Studies on Host-Parasite Interaction between Air-breathing fish , *Anabas testudineus* and Metacercariae of *Enclinostomum heterostomum* of some Ponds of Gopalganj District.

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Abstract

The *Anabas testudineus*, the climbing perch, is a species of fish in the family *Anabantidae*. The present study is aimed to assess the Host-Parasite Interaction between *Anabas testudineus* and metacercariea of *Euclinostomum heterostomum*. An increase in sodium, calcium, and chloride levels were observed in infected liver. Sodium level in metacercariae was significantly lower the cyst fluid while potassium level was significantly higher. The phospholipids and unidentified lipid increased while decreased in infected liver. A decrease in free fatty acid and cholesterol values were also observed in infected fish liver indicating a condition of nutritional disturbances and physical exhaustion.

Introduction

The Gopalganj District is very rich in water resources in the form of ponds , tanks and Lakes with great potentiality of fish production. To the study of the different ponds**: (1) Deorha Pond, Maiirwa Pond Kuchai Coat Block**

(2) Shiv Mandir Pond Shanichani Bzar Kucghai Coat Block

(3) Thawe Temple side of pond.

(4) Marwari Pond Hathua.

(5) Aurai Pond Kuchai Coat Block.

(6) Hathua Raj pond Hathura.

(7) Ghosh & Sinha Pond Gopalganj.

The fish parasites and various parasitic diseases of fishes have been studied extensively for years. The association of helminth parasites to fishes have been supplemented by valuable works on diseases caused by them, (Crawford, 2008; Gupta and Agrawal, 2011;). The metacercariea of *Euclinostomum heterostomum* remain as cyst in the liver of *Anabas*

testudineus and presumably obtains nourishment from the liver of the host during the encystment phase. Therefore, the host-parasite interaction have been a subject of study by several authors. (Floch *et a*l 1999; and Goil, 2009). The present work has been under taken to establish the host-parasite interaction of *Anabas testudineus* and metacercariea of *Euclinostomum heterostomum* based on the biochemical assay .

Materials and Methods

The experimental animal (*Anabas testudineus*) weighing between 40-60gm were collected from few ponds of Gopalganj District. The normal and diseased-fishes were transported in container to the laboratory. Suitable liquid aliquots of the tissues (liver and metacercariae), samples of the cyst fluid and blood plasma were used for estimation of calcium, potassium and sodium by flame emission photometry using MK-11 Flame photometer of "systronics'' India .

Various biochemical components were estimated following the standard methods. (Sidduqi & Nizami, 2008).

Result and Discussion

The infected liver became enlarged, anaemic and yellow, grey nodules of cyst containing parasites were visible. Sodium and potassium were 169.72 + 16.03 and 215.56 ± 7.15mm per kg of dry weight respectively in healthy liver, (Table- 1).

Table -1. Comparision between the distribution of electrolytes in cyst fluid, E.heterostomum metacercariae and the liver of the host *Anabas testudineus*.

Variables	Electrolytes			
	Na+	K+	Ca++	Cl-
Liver(mM/Kg dry wt.)				
A. Uninfected	159.72±16.03	215.56+7.15	45.80+1.96	136.26+6.33
B. Infected	178.32+3.34	208.19+6.75*	58.26±2.74**	143.60+5.68
Cyst Fluid(mM/1)	77.38+8.12	21.77+4.10	22.19+1.39	66.02+2.10
Metacercariae(mM/Kg dry wt.)	53.42+4.79**	88.67±2.94**	15.32+0.87**	45.57+2.51**

Variables are shown as mean ± of S.E. of n = 6 fishes for every parameter.

Significant response * = p < 0.001.

The value for sodium increased while that of potassium decreased in infected liver. Sodium level in metacercariae was significantly lower than the cyst fluid, while potassium level was significantly higher in metacercariae. The values of calcium increased significantly in infected liver, but the increase in chloride value in infected liver was non-significant. The calcium and chloride values in metacercariae are significantly less than the cyst fluid, (Table – 2).

Table-2. Glycogen and lipid contents in metacercariae and cyst wall of E. heterostomum and uninfected and infected liver of *Anabas testudineus*.

Variables	Glycogen(g/100g of fresh tissues)	Lipid (g/100g of fresh tissue)
1.Uninfected liver	4.03 ± 0.28	9.27 ± 0.78
2.Infected liver	2.08** ± 0.69	6.87**± 0.56
3.Cyst Wall	16.96** ± 0.46	4.35* ± 0.39
4.Metacercariae	21.45 ± 0.36	5.5 ± 0.24

Variables are shown as mean ± of S.E. of n = 6 fishes for every parameter.

Significant response * = p < 0.1, ** = p < 0.001.

Glycogen and liquid contents in uninfected healthy liver were found to be 4.03 + 0.28 and 9.27 + 0.28 gram per 100 gram liver weight which decreased significantly to 2.07 + 0.67 and 6.68 + 0.56 in infected liver respectively.

Glycogen and lipid values were significantly higher in metacercariae (Table 2 and 3). However, the total lipid as expressed in percent tissue dry weight in cyst wall was more (25.2%) than those of metacercariae (22.4%). The phospholipids and triglycerides were the major lipid fractions. The phospholipids increased while, triglycerides decreased in infected liver compared to uninfected liver. The decrease was also observed in free fatty acids and cholesterol values of infected fish liver, (Table- 3).

Table-3. Total lipid fractions of liver (uninfected and infected) of *Anabas testudineus* metacercariae and wall of *E.heterostomum*

	Total Lipids		Lipid Fractions				
	% of fresh tissue (Mean ± S.E.)	% of dry tissues	Phospholipids	Triglycerides	Free fatty acids	Cholesterol	Unidentified lipids
Liver 0f C.punctatus							
1.Uninfected	0.9.27+0.78	44.7	23.3	38.7	13.6	18.3	14.1
2.Infected	06.87+0.56	30.8	24.2	21.8	12.9	13.4	27.7
Enclinostomum heterostomum							
1.Cyst wall	04.35±0.39	25.2	13.9	3.2	5.9	14.0	52.0
2.Metacercariae	05.50+0.24	22.4	17.8	21.9	12.5	4.8	42.9

The tissues of metacercariae contained a lower values of phospholipids and cholesterol in comparison to both healthy and infected liver tissues. The lipid fractions such as cholesterol and unidentified lipids were higher in cyst wall in comparison to metacercariae. An increase in unidentified lipid fraction was observed in infected liver and metacercariae cyst wall in comparison to the liver of healthy and uninfected fish.

The total lipid contents in the present investigation was observed to be 22.4% of *E.heterostomum*, however in *Fsoparorchis hypselobargi* from Catfish and *Gastrothylas crumeniferirom* from water buffalo the total lipid contents were reported to 29.5% and 10.5% respectively (Siddiqi and Nizami, 2008). In metacercariae of *E.heterostomum* and what parasite on fresh water speech that totally paid accounts for about one-third i. ftypse/odrag/both parasite on freshwater fish, the total lipid accounts for about one third to one fourth of the dry weight of the worm. There may be several factors influencing the lipid content of a worm, for example water content, type of habitat and species differences.

A decrease in total lipid content followed by an increase in phospholipids in infected liver indicate a condition of obstructive jaundice and myxodema in infected fish.

In the present investigation increase in the sodium, calcium and chloride levels of infected liver indicates water retention by this organ leading to oedema. Higher value of potassium in the metacercariae compared to cyst fluid indicates higher metabolic rate of parasite.

Percentage glycogen was found relatively high in metacercariae and very low in infected liver. Depletion of liver glycogen in *Anabas testudineus* (Fig.a) infected with cysts of *E. heterostomum* may be due to stress. Higher levels of pyruvate and alkaline phosphatase in metacercariae and the cyst wall compared to host liver, has been suggested as a typical sign of degradative metabolism (Folch *et al*,1999).

Fig : *Anabas testudineus*

The significant decrease in the glycogen and lipid of encysted liver is indicative of nutritional disturbances and physical exhaustion of the infected fish. The liver which is enzymatically programmed to carry out a variety of synthetic process, presents a more complicated metabolic picture than other tissues. Depending on the nutritional and hormonal imbalance of the fish, not only carbohydrate is stored as glycogen but gluconeogenetic forces of liver is also enhanced.

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