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ORIGINAL ARTICLE

Quantitative Changes in Protein Contents of Nematode Genus *Procamallanus* Sp. and its Host *Mastacembelus armatus* Lacepede, 1800

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ABSTRACT

Fish is correctly regarded as a healthy component of the diet; it is an excellent source of protein and is low in saturated fats. However, there are risks associated with eating cultured fish owing to the infection by helminthic parasites. Present study deals with taxonomical and protein content in nematode parasites Procamallanus sp. and its host tissue i.e. normal and infected intestinal tissue of Mastacembelus armatus Lacepede, 1800. The result obtained an amount of protein content in the present study indicates that the amount of proteins present in nematode parasite Procamallanus Sp. is lower (2.11 mg/gm wet weight) as compared to protein present in infected intestine of Mastacembelus armatus Lacepede,1800 (2.88 mg/gm wet weight) as well as in host normal intestine of Mastacembelus armatus Lacepede,1800 (4.00 mg/gm wet weight).

Key words: *Mastacembelus armatus Lacepede,1800, Protein Content, Procamallanus Sp.*

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INTRODUCTION

Proteins serve a physiological system in many ways with their ubiquitous nature. They build up new tissue and maintain the structure of every cell/ tissue including its content of protein-containing enzyme systems. Parasitology has developed in to a multi-dimensional approach in helminth research. They serve as valuable models for the study of fundamental biological phenomena, since many species of parasites during their life cycle undergo remarkable morphological and biochemical adaptations related to different environments. Fish is a cheap important source of dietary animal protein and could be taken in a variety of ways such as soups and fish-pie. It contains lipids, minerals, vitamins and oils. Fish oil is also rich in vitamins A and D, which are needed for the healthy development of bones and for the proper functioning of the eyes (Murray and Britt, 1969; Ihekeronye and Ngoddy, 1985; Onukwuozor, 1999; Nwuba and Onuoha, 2006). Fish meal is incorporated in livestock feeds to serve as a source of essential amino acids lysine and methionine which could not be obtained from plant food and grains. Fish farming is also an integral source of income to both small-scale and industrial fisheries (Moses, 1983).Helminths damage health of fish by inducing variable intensity of infection depending upon the quality of environmental conditions (Read, 1992). The importance of fish parasite is related directly to the importance of fish health that they may affect (Hoffman, 1967). The fish parasites feed either on the digested contents of the host's intestine, or host tissues. The parasites multiply rapidly under favorable conditions

(Dogiel, 1956), and cause economic loss by affecting the health of fishes, often cause high mortality (Tripathi, 1959). Parasites interfere with nutrition of hosts, disrupts metabolism and secretary functions of alimentary canal and damage nervous system (Markov, 1961). Nematodes, or roundworms, infect many different species of aquaculture and wild fish. Small numbers of nematodes often occur in healthy fish, but high numbers cause illness or even death. Humans get automatically infected at the time of eating the infected and uncooked flesh of fish. The genus *Procamallanus* was established by Baylis, 1923 with *P. laeviconchus* (Wedl, 1862) as its type species. Nematode of the genus *Procamallanus* Baylis,1923 (Order: Spirurida; Family: Camallanidae) are cosmopolitan in distribution as intestinal parasite of freshwater fishes and occasionally of amphibians (Hoffman,1998). Approximately 34 species were reported from different species of fishes in the world (Yamaguti, 1961), 24 species have been reported from South and Central America (Morvec, 1998) and nine species have been recorded from Bangladesh (Arthur and Ahmed,2002).

Identification of Nematode parasite is first step of controlling the parasitic infection of *Mastacembelus armatus.* In the present study author plan to determine protein content from Nematode parasite of *Mastacembelus armatus* from diffetent localities of Nanded (M.S.) India.

MATERIAL AND METHODS

For the collection of nematode parasites, the intestine of *Mastacembelus armatus* were collected from Nanded. The collected worms were washed in distilled water to render them free from intestinal contents. The Nematode were preserved in 10 % Glycerine alcohol and mounted in glycerine jelly for taxonomic identification. The taxonomic observation turns then to *Procamallanus sp.* The Protein content was determined by the Lowery's Method.

RESULTS

TAXONOMY:

The body is mediam, thin, slender, semitransparent, head end bearing truncated and tail end becomes curved pointed end. The mouth aperture is oval in shape; head bears two pairs of submedian papillae and a pair of laterally located amphids. Buccal capsule forms a chitinous ring with the junction of oesophagus. Oesophagus consists of muscular and glandular parts. The posterior part of oesophagus joins to intestine. The intestine leads into short rectum that opens directly to the exterior at the anus in female and in male into the cloaca.

Male Characters:

Males are smaller than females. The mouth aperture is oval in shape; head bears two pairs of submedian papillae and a pair of laterally located amphids. The excretory pore opens on the ventral surface of the body. The nerve ring surrounding the muscular portion of the oesophagus. The buccal capsule is cylindrical and leads in the the oesophagus. The oesophagus is composed of two portions an anterior muscular and posterior glandular one. The testis lies in the anterior third of the body and extends to the base of muscular portion of the oesophagus, it reserves in posterior direction and reaches to posterior end, it leads to vas deferens which opens into the cloaca through short and narrow ejaculatory duct. The caudal papillae are well developed. The total seven pairs of caudal papillae are present. The cuticular processes present behind the post-anal papillae. The spicules are unequal and dissimilar in shape. The right spicule is long than left.

Female Characters:

The females are longer than males. The mouth aperture is oval in shape; head bears two pairs of submedian papillae and a pair of laterally located amphids. The excretory pore opens on the ventral surface of the body. The nerve ring surrounding the muscular portion of the oesophagus. The buccal capsule is cylindrical and leads in the the

oesophagus. The oesophagus is composed of two portions an anterior muscular and posterior glandular one. The vulva is post-equatorial. The vulvar opening is an oval, small, with slightly elevated lips. The muscular vagina runs posteriorly. The vagina gives of two opposed, distended uterine tubes. Eggs are oval to rounded in shape. The tail is pointed.

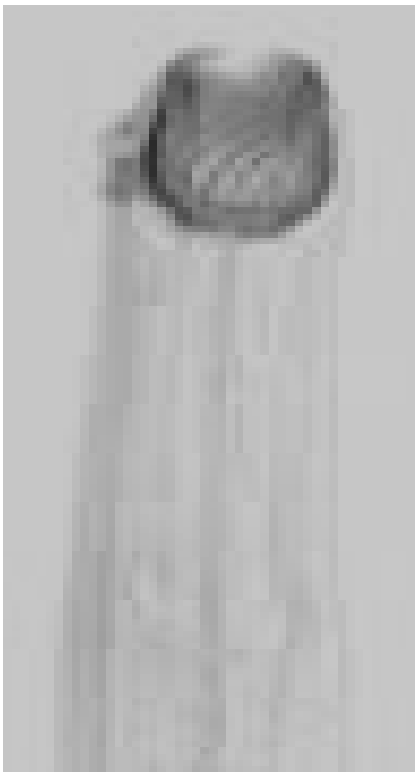


Fig. 1. Anterior End of Male

Fig. 2: Anterior End of Female

BIOCHEMISTRY:

The result obtained an amount of protein content in the present study indicates that the amount of proteins present in *Procamallanus sp.* is lower as compared to protein present in infected intestine as well as in normal intestine of host *Mastacembelus armatus* . This is summarized in table.

DISCUSSION

Proteins are the most abundant organic molecules in cells constituting 50 percent of more of their dry body weight. They are found in every part of every cell. The main significance of the proteins is their role in structural make up of the body rather than in the yield of the energy.

The result obtained an amount of protein content in the present study indicates that the amount of proteins present in nematoode parasites is lower as compared to protein present in infected intestine as well as in host normal and infected intestine. This is summarized in table and graph.

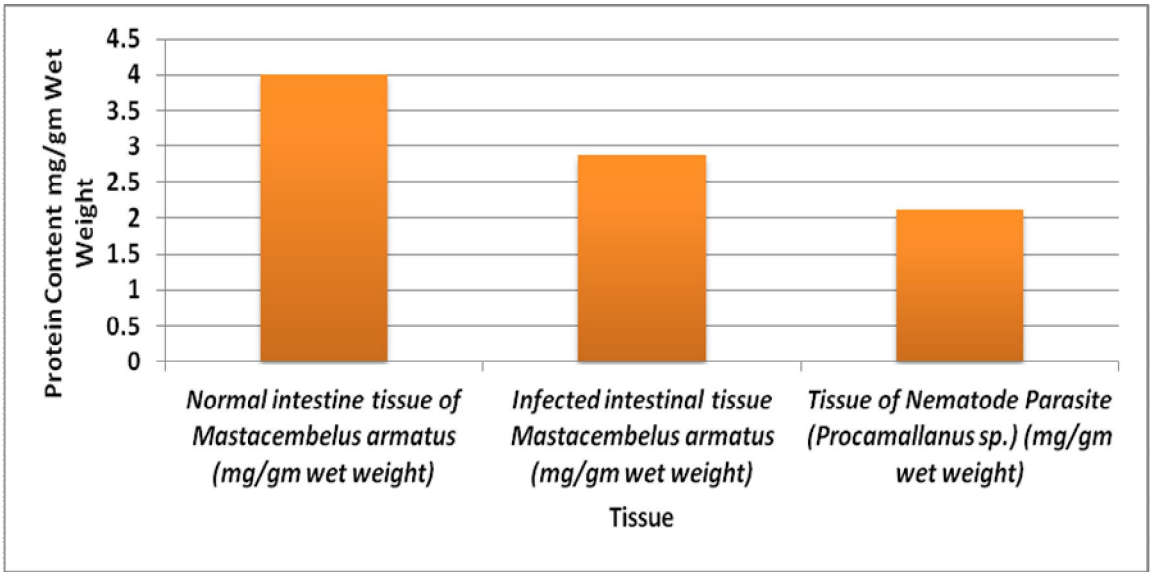
In parasitic helminthes, the protein usually constitute between 20 – 40 % of the dry weight (Sharma 1979) but values, as high as 70% of the dry weight have been reported for *Macrachanthorhynchus hirudinaceus* and the infective larvae of *Nippostrongylus brasiliensis* (Barrett, 1997) the female parasites showed higher level of amino acid then the males (Barus, 1998) the total protein content of Acanthocephalon parasites *Pallisentis nagpurensis* shows the female parasites were having higher protein content then males. They also determine soluble, insoluble protein and free amino acids in adult *Pallisentis nagpurensis* that is soluble protein in female body 40.1± 4.2 where as in male is 20.2± 3.0,

in soluble protein is 54.2± 4.2 in female and 30.2± 3.0 in male and free amino acid is 4.05± .05 in female where as 3.10± 0.42 in male body.

Table 1: Comparative chart of protein content in Normal host intestinal tissue, Infected Intestinal tissue and their parasite

Protein contents		
Normal intestine tissue of *Mastacembelus armatus* (mg/gm wet weight)	**Infected intestinal tissue *Mastacembelus armatus* (mg/gm wet weight)**	**Tissue of Nematode Parasite (*Procamallanus* sp.) (mg/gm wet weight)**
4.00	2.88	2.11

Graph 1: Graph showing protein content in Normal host intestinal tissue, Infected Intestinal tissue and their parasite



Similar result also reported by Jadhav et.al., 2007 from *Davainea shindei* amount of protein present in *Davainea shindei* 13.20 mg/mg wt. of tissue where as in host intestine is 15.42 mg/mg of tissue. Bhure et. al., 2012 studied amount of proteins present in nematode parasites is lower (15.88 mg/gm) as compared to protein present in infected intestine (19.33 mg/gm) as well as in host normal intestine (19.77 mg/gm). Nanware et.al., 2012 studied amount of proteins present in Cestode *Cotugnia* sp. parasites is lower(5.77mg/gm) as compared to protein present in infected intestine (6.66 mg/gm) as well as in host normal intestine (16.22 mg/gm), Bhure et. al.,2014 reported amount of proteins present in cestode parasite *Moniezia expansa* is lower (2.72 mg/gm wet weight) as compared to protein present in infected intestine of *Capra hircus* (3.63 mg/gm wet weight) as well as in host normal intestine of *Capra hircus* (4.09 mg/gm wet weight). Pallewad et al., 2014 studied Protein contents in normal intestinal tissue of *Capra hircus L.* is 31.27 mg/100 mg; in infected intestinal tissue is 28.36 mg/100mg where as in *Cotylophoron cotylophorum* (Fischoeder, 1901) Stiles et Goldberger,1910 is 23.60 mg/100gm. The distribution of protein content shown in the present study is an agreement with the result of Nanware et.al. (2010) & Bhure et.al. (2011). Bhure et.al.,2015 recorded amount of proteins in *Spinitectus indica* is 2.55 mg/gm; in infected intestine of *M. armatus* is 3.11 mg/gm while in normal intestine is 4.22 mg/gm. The distribution of protein content shown in present study is an agreement with the previous study. Bhure and Nanware, 2015 determined amount of proteins present in *Gangesia sp*.

(2.0 mg/gm) is lower as compared to protein present in infected intestine (2.44 mg/gm) as well as in normal intestine (3.66 mg/gm) of host *Wallago attu*. Bhure et.al. (2015) determined protein contents is high in normal intestinal tissue of *M. armatus* is (27.27 mg/100 mg); in infected intestinal tissue is (26.06 mg/100mg) where as low in *S. maharashtrii* sp. (20.90 mg/100gm); in *S.jadhavae sp.* (24.24mg/100mg); in *S. madhavae sp.*is (25.00 mg / 100 mg)*;* in *S. satarensis sp.* is (23.63 mg / 100 mg); in *S. mangalbaiae sp.*is (22.42 mg / 100 mg) and in *S.microrostellata sp.* is (21.21 mg / 100 mg).Bhure et. al.,2016 reported high protein content in normal intestinal tissue of *W.attu* is (29.28 mg/100 mg) as compared to infected intestinal tissue 28.02 mg/100mg and in *Camallanus jadhavii is* 24.80 mg/100mg.

The present study concluded that, the amount of protein is low in nematode parasite than infected intestine and normal intestine of host.

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