**Introduction**

*Pomphorhynchus laevis*, the Acanthocephalan, is a common parasite of several species of freshwater fish [2]. In *P. laevis*, the presoma which comprises neck, bulb and proboscis, can penetrate the entire thickness of the gut wall, however the remaining metasoma appears in the gut lumen [2]. The histopathology of the acanthocephalan can be directly related to the depth of penetration of the host’s intestines by the presoma.

The pathology of *P. laevis* infection in the alimentary tract of the salmon (*Salmo salar*), the chub (*Leuciscus cephalus*), the rainbow trout (*Salmo gairdneri*) and the stone loach (*Noemachilus barbatulus*) was demonstrated in earlier studies [4, 7, 12, 14, 15]. But there were no research on the pathogenesis of *P. laevis* in tench (*Tinca tinca*). For this reason, the aim of the present study was to determine pathology in tench naturally infected with *P. laevis*.

**Materials and methods**

Investigation materials were consisted of 23 tench (*Tinca tinca*) which were fished in the Kapulukaya Dam in Turkey by the local fishermen. Tench were transferred to the laboratory in containers and then were weighted. After the dissection of the fish, the whole digestive tract was removed from each fish and then was cut longitudinally and examined for *P. laevis*. Among the 23 infected fish, seven were prepared as follows for histopathological studies. Pieces of intestinal tissue with attached parasites were fixed in buffered formalin, dehydrated with alcohol and embedded in paraffin. Afterwards, these blocks were serially sectioned at about 5 µm and stained with haematoxylin-eosine, periodic acid-Schiff and Mallory Tricrome [13]. The intestine of 5 uninfected tench were similarly processed for comparative purpose.
Results

Infected tench with *P. laevis* were sized 23-34 cm (mean 27.5 cm), and weighted 280-600 gr (mean 386 gr). *P. laevis* occupied the posterior positions in the tench intestine in present study (Fig. 1). Proboscis perforated to gut and emerged in the coelom or penetrate to liver.

Specimens of *P. laevis* were not only found in the host’s alimentary canal but also in extraintestinal position. The acanthocephalan was never found attached to the stomach. *P. laevis* were found between 1 and 15 infected fish.

Examination of histological material was showed that the mucosa, submucosa and muscle layers were completely disrupted to form a tunnel at the attachment site of acanthocephalan (Fig. 2). This parasite proboscis had penetrated the host liver (Fig. 3). The collagenous fibers with numerous granulocytes were seen around the tunnel. Also the similar host responses were prominent at the end of the tunnel and around the bulb and proboscis. At site of damage, the *lamina propria* was thickened and the goblet cells in this region were more prominent and their number had increased.

Neck of *P. laevis* penetration through the gut wall was resulted in extension of the fibroblast, however there wasn’t completely capsule formation. Any mucus-like substance was not observed between host tissue and the parasite’s presoma. The presoma was segmentally covered by fibrous inflammation tissue. Predominated cell types within the inflammation tissue were fibroblasts, granulocytes, lymphocytes and macrophages.

Discussion

*Pomphorhynchus laevis* was exhibited a distinct preference for a particular area of the digestive tract in various fish species. Earlier studies [4, 8, 10, 11] was demonstrated that *P. laevis* distributed not only in the anterior part, but also in the posterior part of the host alimentary canal. In the present study, the Acanthocephala occupied only the posterial positions in the tench intestine.

Histopathological changes in the alimentary canal of fish infected by Acanthocephala varied depending to the species of parasite [5]. The genus of *Pomphorhynchus* frequently disrupted through the gut wall [5]. The host response to *P. laevis* is the form of fibrosis and encapsulation [15]. Capsule formation is not an invariable consequence of acanthocephalan infections although connective tissue proliferation and the presence of the inflammatory cells is common [1, 5]. The capsule may aid the fish by preventing the gut contents contaminating the abdominal cavity and causing peritonitis [12]. In the present study, *P. laevis* was disrupted all layers of intestine, moreover, proboscis emerged in coelom or penetrated to liver. Although the proliferation of connective tissue and the presence of the inflammatory cells around the presoma was began, it was not completed as a capsule formation in this study.

Increasing mucus secretion in fish infected by acanthocephalan has been reported by previous studies [1, 4-6, 15]. HARRIS [6], noticed that the presence of antibodies in the mucus of the fish is work a defense system against infectious organisms. An increase in mucus secretion in infected fish is not a consequence of an increase in goblet cell numbers, because goblet cells become more active during *P. laevis* infection [15]. In present study, the number of goblet cells was increased in affected region, and increasing mucus secretion was observed on the intestine surface.

The presence of a mucus-like substance between the innermost layer of the capsule and presoma of *P. laevis* was reported [4]. According to CHAICHARN and BULLOCK [3], this substance is different from the mucus of the goblet cells, and its secretion is due to epithelial fibroblast cell lining the capsule. In this study, mucus-like substance between the intestine and presoma was not observed.

Granulocytes have been previously reported in inflammatory responses to fish infected by acanthocephalan [1, 7, 9]. The differences of cellular components in inflammation tissue of the stone loach appeared to correlated with the amount of collagen present [14]. The presence of granulocytes, a few macrophages and a small amount of collagen is used as an indicative of acute inflammation [15]. A chronic inflammatory state is associated with the presence of a large amount of collagen, giant cells and fibroblast [15]. In present study, fibroblasts, granulocytes, lymphocytes and macrophages were prominent in the inflammation tissue. Since giant cells were not found in inflammation tissues, it was indicated to acute inflammation.

In conclusion, *P. laevis* was disrupted in attachment site of tench intestines. This parasite was also penetrated the fish liver. The host response to *P. laevis* was the form of fibrosis around attachment site of parasite. Completely capsule formation and mucus like substance were not observed. It might be related to acute infection.

Bibliography


