



Studies on biochemical contents of piscian tapeworm *senga* (dollfus, 1934) and its host intestinal tissue

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ABSTRACT

Present communication deals with some biochemical parameters i.e. glycogen, proteins and lipids were estimated in normal, infected intestine and their relevant four species of pseudophyllidean tapeworm *Senga* Dollfus, 1934 viz. *S. satarensis* Bhure et. al., 2011, *S. madhavae* Bhure et.al., 2011, *S. mangalbai* Bhure et.al., 2011 and *S.microrostellata* Bhure et.al., 2013. The non-infected intestine contains more glycogen, protein and lipids as compared to infected intestine, whereas low biochemical content in all the species of the genus *Senga*. The intestinal parasites were capable of extracting nutritious materials from their host and thus represented a high level in glycogen, protein and lipid.

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Introduction

Cestodes are endoparasites found attached to the mucosa of the vertebrates host's intestine. They are firmly attached to the intestine with the help of suckers and rostellar hooks. The remaining body is freely held in the lumen of the host intestine. The naked covering of the body of the parasite is permeable to physiological substances. As a matter of fact, the body covering exchanges the material in the intestinal lumen by the active and passive transport mechanism. The cestode parasites utilize the food from the intestinal gut of host. The metabolism depends on the feeding habits and the rich nourishment available in the gut of the host. The parasites use this nourishment for their normal development and growth. A major part of energy source utilized by the parasite is from Carbohydrates. Carbohydrates are chiefly energy source in all parasites. Proteins are the most abundant organic molecules in cells constituting 50 percent or more of their dry body weight. The main significance of the proteins is their role in structural make up of the body rather than in the yield of the energy. Lipids are of great importance to the body of cestodes as the chief concentrated storage form of energy, besides their role in cellular structure and various other biochemical functions.

Genus *Senga* was established by Dollfus, 1934. It is an intestinal tapeworm of freshwater fishes and have a serious impact on health productivity and quality of life, in addition gastro-intestinal disorders and lack of vital nutrients. Fishes are the most popular group of animals, about 40,000 species of fishes are known that live in different aquatic habitat. Fishes occupy very important position in the animal kingdom especially in relation to man. Economically fishes are useful to man as a food, fish oil, leathers, medicines and disease control, fish meal and fish manure. Fishes are suffering from cestode infection, which leads to anemia and reduces the food value. Investigations into the biochemical profiles are revealing new

facts, which would be very useful in developing a rational approach to design the antihelminthic therapeutics. Keeping the view in mind the nutritional, economical and medicinal value of fishes the present work is done.

Material and methods

Forty four intestines of *Mastacembelus armatus* were examined for tapeworm infection. The tapeworms were removed, identical parasites were sorted out with the help of microscope, preserved in 4 % formalin, stained with Haematoxylin and Borax carmine and morphological observations turned out to be the four species of pseudophyllidean tapeworm *Senga* i.e. *S. satarensis* Bhure et. al., 2011, *S. madhavae* Bhure et.al., 2011, *S. mangalbai* Bhure et.al., 2011 and *S.microrostellata* Bhure et.al., 2013.

The collected normal, infected intestinal tissue (small pieces) and parasites were kept on blotting paper to remove excess amount of water. The material transferred in previously weighed watch glass and weight on sensitive balance. The biochemical content were estimated by following standard methods.

1) Glycogen was estimated by Kemp et. al., method (1954)

2) Protein was estimated by Gornall et. al., method (1949)

3) The lipid content was estimated by Folch et.al., method (1957)

Results and discussion

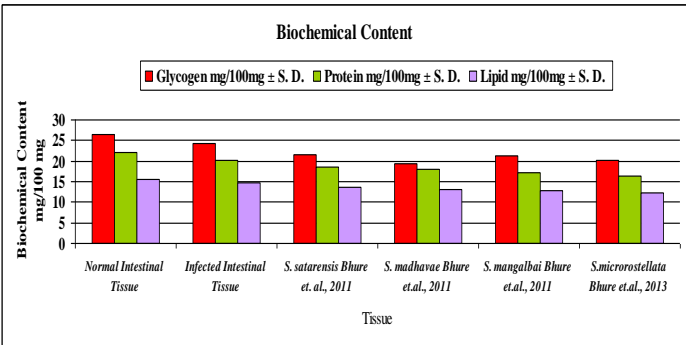
The glycogen, protein and lipid contents in the infected, non-infected intestinal tissue of *Mastacembelus armatus* and intestinal tapeworm *Senga* i.e. *S. satarensis* Bhure et. al., 2011, *S. madhavae* Bhure et.al., 2011, *S. mangalbai* Bhure et.al., 2011 and *S.microrostellata* Bhure et.al., 2013 are shown in Table No.1. and Graph No.1. The glycogen content in the normal intestinal tissue is 26.58mg/100 mg and in infected intestine contents 24.32mg / 100 mg where as in *S. satarensis* is 21.62mg / 100 mg, *S. madhavae* is 19.37 mg / 100 mg, *S. mangalbai* is 21.17 mg / 100 mg and *S.microrostellata* is 20.27 mg / 100 mg.

The protein contents in the non-infected intestine is 22.12 mg/100 mg wet weight of tissue and infected intestine contents 20.16 mg/100mg wet tissue where as in *S. satarensis* is 18.48 mg / 100 mg, *S. madhavae* is 17.92 mg / 100 mg, *S. mangalbai* is 17.08 mg / 100 mg and *S.microrostellata* is 16.24 mg / 100 mg wet tissue. The lipids contents were low in the worm as compared to its host's intestine. The lipid level in non-infected intestine is 15.68 mg/100 mg, in infected intestine contents 14.84 mg / 100 mg where as in *S. satarensis* is 13.72 mg / 100 mg, *S. madhavae* is 13.16 mg / 100 mg, *S. mangalbai* is 12.88 mg / 100 mg and *S.microrostellata* is 12.32 mg / 100 mg.

Table 1: Glycogen, Protein and Lipid contents in the intestine of Mastacembelus armatus and their relevant Cestode parasites Senga Dollfus, 1934.

Sr. No.	Tissue	Glycogen mg/100mg ± S. D.	Protein mg/100mg ± S. D.	Lipid mg/100mg ± S. D.
1.	Normal intestine	26.58	22.12	15.68
2.	Infected intestine	24.32	20.16	14.84
3.	<i>S. satarensis</i> Bhure et. al., 2011	21.62	18.48	13.72
4.	<i>S. madhavae</i> Bhure et.al., 2011	19.37	17.92	13.16
5.	<i>S. mangalbai</i> Bhure et.al., 2011	21.17	17.08	12.88
6.	<i>S.microrostellata</i> Bhure et.al., 2013	20.27	16.24	12.32

Graph 1: Glycogen, Protein and Lipid contents in the intestine of Mastacembelus armatus and their relevant Cestode parasites Senga Dollfus, 1934.



Bhure and Nanware, 2013 reported similar finding of biochemical content viz. non-infected intestinal tissue of *Channa stratus* contains more glycogen, protein and lipids as compared to infected intestine of *Channa stratus*, whereas low biochemical content in worm *Gangesia*. Jadhav et.al, (2008) reported such type of variation in glycogen content i.e. content of glycogen or carbohydrates is present in *Davainea shindei* is lower (15.17 mg/100mg) where as in host intestine it contains high amount (17.56 mg/100 mg). Bhure et.al., 2010 and Nanware et.al., 2010 reported the amount of glycogen were lower in the body of parasites than infected and normal intestinal tissue of host. Bhure et.al, 2011 estimated glycogen contents in the normal intestinal tissue is 93.25 mg/100 mg, infected intestinal tissue contents 91.02 mg / 100 mg where as *Tylocephalum sp.* contents 88.28 mg / 100 mg. The glycogen level in normal and post helminth infected tissue a *Catla catla* & *Labeo rohita* was determined by P. Anilkumar and Rajlingam (2009) They summarized the content of glycogen is high in infected intestine and liver of *Catla catla* and *Labeo rohita* as compared to normal tissue of both fishes. But in the present investigation, there is marked variation in glycogen content as

lower glycogen level is noticed in parasite than infected and normal intestine of its host. Graff and Allen (1963) determined glycogen content of *Moniliformis dubis* from male rat. The glycogen content of the male worms, when expressed as mg glycogen/gm wet weight of tissue, was over twice them the amount found worms i.e.16.81 (I 4.3) in male while 7.87 (I 1.76) in female.

Similar result also reported by Jadhav et.al. 2007 from *Davainea shindei* i.e. amount of protein present in *Davainea shindei* is 13.20 mg/gm wt. of tissue where as in host intestine is 15.42 mg/gm wt. of tissue. Bhure et.al., 2011 reported Protein contents in the non-infected intestinal tissue was 30.12 mg/mg, infected intestinal tissue contents 27.72 mg/mg where as the tapeworm *Tylocephalum sp.* contents 25.01 mg/mg wet tissue. Dhondge et.al., 2010 reported the amount of Protein was lower in the body of parasites than infected and normal intestinal tissue of host. The distribution of protein content shown in the present study is an agreement with the previous study.

The difference in the lipid content of the parasite can be due to the difference in diet. Hence there is a relationship between the lipid content of the parasite and nutrient content in environment. Similar finding was recorded by Dhondge et.al., 2010 reported the amount of Lipid was lower in the body of parasites than infected and normal intestinal tissue of host. Bhure et. al., 2011 reported Lipids contents in non-infected intestinal tissue was 19.60 mg/100 mg, in infected intestinal tissue contents 17.37 mg / 100 mg where as in tapeworm *Tylocephalum sp.* contents 16.74 mg / 100 mg. Jadhav et.al 2007 from *D.shindei* is 17.85 mg/gm and its host intestine is 19.85 mg/gm.

Nanware et al., 2011 described regional distribution of glycogen in *Stilesia sp.* i.e. immature region contain low glycogen as compared to mature and gravid region. The higher content of lipid in older proglottids has led to the view that much of this lipid largely represents waste products of metabolism (Brand T. Von, 1952). M.R. Siva Sai Kumari (1994) reported the total lipids content of cestode *Ncokrimia singhia* in immature matur and gravid region was 4.675 ± 1.215 , 29.200 ± 0.608 and 31.902 ± 2.804 mg/gm fresh weight.

The biochemical estimation in the host non-infected and infected intestinal tissue of *Mastacembelus armatus* and their pseudophyllidean tapeworm *Senga i.e. S. satarensis* Bhure et. al., 2011, *S. madhavae* Bhure et.al., 2011, *S. mangalbai* Bhure et.al., 2011 and *S.microrostellata* Bhure et.al., 2013 were found that these parasites were capable of extracting nutritious material from their hosts and thus represented a higher level in glycogen, protein and lipids.

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