



BIOCHEMICAL STUDIES OF THE FRESHWATER CATFISH (*Clarias batrachus*) INFECTED WITH CESTODE PARASITE: LYTOCESTUS VYASAEI (PAWAR, 2011)

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AUTHOR'S CONTRIBUTION

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ABSTRACT

The present communication deals with the biochemical studies of cestode parasite and their host tissue i.e. uninfected (normal) and infected intestinal tissue of freshwater catfish *Clarias batrachus*. From the results and values it can be concluded that the endoparasites could be able to maintain the good balance in the glycogen, protein and lipid content with their hosts. The protein, glycogen and lipid content in *Lytocestus vyasaei* are higher than the infected and uninfected intestinal tissue.

Keywords: Freshwater; cestodes; *Clarias batrachus*; *Caryophyllidea*.

1. INTRODUCTION

The cestode parasites utilize the food from host intestinal tract, so their metabolism depends on feeding habits and rich nourishment available in the gut of the host. Parasites take nourishment for their normal development and growth from host body with the help of adhesive organ or sucker. The metabolic and in vitro studies suggest that a complex nutritional relationship occurs in the cestodes and they are capable of fixing CO_2 . Thus it is clear that the cestode parasites use the waste metabolic materials from the host intestinal mucosa very efficiently.

The Cestodes are an endoparasitic helminthes which almost completely occupy the alimentary canal also occur in common other sites like the bile duct, the gall bladder or the pancreatic duct [1]. The structurally cestodes is an elongated tape-like body enables it to live in its tubular habitat [1]. As an alimentary canal is absent, the parasitic worm derives its nutrition from

the host's gut across its highly specialized, metabolically active body surface or tegument [1]. Carbohydrates metabolism are the main energy source in cestode parasites [2]. The main carbohydrates reserve in cestodes as "Glycogen" which is a typical energy reserve of helminthes inhabiting biotopes with low oxygen tension. The main polysaccharide in cestodes is glycogen, closely resembling mammalian glycogen. Glycogen has been reported to be the most important energy reserves in adult helminthes [1]. Lack of protein in the host's diet does not affect the cestodes to a great extent as the lack of carbohydrate does [2]. The presence or absence of proteoglycans and glycoproteins has been reported from different parts of *Echinococcus granulosus* [2]. Proteins are absorbed by the parasites by diffusion and transmission. It is naturally available from the host tissue as there is no media to acquire proteins in parasites; these proteins are naturally available from the host tissue. The worms utilize different degree of protein for producing energy. The protein content of

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cestodes is relatively lower than that of other invertebrates has been reported [1,2,3]. Study of the amino acid composition in cestodes shows that they are closely similar to that of hosts only with a small number of exceptions [1]. Thus, the cestodes obtain their required amino acids by absorption from the host's tissue [1]. The lipid contents of the cestodes are highly variable [1]. There is considerable variation in lipids from species to species and the degree of lipid content. Variation is also seen in the segments and regions of the worms being experimented thus total lipid to be somewhat meaningless, unless the degree of maturity is known [4]. Lipids have also been reported in the form of simple lipids, conjugated lipids in cestodes [1]. Yet, there is no evidence which can prove the utilization of fats as stored nutrients of endoparasites [2]. The ability to synthesize fatty acids in cestodes has been very much restricted and it has to depend largely on the fatty acids of the hosts to accomplish their requirements [1]. Very little information is available on the biochemical studies in cestodes parasites of fishes [5].

Present work is an attempt to study the biochemical findings of caryophylladein cestode parasites

Lytocestus vyasaei from freshwater catfish *Clarias batrachus*.

2. MATERIALS AND METHODS

The cestode worms were collected from the alimentary tract of *Clarias batrachus* and then washed with distilled water. Collected worms were dried on the blotting paper and keeping them to remove excess water content and transferred to watch glass and weighed on sensitive digital balance. The wet weight of the tissue is taken and kept in an oven at 50-60°C for 24 hrs for drying then the dry weight was also taken. The estimation of protein content was carried out by Lowry's method [6] while glycogen estimation was carried out by Kemp et al. method [7] and lipid estimation by Barnes and Blackstock [8] method.

3. RESULTS AND DISCUSSION

The protein, glycogen and lipid contents in *Lytocestus vyasaei* and infected and uninfected intestinal tissues from the host *Clarias batrachus* was calculated by statistical analysis (Table 1).

Table 1. Protein, glycogen and lipid contents (mg/100 mg of dry tissue) of *Lytocestus vyasaei*, infected and uninfected intestinal tissues

Host	Tissues	Protein content	Glycogen content	Lipid content
<i>Clarias batrachus</i> L.	<i>Lytocestus vyasaei</i>	27.05±0.75	35.81±3.19	5.27±1.27
	Infected tissue	10.16±0.75	16.79±1.06	2.27±0.13
	Uninfected tissue	19.25±1.49	23.54±2.13	3.41±0.17

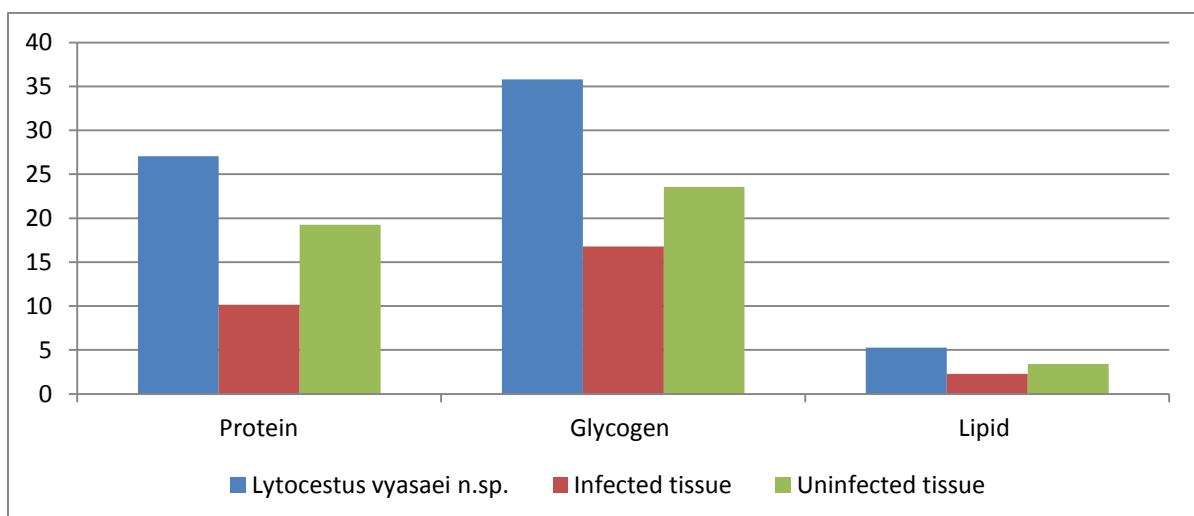


Fig. 1. Protein, glycogen and lipid contents of *Lytocestus vyasaei*, infected and uninfected intestinal tissues of host *Clarias batrachus*

Protein results are represented of cestode, *Lytocestus vyasaei* 27.05±0.75 was higher than the infected and uninfected intestinal tissues. The uninfected tissue 19.25±1.49 was higher than the infected tissue i.e. 10.16±0.75 mg/100 mg. whereas values of glycogen content for whole worms, *Lytocestus vyasaei* with their respective host intestinal tissues are given in Table 1. The glycogen content of *Lytocestus vyasaei* was higher as compared with the infected and uninfected intestinal tissues as 35.81±3.19, 16.79±1.06 and 23.54±2.13 mg/100 mg dry tissue respectively. *Lytocestus vyasaei* is an intestinal parasites and environmental oxygen is not available. These parasites depend on anaerobic carbohydrate metabolism to obtain the energy required. As there was no possibility of aerobic source of energy, a regular supply of glycogen was necessary hence; large quantities of polysaccharides are stored which can be oxidized to yield (ATP) Adenosine triphosphate. The lipid content of *Lytocestus vyasaei* was higher than the infected and uninfected intestine, 5.27±1.27, 2.27±0.13 and 3.14±0.17 mg/100 mg of dry wet tissue respectively. The lipid content is more in the parasitic tissue as compared to their hosts. It seems that the parasites taking benefit from its host and is thus absorbing most of the nutrients. The parasite is fulfilling its needs from the host and it is in a way causing hindrance in the proper development of the host. This high level of lipid may also because, the parasite often absorbing the lipid stores from the further processes and lipid get exhausted very slowly.

4. DISCUSSION

A lot of work has been done on the biochemical composition of cestodes parasites of freshwater and marine water teleosts fishes. Some recent biochemical studies include those on *Lytocestus* sp. parasitizing the intestine of *Clarias batrachus* whose glycogen, protein, lipid and glycogen contents were estimated at 22.5 mg/g wet weight of the tissue 11.2 mg/g and 12.61 mg/100 ml of solution respectively [9]. The protein, glycogen and lipid contents of *Senga* sp and *Circumoncobothrium* sp. parasitizing from freshwater eel fish *Mastacembelus armatus* have been reported as 14 mg/gm wet of tissue, 14.4 mg/ 100 ml solution and 25.07 mg/gm; 13.44 mg/gm wet of tissue, 13.5 mg/100 ml solution and 24.8 mg/gm respectively [10]. From the above discussed studies the workers have inferred that the proportion of lipids was higher as compared to that of protein and glycogen contents in cestodes which is quite different to earlier studies. However, the results of the present study (Table 1 and Fig. 1) showed that glycogen is a large amount of the organic constituent of this species and supports all above earlier discussed works. Proteins occurs in parasites the presence and

utilization of proteins are reported in cestodes by various authors [11,12,13,14,15,16]. Good child reported protein content in *Hymenolepis diminuta* isolated from adequately fed rats contained 32% protein, while the corresponding figure for worms taken from starved rats was 59.5%. In the present study protein content in *Lytocestus vyasaei* is observed it is 27.05%, but their host tissues, infected and uninfected intestinal tissue protein content is less compared to the parasite tissue. The values of glycogen content of *Lytocestus vyasaei* are comparable with those of *Hymenolepis diminuta*¹⁷ and *Taenia taeniformis* [17]. The glycogen content was higher than their respective host tissue. Similar trends of glycogen had been reported [18] the decrease in glycogen content of intestinal tissues of infected rats and their uninfected tissues. A number of workers have reported the content of glycogen in different helminth parasites. The terms of percentages the glycogens content of a few parasites are given in terms of percentage. In *Taenia taeniaeformis* [18] 2.5 to 5.6%, in *Hymenolepis diminuta* [19] from 1.1 to 9.3%. 16% in *Schistocephalus Solidus* [16] larva respectively. Also similar work is observed that the protein, lipid and glycogen in cestode parasites and intestine of *Gallus gallus domesticus* [20].

5. CONCLUSIONS

The biochemical estimations of glycogen, protein and lipid from the cestode parasites, *Lytocestus vyasaei*, infected and uninfected intestinal tissues collected from the host *Clarias batrachus* results concluded that glycogen and protein content is more in the cestode parasites as compared to the infected and uninfected intestinal tissue but the same was increased in uninfected (Healthy) intestinal tissue when compared with the infected intestinal tissue. Also lipid content of the *Clarias batrachus* uninfected intestinal tissue is slight more as compared to infected intestinal tissue and in the *Lytocestus vyasaei* it was more as compared to the infected and uninfected intestinal tissue. Hence the parasites are absorbing the essential metabolic content from the host and are accumulated in the body in the form of high glycogen, protein and lipid.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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