RESEARCH ARTICLE

Histopathological Effects of the Cestode parasites on fishes from the Amravati region of Vidarbha (MS) India

Gaikwad PR[1], Sonune MB[2] and Nagmote SR[1]

[1]Late. B. S. Arts, Prof. N. G. Science & A. G. Commerce College, Sakharkherda, Dist. Buldana.
[2]Professor, Department of Zoology, Shri Shivaji Science , Arts & Commerce College, Chikhali, Dist. Buldana

Manuscript details:

Received: 24.10.2016
Accepted: 24.12.2016
Published : 06.02.2017

Editor: Dr. Arvind Chavhan

Cite this article as:
Gaikwad PR, Sonune MB and Nagmote SR (2016) Histopathological Effects of the Cestode parasites on fishes from the Amravati region of Vidarbha (MS) India, *International J. of Life Sciences*, 4 (4): 602.-605.

ABSTRACT

The histopathological studies of infected and non-infected intestinal tissue of the host; with scolex attached to the epithelium of mucosa (villi), mature and gravid segments in lumen of intestine and among the villi. It also includes cysts of parasite in submucosa of host intestine. The transverse sections of infected intestine shows the damage to intestinal villi and submucosa. Histopathology includes the study of non-infected and infected intestine of host with reference to the cestode parasites – *Circumoncobothrium shindei, 1977 Senga sonunae n.sp. Lytocestus indicus* (Moge, 1925), *Cotugnia aurangabadensis* (Shinde, 1968), *Raillietina corvina* (Fuhrmann, 1909).

Key Words: Scolex, Villi, Cestode etc,

INTRODUCTION

Parasitism is intimate relationship between two organisms in which one (the parasite) lives on, off or at the expense of the other (host). The parasitism is having the ecological relationship between two different organisms. The parasite is metabolically or physiologically depend upon it's host. Heavily infected host may be killed by their parasites. The reproductive potential of the parasite exceeds that of their hosts. The helminth infections are very common in man, domestic animals and wild-life. Mostly the poor tropical and sub-tropical areas with poor soci-economic status, endemic helminth infections are very common.

Fish diseases and histopathology, with a broad range of causes, are increasingly being used as indicators of environmental stress since they provide a definite biological end-point of historical exposure, it is a mechanism which can provide an indication of fish health by determining early injury to cells and can therefore be considered an important tool to determine the effect of parasites on fish tissue.

Pathogenic effects of cestode are due to attachment of the adult parasite in the gastrointestinal tract and also to the encapsulation of larval stages in the tissues. Cestode live in a very hazardous environment as on there is continuous movement of the gut lining, food gut surface and the

nature of its related glands, they have a hold fast organ (scolex) for attachment, which may be acetabulate with 4 suckers, bothridiate with 4 bothria (muscles hold fast organs), or bothriate with 2 bothria (holdfast grooves), some cestode scolices may also be armed with hooks and spines or have a retractable rostellum or proboscis covered with fine hooks.

Data on the pathological mechanism of Caryophyllid cestodes were presented by Mackiewicz and Cosgrove (1972), who made a comparative pathological study on the mode of attachment and scolex morphology of 15 Caryophyllid species. These authors found that Caryophyllid species without attachment organs could cause considerable pathology at the attachment point. They reported about some mechanical displacement and ephithelial loss adjacent to the scolex proper and a narrow eosinophilic interface layer at the neck region.
The physiological conditions of a specific species depend mainly on the type of site which is available; this may be favourable or unfavourable where the parasites get sufficient nourishment. The type of diet available will have profound effect on the growth rate of the cestode parasites and also the distribution of cestode is likely to be related not only to the physiochemical conditions within the gut, but also the actual topography of the gut surface and the nature of the related glands.

In low to moderate infections, pathological effects are localized around the attachment of the adult worm. The extent damage is proportional to the depth of penetration of the scolex. It is negligible when parasites are attached to the ephithelial mucosa only and becomes extreme, with extensive qranuloma and subsequent fibrasis, when the scolex is anchored in the muscle layer or entirely perforates the intestinal wall (Paperna & Zwerner, 1976, McDonough & Gleason, 1981, Kabata 1985). The depth of penetration of some species may vary in different host fishes (Tarachewski 1989). Although reports of the presence of the tapeworm, *Proteocephales* sp., in liver of freshwater fishes have been discussed (Wardle and McLeod, 1952). Thanapon Yooyen et al (2006) also found one species of cestode, *Senga chiangmaiensis* in the liver of *Mastacembelus armatus*. Often no injury results from intestinal cestodes unless they are present in high numbers, but an inflammatory reaction may occur in association with mature worm and plerocercoid larvae that exert mechanical pressure on internal organs.

Plercocercoids migrating in the visceral cavity can produce adhesions that are very damaging to fish and can even cause death when vital organs are severly injured. The large plerocercoids of *Lingula intestinalis* can cause great damage to small fish even rupturing the body. The pathogenicity of adjacent cestodes of various orders described by Rees G, in 1967. In fishes Mevicar (1972) described host parasites relationship of *Acanthobothrium, Phyllobothrium, Echinobothrium*. Murlidhar and Shinde (1987) observed histopathology of *Acanthobothrium, Uncinathum* of fish *Rhynchobatus djeddensis*. Caira (1993) observed a comparison of mode of attachment of histopathologenicity of tapeworm representing two orders infecting the spiral intestinal of the nursa shark, *Ginglymostoma cirratusa.*
At the same, it is known that tapeworm ingest nutrition by digesting the intestinal content and partially by damaging the intestinal wall with the help of their proteolytic enzymes while they protect themselves from the effect of host-produced proteoytic enzymes with their protease inhibitors. Mackiewicz et al. (1972) supposed that proteolitic enzymes or other lytic secretionplayed a role in pronounced tissue reaction.

Adult cestodes are not uncommon parasites in the digestive tract of fishes. However compared to larval stages, adult helminth in general and cestode in particular are looked upon as of not having much adverse effect on their fish hosts. Never the less quit a few reports on the pathogenicity of cestodes on fishes are available (Winsniewski, 1932; Vik, 1957). But often the pathology of infection is reported only in very general terms and the exact nature of damage to fish hosts by adult cestodes is not fully examined. This work is an attempt to bring out the different aspect of pathology of infection of fresh water fish *Mastacembelus armatus* (Lacepede) and *Clarias batrachus* (Linnaeus) by the adult cestode, *Senga sonucanar* n.sp, *Circumoncobothrium shindea* and *Lytocestus indicus.*

Fish is a cheap and important source of protein. It contains lipids, minerals, oils and vitamins. *Mastecembelus armatus*, *Mrigal, Labeo rohita, Clarius batracus, Channa orientalis, Catla, Rohu* and etc. are widely distributed in India and it occurs mainly in quiet waters, lakes, pools but may also occur in fast flowing rivers. The fish is generally classified as omnivores or predators feeding mainly on aquatic insects, fish and higher plants debris. In most part of

the world, fish production is mainly from the wild. As the world population grows, fish resources are being depleted at an increasing rate as a result of environmental degradation, over harvesting, pollution thus fish production could no longer meet the demand of the growing population. This had led to increase in the involvement of stakeholders in aquaculture. This method has also been plagued by the problems of overcrowding, poor environmental conditions and pollution which often result in reduced immunity of fish and higher susceptibility to parasites and diseases. The present study deals with Histophathological Study of Cestode parasites from some fresh water fishes from Amravati Division.

MATERIAL AND METHOD

Freshwater fish *Clarias batrachus* (Linnaeus) were brought to the laboratory for examination. During the parasitological examination the intestines were cut open and examined under stereomicroscope to see the degree of infection. The tapeworms were collected, placed in saline solution, freed from the adhering mucus by gentle shaking, they were flattened, processed and stained for morphological studies and were identified as *Lytocestus indicus*, *Circumoncobothrium shindei Senga sonunae n.sp., Cotugnia aurangabadensis and Raillietina R. corvina* with in short time 2 to 3 cm long pieces of proximal intestinal and liver segments containing tapeworms were fix in Bouin's solution for 24 hrs, as the tissue undergoes autolysis rapidly after death and rapid fixation is essential.

The fixed material were transferred and processed through ascending grades of alcohol, dried in a wax miscible agent and impregnated in wax (M.P 58º to 60ºC). Sectioning were carried out on a rotary microtome at 6Em. Sections were floated on warm water at 48ºC and mounted on chemically cleaned slides coated with egg albumin. The mounted, unstained sections were dewaxed in three stages of xylene at 1 minute each and stained with most widely used standard haematoxylin and eosin stain, staining was carried out using haematoxylin and eosin staining technique (Bullock, 1978). This stained is often sufficient for identification of larger parasites such as helminthes, in this method the nuclei of cells are stained by the haematoxylin, the cytoplasm is coloured by the eosin.

Stained mounted sections were examined under light microscope for good ones that were selected for photomicrography.

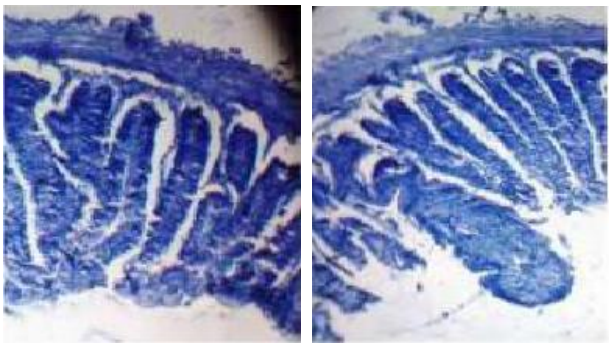
RESULT AND DISCUSSION

Histopathological sections from intestine of *Channa gachua* infected with *Senga sonunae n.sp* cestode parasite.

The worm was first detected in March 2014, specimen of cestode *Senga sonunae n.sp* during the dissection of freshwater fish ***Channa gachua*** and submitted for routine diagnostic examination from Mahan Project, Dist. Akola (M.S) India.

Histology of intestine of *Channa gachua* infected by *Senga sonunae n.sp* include both morphological and histopathological changes and exhibited excessive mucus secretion, the worms were found located in the lumen of intestine.

Attached cestode parasite



Non Infected **Infected**

Pathological effect exhibited ruptured serosa layer, strong inflammatory edema and vacuolization in tunica muscularis and lamina propria, shortened and irregular shaped villous processes with blunt tips, breakage and separation of villous processes with large space (Plate no.6). Thus it can be concluded that the worm contact with host tissue and utilize the nutritive material to the favourable for its nourishment and growth from the host tissue and make host weak, affecting the growth of host causing damage to intestinal tissue of host.

The present findings are more or less similar to the observations made by R. Kaur (1981) reported pathological change in pathological changes mainly enhanced mucus secretion in *Channa straitus* infected with *Senga Sp.* Laxma Reddy and Benarjee (2006) observed that the stomach is highly affected due to helminth infestation which was evidenced by total eruption of villi from the mucous membrane which resulted to a major disruption of the structural organization of the organ which might have profound influence on the nutrition and digestion process of the fish.

Conflicts of interest: The authors stated that no conflicts of interest.

REFERENCES

Adamson ML and Caira JN (1994) Evolutionary factors influencing the nature of parasite specificity. Parasitology, 109: 585 – 595.

Bullock WL (1963) Intestinal histology of some salmonid fishes with particular reference to the histopathology of acanthocephalan infection . J Morphol 112:23-35.

Fuhrmann O (1909) Neue Davaineiden. Centralbl. F. Bakt. U. Parasit. Abt. L. orig XLlX: 94-124.

Banarjee G, Laxma Reddy B and Bikshapathi V (2006) Histopathology and Histochemistry of the intestine of *Clarias batrachus* due to trematode *Fenarchopsis goppo* (Ozaki, 1925) J. Aqua. Biol. Vol. 21 (2) : 257-262.

Grawel SS and Kaur R (1981) *Raillietina* (*R*) *patilensis* n.sp. from *Columba livia intermedia*. Ind. J.zool. 9 : 7-9.

Kabata Z (1958) *Lernaeocera obtuse* n.sp. Its biology and its effects on the haddock. Mar. Res., 3: 1-26.

Mackiewicz JS, Cosgrove GE and Gude WD (1972) Relationship of pathology of scolex morphology amoung caryophylloid cestodes. Zeitschri fur Parasitenkunde, 39, 233-246.

Mackiewicz JS, Cosgrove GE and Gude WD (1972) Relationship of pathology of scolex morphology amoung caryophylloid cestodes. Zeitschri fur Parasitenkunde, 39, 233-246.

McDonough JM and Gleason LM (1981) Histopathology in the rainbow darter, *Etheostoma Caeruleum* resulting from infections with the acanthocephalans, *Pomphorhynchus bulbocolli* and *A. dirus*. J. Parasitol 67: 403-409.

Mevicar AH (1972) The ultra structure of the parasite host interface of three tetraphyllidean tapeworms of the elasmobranch, *Raji naevus*. Parasitology, 65 (1): 77-88.

Meyer MC and Vik R (1968) Observations on *Diphyllobothrium Sebago* plerocercoids in the fish hosts. Proc. Helminth. Wash. 35: 92-96.

Moghe MA (1925) Two new species of cestode from Indian Columbidae. Red. Ind. Mus. 27 : 431-437.

Murlidhar A and Shinde GB (1987) Histopathology of the cestode *Acanthobothrium uncinatum* (Rudolphi, 1819) from *Rhynchobatus djeddensis* at Kakinada, A.P. India. Indian J. of Parasitology 11 (1): 85- 86.

Paperna I and Zwerner DE (1976) Parasites and diseases of striped bass, Morone sexatalis (Walbaum) from the lower Chesapeake bay. J. Fish Biol. 9: 267-287.

Rees G (1967) Pathogenesis of adult cestodes. Helm. Abst, 36: 1-23.

Shinde GB (1968) On *Circumoncobothrium Ophiocephali* N.Gen, N, sp, from fresh water fish (Ophiocephalus Leucopunctatus) in India. Rivista Di Parassitologia, vol. xxix- N.Z. Giugno.

Taraschewski H (1989) *Acanthocephalus anguillae* intra and extraintestinal positions in experimentally infected juveniles of goldfish and carp and in sticklebacks. J parasitol 75:108-118.

Thanapon Yoogen et al. (2006) A new record of *Clinostomum phillippinensis* (Valasquez, 1959) in *Trichogaster microlepis* (Gunther, 1861) from Bung Berapet, Nakton Sawan, Thiland, Southeast Asin J. Trop Med. Public Health. Vol 37 (Suppl 3).

Wardle RA and McLeod JA (1952) The Zoology of Tapeworms, Mimmeapolis, University of Minmestoa press pp. 780.

Wisniewsk LW (1932) *Cyathocephalus truncates* Pallas, ein Fish parasit aus dem Vrele Bosne R,b. List Fischerb., 7: 4 pp.