10 X)

DISCUSSION:

Histology is a valuable tool for the toxic effects of different contaminants. This research also provides the opportunity to determine the impact of pollutants on different organ and animal system. Histopathology offers a simple tool for detecting irritant symptoms in different organs. Chemical contamination to fish is potentially causing a number of lesions in various organs. In order for the impact of contamination to be determined, gill, intestine, kidney and liver are the correct organ for histological exams. This form of fish research has been largely handicapped because the histological literature on various fish organs was inadequate. Sublethal research of fish has shown considerable interest in histopathology studies in recent years.A functional response by organisms providing information on the nature of toxicities and changes in biochirurgical, physiological and histological changes in vital tissues are tissue changes in testorganisms exposed to sub-lethal concentration of toxicants. Considerable evidence indicates that from a histopathological and historochemical point of view, pesticides and heavy metals are responsible for many harmful effects on fish and other species.

Gill is the first organ of fish to come into contact with any pollutant. Gill fish is very sensitive and an important indicator of water-borne toxicants to changes in environmental composition. Therefore, damage to the gill epithelium in fish exposed to various pollutants is a common response. The magnitude of the gill damage depends on the toxicant concentration and exposure duration. In this analysis, Anabas testudineus with water pollutants of the water sample in the Buckingham canal have shown substantial damage to their gill architecture, which is in line with previous observations.

As the body's principal metabolic business, liver has many fundamental functions, such as metabolism, storage and bile separation. More toxicants accumulate than most body organs. Liver is the organ that metabolises and destroys the toxicants. Because the metabolism and detoxification of endogenous waste and drug products in the liver of proteins, fats and carbohydrates occurs, they are more prone to injuries from toxicants. Hepatocytes form a cord-like design, wide in form, polygonal in the form of a uniform eosinophilic cytoplasm and a central nucleus in the liver parts of normal fish Anabas testudineus.

The hepatic cords isolate a significant number of blood sinusoids. Toxicant toxicity has contributed to clear histopathological changes in the liver.

By extracting and deleting hazardous substances and the nitrogen waste products kidney serves as a detoxifying organ. Histological changes in the kidneys of notopterus notopterus and of Oreochromis mossambicus have been documented by Gupta and Dalela, Gayathri and Sultan, which show degeneration and dissolution of renal tubular epithelial cells, vacuolizing, loss of the nuclei, some shrinking and ruptured glomerulus, tubular necrosis, particularly of the convoluted part, and After subtle exposure to phenolic agent, the renal corpuscles were very compromised with hypertrophy and necrosis. Tilak et al. in Cirrhinus mrigala made related observations on chlorpyrifos toxicity.In the collection, detoxification and excretion of waste materials, the kidney played a major role. In regulating fish, a large number of nephrons with a renal corpuscle formed the trunk kidney involved in the excretory function. The tunnel, which is made of two parties, a glomerulus and a capsule, is the proximal part of the tumour. In this analysis, the extreme shrinking lumen of the tubules indicate that the treatment with Anabas testudineus prevents the tubular re-absorption.

CONCLUSION:

The findings of the current study showed that Buckingham Canal water toxins also have reaching implications in the aquatic environment for Anabas *Testudineus*. Moreover even smaller amounts of any toxicant in the atmosphere will cause significant histological changes and more caution and diligence is called for before the dumping into agricultural or environment of municipal and industrial waste, pesticides and bio/inorganic manures.

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