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Biochemical and Histopathological Analysis in *Heteropneustes fossilis* (Bloch) Infected by Diplostomulum

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ABSTRACT

The present investigation was carried out to study the effect of infestation of diplostomulum infection on the kidney function and plasma biochemical and pathological alterations of *Heteropneustes fossilis*. In two aquaria infected and normal fishes were kept. The present study should that a significant increase in sodium, potassium and cholesterol were noticed while ester cholesterol, total plasma protein, glucose, chloride and calcium decreased where noticed. The pathological examination revealed that diplostomulum metacercaria was associated with various somatic and visceral organs and cause extensive damage to fish. However symptoms observed were necrosis, fibrosis and other mechanical damages. It could be concluded that diplostomulum infection induced marked plasma biochemical changes.

Keywords *Heteropneustes fossilis*, Diplostomulum, Metacercaria, Biochemical changes.

INTRODUCTION

Parasites are major concerned to freshwater and marine fish all over the world and of particular importance in tropics (Iyaji and Eyo 2008, Bichi and Dawaki 2010, Ekanem et al. 2011, Oriakpono et al. 2012). The standardization of hematological and biochemical parameters is difficult in fish because these parameters can be influenced by deficient diet diseases environmental stress situation and immunity. However, the analysis of theses parameters may improve the diagnosis of fish health (Blaxhaill and Daisley 1973, Alam 2008, Alam and Dubey 2012, Alam et al. 2013, Alam et al. 2015). In the present study an effort has been made to assess the extent of pathological effect on the blood biochemistry of an air-breathing fish, *Heteropneustes fossilis* infected with diplostomulum metacercaria.

MATERIALS AND METHODS

Fifty *Heteropneustes fossilis* with average body weight of 50 to 70 g/fish were obtained from Dighi Tank of Darbhanga and transported to laboratory and reared in a big aquaria (Size 60 × 30 × 30 cm), fed on chopped goat liver and provided with continuous aerated and renewed tap water fishes were kept one week for acclimatization and pathological examinations.

Plasma was obtained after centrifugation of blood and was further analyzed on the same day. Plasma glucose was determined colorimetrically by Anthrone method (Seifter et al. 1950). Total plasma protein was determined colorimetrically by Bluret method (Gornall et al. 1949). Total esterified and free cholesterol in plasma were determined according to Webster (1962). The plasma sodium, potassium,

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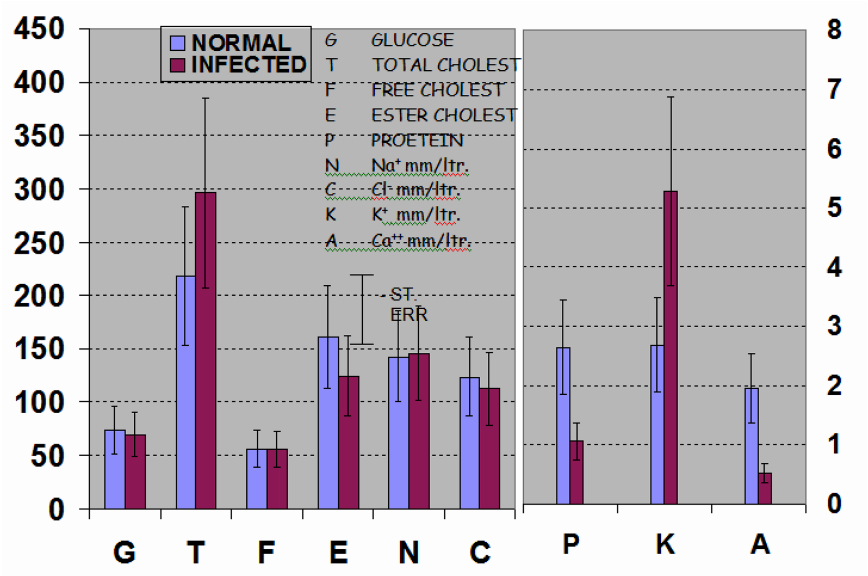

Fig. 1. Decrease in total plasma protein in *Heteropneustes fossilis* after infection of diplostomulum.

calcium and chloride were measured by flame emission photometry (Wooton 1974) using MK–II flame photometer of Systronics India.

RESULTS AND DISCUSSION

The blood plasma of *Heteropneustes fossilis* contains large number of organic molecules such as glucose, proteins, cholesterol and electrolytes such as sodium, potassium, calcium and chloride. These showed a marked variation between normal and infected fishes. A significant increase in cholesterol was noticed while ester cholesterol decreased in this condition. The decrease in total plasma protein was noticed in *Heteropneustes fossilis* after infection of diplostomulum (Table 1, Fig. 1).

Clinically *Heteropneustes fossilis* infected by diplostomulum the histological kidney section showed fibrosis in some of the renal tubule (Fig. 2). Besides cellular infiltration, vacuolation and necrosis here also seen. A significant increase in sodium and potassium was observed, decrease in calcium and chloride were noticed in *Heteropneustes fossilis* infected by diplostomulum (Table 1, Fig. 1). A wide range of variation of blood or plasma glucose level of fishes have been reported. Alam (2008) has reported no significant change in plasma glucose level in *Heteropneustes fossilis* infected with diplostomulum type. The decrease in plasma protein level in *Hetero-*

Table 1. Effect of diplostomulum infection on plasma protein, glucose, cholesterol, sodium, calcium, chlorine and potassium of *H. fossilis* (±se = Standard error, n=5 animals in each group).

Parentheses	Normal	Infected
Protein	2.64 ± 0.11	1.05 ± 0.02 $p < 0.001$
Glucose	73.92 ± 22.10	69.75 ± 18.25
Cholesterol		
Total	218.67 ± 14.32	296.92 ± 18.77 $p < 0.05$
Free	56.26 ± 8.18	55.63 ± 12.53
Ester	160.95 ± 14.49	124.31 ± 5.66 $p < 0.05$
Plasma electrolvtes		
Na^+ mm / liter	142.60 ± 4.23	146.17 ± 5.19
Cl^- mm / liter	123.88 ± 2.22	112.60 ± 1.20 $p < 0.05$
K^+ mm / liter	2.68 ± 0.15	5.28 ± 0.05 $p < 0.05$
Ca^{++} mm / liter	1.95 ± 0.01	0.52 ± 0.006 $p < 0.05$

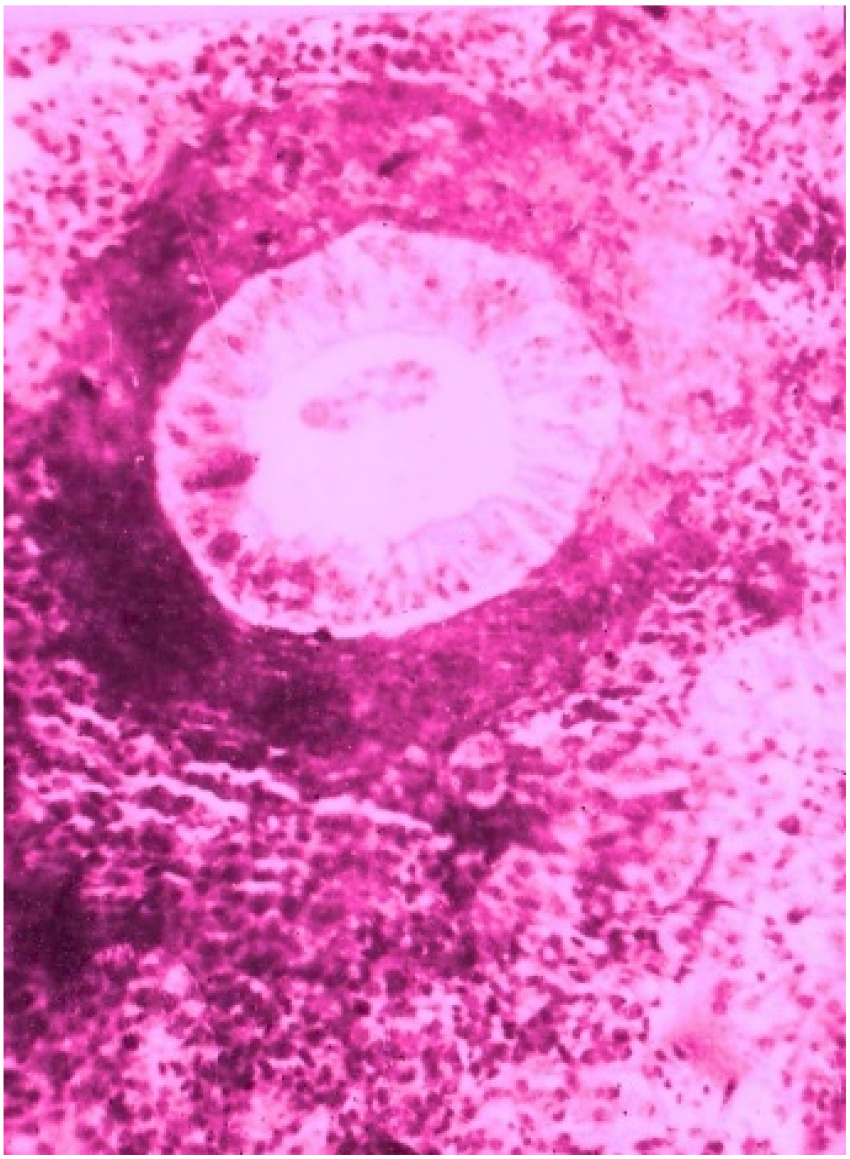

Fig. 2. Section of infected kidney of *H. fossilis* showing fibrosis in renal tubule (H and E × 280).

pneustes fossilis infected with diplostomulum type and in the present investigation a significant decrease was noticed the plasma protein value of infected fishes of diplostomulum (Dubey 1980, Alam et al. 2015).

The literature dealing with the effect of infection on electrolyte balance are rare. Diplostomulum infection in *Heteropneustes fossilis* caused potassium ion increase while calcium and chloride decrease (Alam 2008). Zaki et al. (2008) have reported that sodium and potassium concentrations were significantly increased in *Tilapia nilotica* infected with *Saprolegnia parasitica*. Alam et al. (2009) have also reported significant alteration in sodium, potassium, protein and cholesterol in *H. fossilis* infected by saprolegnia species. In the present case of diplostomulum infec-

tion sodium (Na) and potassium (K) ions increased while calcium (Ca) and chloride (Cl) ions decreased significantly. Such Observation on the electrolyte might be related with the hemodilution and kidney failure i-e vacuolar degeneration of renal tubules of fish. This confirms the previous results recorded by Mahmoud et al. (2011), Kabir and Avie (2011), Pinky et al. (2012), Ugbor et al. (2015), Alam et al. (2015), Wellborn (1986).

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