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HISTOPATHOLOGICAL CHANGES IN THE INTESTINE AND STOMACH INDUCED BY NEMATODE PARASITE IN CATFISH, *ARIUS ARIUS* (HAMILTON, 1822) FROM KARACHI COAST

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ABSTRACT

This investigation was undertaken to study the histopathological changes in the intestine of catfish, *Arius arius* (Hamilton, 1822) from the Karachi coast due to the nematodes parasites. The sampling was carried out in December, 2014. The infected fishes were purchased from different fish markets and brought to the parasitology laboratory for further detailed investigation by using standard parasitological procedures.

Four species of nematode parasites namely *Raphidascaris acus* (Bloch, 1779), *Metabronema magnum* (Taylor, 1925), *Haplonema immutatum* (Ward et Magath, 1917) and *Hedruris bryttosi* (Yamaguti, 1935) were recovered from the intestine and stomach of *Arius arius* (Hamilton, 1822). The histopathological changes include fibrosis, edema, epithelial necrosis, dilation of blood vessels and inflammation were recorded.

Key words: Intestine, histopathological changes, *Arius arius*, nematode parasites, cellular changes, Karachi Coast.

INTRODUCTION

Fishes are infected by a variety of helminth parasites including monogenean, digenean, cestodes, nematodes and acanthocephalans (Khalil and Polling, 1997) and all of these parasites have a varying degree of being pathogenic (Paperna, 1996). These parasites cause various diseases in fishes and affect their normal physiology (Kabata, 1985) and cause severe changes in the host which result in the mass mortalities of fishes and reduce the production of fishes as well as have zoonotic affects (Fagbenro *et al*., 1993). Van Dan Brock (1979) revealed that the pathological conditions caused due to parasites lead to the nutritional devaluation of fishes.

Determination of Gastro intestinal tract (GIT) parasitic helminth is important for epidemiology of fish parasitic diseases and its routes of transmission to other hosts. Helminth parasites are frequently found in viscera and body cavity of catfishes and damage the GIT of its hosts. Fish parasites are becoming a serious economic and health issues (Imam and Dewu, 2010).

El-Din *et al*., (2009) reported *Procamallanus laeviconchus* from the GIT of the *Clarius gariepinus* and found goblet cell hyperplasia, cellular infiltration, degeneration of connective tissue, and formation of compact fibrous capsule around the cephalic end of the parasite in the stomach of the host while in the mucosal and submucosal layers of the intestine the parasite caused complete elimination of the epithelial cells at the point of attachment and degeneration of host tissues. Akinsanya (2007) examined the fish *Parachanna obscura*, *Synodontis clarias*, *Heterotis niloticus* and *Chrysichthys nigrodigitsatus* infected intestine. The major symptoms recorded were mucosal oedema, haemorrhage with haemosiderosis. Awachie (1965) found acanthocephala mostly *Rhadinorhynchues horridus* and the trematode *Euclinostomum* in fishes from River Niger. Akinsanya and Otubanjo (2006) also recovered three cestodes and one nematode from *Clarias gariepinus* obtained from Lekki Lagon, Lagos, Nigeria.

In the present study histopathology of the intestine and stomach induced by nematode *Raphidascaris acus* (Bloch, 1779) is being reported in detail.

MATERIAL AND METHOD

The fishes of Ariidae family were brought to the laboratory from fish market near Karachi coast during December, 2014 and were observed and identified. Each fish was dissected and the contents of its gastrointestinal tract (GIT) were removed and placed in Petri dishes containing normal saline. The intestines and other GIT parts

were opened from anterior to posterior in order to observe the helminth parasites. The worms were easily visible and were carefully removed with help of forceps and placed in Petri dishes containing normal saline. The parasites were then fixed in 70% alcohol in different specimen bottles and later on stained and identified by using identification key of Yamaguti (1959).

The infected and uninfected intestine were placed in separate bottles and 3% formalin was used for preservation of tissues. Sections were made from the preserved tissues and its dehydration was made possible by placing the tissues in increasing concentrations of alcohols. Tissues were then cleared and embedded in molten paraffin wax and solidified. 4-5 microns sections were made from the blocked tissues and were stained by using haemotoxylin and eosin. The stained tissues were washed in tap water and were mounted using DPX (A mixture of distyrene, a plasticizer, dissolved in toluene-xylene and used as a synthetic resin mounting media that replaces xylene-balsam) and examined under microscope (Nikon Optiphot Japan 211316). The photomicrographs were taken in the Laboratory of Parasitology, Department of Zoology, University of Karachi, Karachi, Pakistan by digital camera (Fine pix S6000 fd).

RESULT

Four specimens of *Raphidascaris acus* (Bloch, 1779) were recovered from the intestine and stomach of the fish *Arius arius* (Hamilton, 1822).

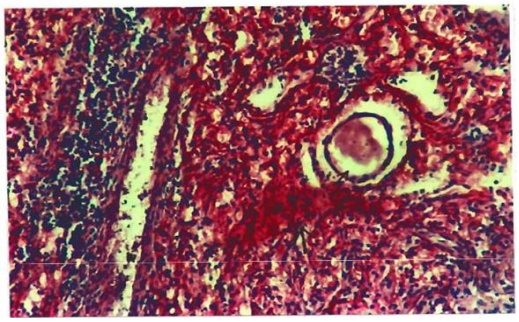

Fig. 1. Severe necrosis in the mucosa and sub-mucosa of the intestine in *Arius arius* (X100).

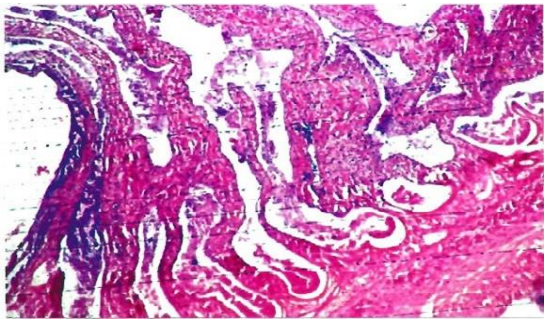

Fig. 2. Collapsed villi, epithelia is destroyed resulting in congested sub-mucosa (X50).

Fig. 3. Section of stomach showing erosion of surface tissue of gastric glands (X200).

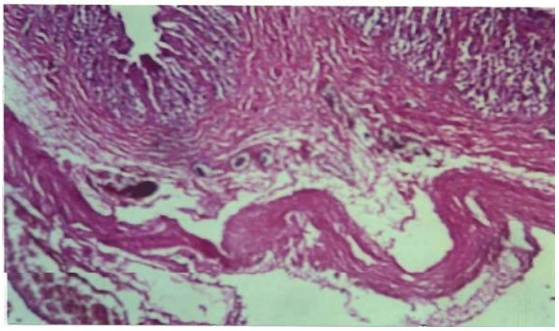

Fig. 4. Section of stomach showing destruction of tissues due to nematodes in the sub-mucosa (X20).

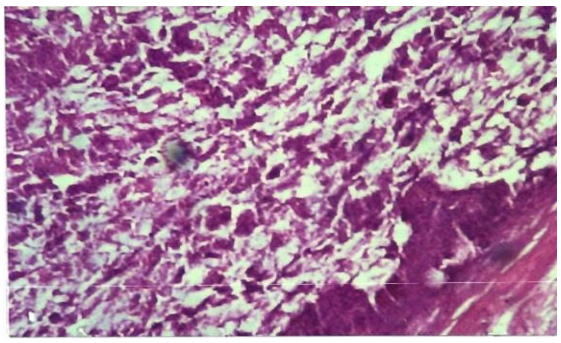

Fig. 5. Section of gastric mucosa showing complete gastric destruction (X200).

Pathological effects of nematode parasites

The nematode parasites induced a number of pathological lesions. The common ones were intestinal inflammation and necrosis around the worm (Fig.**1**). In the uninfected host no morphological tissue changes were seen while the infected host fish by nematodes showed defoliation of surface epithelial (Fig.**2**) and necrotic inflammatory debris was seen in the intestine. *Raphidascaris acus* infection resulted in edematous intestinal mucosa which was thickened and diffused. Inflammation in sub-mucosa (Fig.**1**) and necrosis were present. The site of penetration of parasite is usually edematous with various degree of erosion and bleeding in the stomach (Fig.**3**). The pathological conditions of stomach include necrosis, degeneration (Fig.**4**) and abscess formation. The intestine of *Arius arius* (Hamilton, 1822) showed severe damage, loss of epithelial lining, flattening and fusion of the villi with sloughing of the epithelial covering of villi. Lengthening of crypt gland and degeneration of glandular cell was observed. Damage to all layers of stomach was obvious including gastric glands, sub-mucosa and muscular layer. Severe destruction had occurred to the cells of stomach walls and the underlying tissues were hyaline (Fig. **5**).

DISCUSSION

Helminth infections cause a series of pathological effect in their host. The pathological lesions were present in the stomach and intestine of the host examined. Diffused necrosis and shortening of villi were observed in the intestine of infected host. Nematodes cause severe nutritional deprivation, tissue damage to the stomach and intestines of their hosts. The histopathological changes induced by nematodes depend on the penetration and burden of worm. The work on the histopathological aspects of parasites on their hosts from Karachi Coast has been carried out by Bilqees and Fatima (1995), Bilqees and Fatima (1993a, b) and Khatoon *et al.,* (1999). Khatoon and Bilqees (1996) studied the histopathology of the stomach of *Rachycentron canadus* infected with *Raphidascaris* species of nematodes while Bilqees *et al*., (1999) also studied anisakis follicular changes in liver of the fish *Hilsa ilisha*. The nematodes caused severe destruction to all the tissues of stomach of the hosts by mechanical destruction as well as toxic effects. Atrophy of epithelial cells of mucosal region and mucus secretion, sloughing of villi and fibrosis was studied by Rizwana (2007) in *Lutjanus argentimaculatus* (Forsk. 1775) off the Karachi coast .All the above mentioned changes resulted to a major disruption of the structural organization of stomach which may have a profound influence on the nutritional and digestion process of the fish.

The nematodes caused severe cellular changes and destruction of tissues in the epithelial tissue of intestines. Khatoon and Bilqees (1999) have also reported damage to surface epithelium of intestines. The nematodes cause morphological changes in the cells of the intestines which leads to malnutrition of the host.

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