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EFFECTS OF TREMATODE INFECTION ON THE INTESTINAL EPITHELIUM OF *POMADASYS OLIVACEUM* (DAY, 1875)

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ABSTRACT

Observations were made on the infected intestine of *Pomadasys olivaceum* by trematodes. Standard techniques were used for microanatomical preparations. Histopathological sections revealed excess mucous secretion due to this infection, foci of necrosis and inflammatory reactions were prominent. Hypertrophy of lamina propria is an important finding with keratinized serosal region. In severely effected area where parasite was physically present whole morphological architecture deviated from the normal.

Key Words:- Trematode, Histopathology, Fish, *Pomadasys olivaceum* , Intestine Karachi coast.

INTRODUCTION

Fishes are poikilothermic water-dwelling vertebrates and are important as a source of food. Nutritionists have known for years that fishes are source of top quality protein. Fishes can make a significant contribution to the nutrient needs of humans. A four ounce serving can contain 30% to 50% of the body's daily requirement of protein. In Pakistan fishing is the main source of employment and income for the peoples residing in and around Indus delta. This leads to an increasing risk of infection by disease causing agents such as viruses, bacteria, fungi and parasites. Parasites in marine fishes are of public health concern if they are found within food products that are intended for human consumption. Parasite within the fish tissue might harm the consumers by causing allergic reactions. Studies on helminth parasites are made by collecting them from fish *Pomadasys olivaceum* of Karachi coast. The parasite collected were trematodes *Prosorchis, Lecithocladium* and *Helicometrina*. Histopathological effects of trematode belonging to the genus *Lecithocladium* on host intestine is reported here.

MATERIALS AND METHODS

Pomadasys olivceum (Day, 1875) was purchased from different fish markets. These were brought in Parasitology laboratory for examination. Out of 100 fishes 55 were infected by different parasites such as trematodes, cestodes, acanthocephala, and nematodes. Cestodes and nematodes were recovered only in larval forms. After collecting trematodes from intestine of *Pomadasys olivaceum* (Day, 1875), these were fixed in F.A.A. Solution and then stained by using Mayer's carmine alum. After staining dehydrated in graded series of alcohols and cleared in clove oil and xylene and mounted permanently. For the preparation of histological slides, small piece of infected tissue were fixed in 10% buffered formalin. After fixation the tissue must be processed into a form in which it can be made into thin microscopic sections. First water from the tissue must be removed by dehydration. The usual way this is done by passing through a series of alcohols i.e., 70% to 100%. After dehydration the next step is clearing, the commonest clearing agent is xylene. Finally the tissue is embedded with embedding agent, almost always paraffin. Once the tissues have been embedded, they are sectioned into very thin sections by using a microtome. Then the embedding process is reversed in order to get the paraffin wax out of the tissue and allow water soluble dyes to penetrate the sections. Before any staining can be done, the sections are deparaffinized by running them through xylene to alcohols to water. After this sections of tissues were stained with hematoxyline and eosin. Hematoxyline is basic dye and colours nuclei blue while eosin is the acidic dye and colours the cytoplasm pink. Then slides were passed through the process of dehydration, clearing and mounting permanently. Finally microphotographs of selected sections were prepared with Nikon Photomicroscope (Optiphot-2).

HISTOPATHOLOGICAL STUDY OF INFECTED INTESTINE

OBSERVATIONS

Studies on histopathological sections of the fish *Pomadasys olivaceum* intestine infected with trematode *Lecithocladium* species were made. Some sections revealed that the intestinal epithelium was completely destroyed and cellular architectural status badly deviated from the normal (Figs. 1-6). Mucus was excessively secreted by trematode infection (Figs. 2, 4). Trematode infested area was showing fibrosis in sub-mucosa and atrophy of cellular components in muscularis externa (Fig. 2). Lamina propria in mucousal region was showing hyperplasia due to which the ends of neighbouring villi come together and anastomose with each other. At some portions of

intestine, lamina propria was showing both the hyperplasia and hypertrophy (Figs. 1, 4, 5). Erosion of serosa along with pink proteinaceous material are seen representing fibres in the mucosal region (Figs. 3, 6). In micrograph 3 note the sharp demarcation of villous portion of intestine and fibrotic portion of intestine. Marked demarcation between muscularis externa and sub-mucousa by fatty degeneration is obvious in Fig. 6. In micrograph 5 the highly engorgement of one of the villi along with fibrosis of all layers is an important finding. In another portion of intestine villi are totally whipped off which indicates the severity of infection that may also be confirmed by presence of two vacuolated spaces which is indicative of parasitic presence in the vicinity, atrophy and fibrosis was also prominent (Fig. 6). The necrosis is prominent in most portions of intestinal section, the necrotic area is composed of phagocytic cells which have engulfed debris from dead intestinal tissue (Fig. 7).

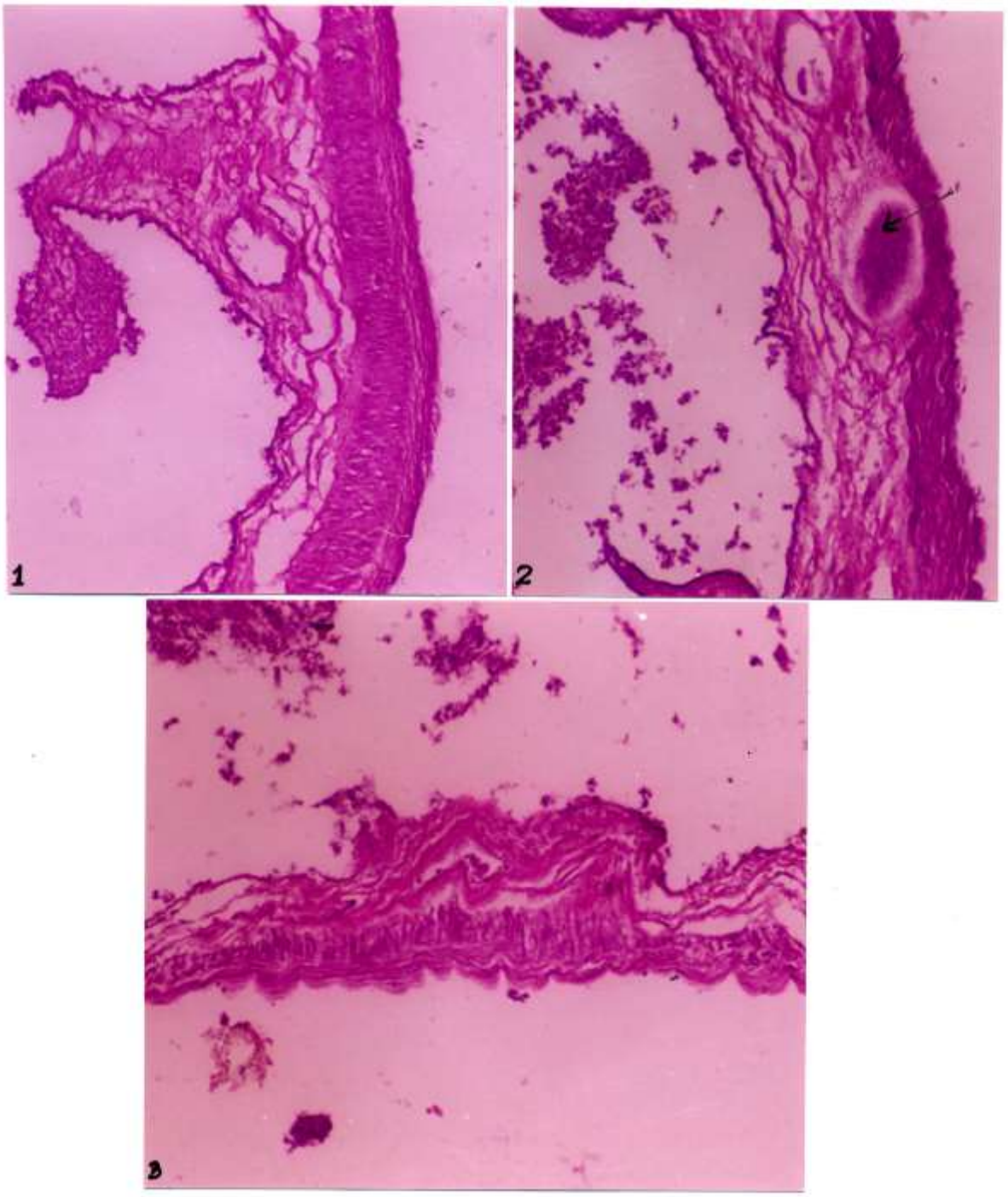

Fig. 1. Another portion of intestine shows hypertrophy and hyperplasia of lamina propria in mucosa X50.
Fig. 2. Section of intestine showing section of trematode (arrow), fibrotic degeneration muscularis externa, erosion of serosa and mucosa X50.
Fig. 3. Section of intestine showing erosion of serosa, necrosis in the muscularis externa (arrow), and complete atrophied mucosa. At some places dysplasia is also prominent X50.

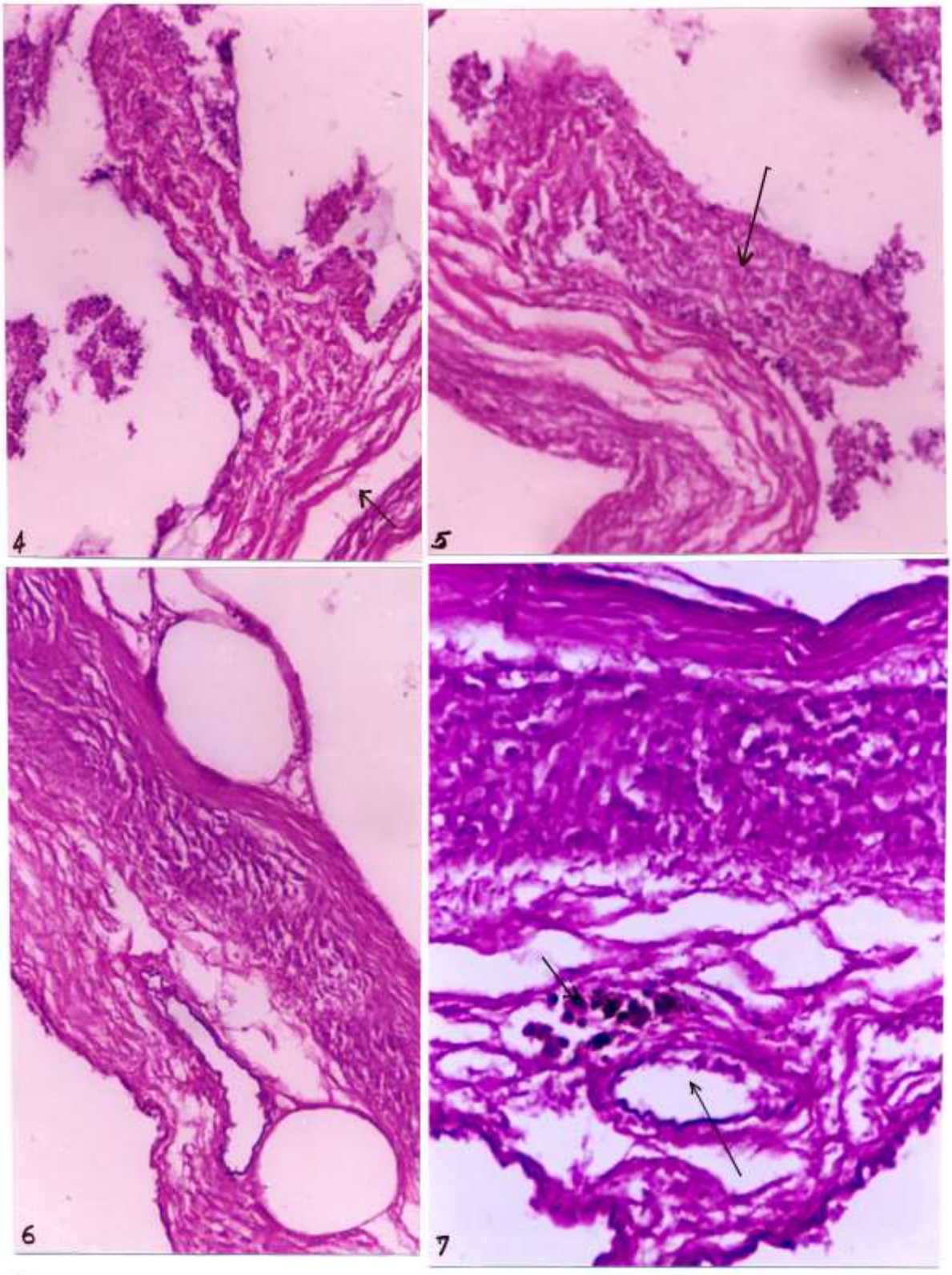

Fig. 4. Section of intestine showing fatty degeneration in sub-mucosa (arrow). Hypertrophy and hyperplasia of villi is also prominent while neighbouring villi completely washed out X100.

Fig. 5. Section of intestine shows complete destruction of all layers of intestinal architecture. A coagulated hypertrophid villi also prominent (arrow) X100.

Fig. 6. Portion of intestine showing vacuolated spaces which indicates the location of parasite where parasite is not physically. Fibrosis also prominent in the whole thickness of the intestine. Villi are totally whipped off X100.

Fig. 7. Portion of intestine shows necrotic necrotic foci (arrow) near the vacuolated place (arrow) which indicates that parasite was present here. All layer degeneration is also prominent X200.

DISCUSSION

Fishes throughout the world serve as one of the important proteineous dietary items for making different dishes. So if fishes become infected in turn they may also infect human beings. Here an attempt is made to study the tissue changes caused by trematodes in fish *Pomadasys olivaceum*. This fish was parasitized by *Lecithocladium hexavitellarii* (Bilqees, 1971). These trematodes parasitized the sub-mucousal region where they penetrated by their ventral oral sucker, and responsible for degeneration of all intestinal layers. Excessive mucous secretion is an important finding which was not observed in *Pomadasys olivaceum* by trematode infection (Khatoon *et al*., 1998). Hypertrophy of lamina propria was prominent in this fish which was not reported by Khatoon *et al*., 1998. During the study the common tissue damage observed are erosion, degeneration, sloughing of intestinal villi and sub-mucosa, these findings are similar as described by Bilqees *et al*., 1994 in the intestine of *Rachycentron canadus* (L.) infected by acanthocephala. In the sub-mucosal region a lesion is also observed which appeared like a hole or perforation in the intestinal wall is similar as observed by (Bilqees & Fatima 1995, Fatima & Bilqees, 1991) in the intestine of fish infected by acanthocephala. It is known that nature of damage to intestinal mucosa is primarily traumatic by penetration of the acetabulum and some times due to oral sucker. It is compounded by the tendency of the worm to release its hold. Occasionally reattach at another place (Roberts *et al*., 2006, Butterworth, 1984, Mills, 1979). Total destruction of all layers of intestinal wall specially the hypertrophy, necrotic fibrosis and excessive mucous secretion, are an important observations during the present study.

Conclusion:

It is concluded that parasite enzymes may be also responsible for the damages in the same way as they present physically in the organ.

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