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**Research Article**

# Effect of diplostomulum infection on fresh water fish *Heteropneustes fossilis* in Darbhanga, Bihar, a global problem

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**Abstract:** Fish is the master of aquatic life, which serves as hosts to a range of parasites that are taxonomically diverse and that exhibit a wide variety of life cycle strategies. Many of these parasites are passed directly between ultimate hosts whereas other needs a series of intermediate hosts. Parasites thrive primarily in a dynamic equilibrium with their host(s) and they are often overlooked in fish health assesments. The damage associated with the fish host is relative to the intensity of infection and severity of infection of parasite. Infection with parasite Diplostomulum metacercaria can lead to severe skin and other tissue pathology and change the haematological and biochemical parameters of Heteropneustes fossilis which may result in host mortality.

**Keywords:** Diplostomulum, Heteropneustes fossilis, Haematology, Skin.

## INTRODUCTION

Many countries are working to search out the importance of fish for men till date. In the water bodies in India especially at Darbhanga, Bihar, air breathing fish usually thrive and constitute important fishery resources. These fish may be cultivated in oxygen deficient water by systematic and scientific culture and are subjected to various parasitic diseases. These diseases not only deplete the fish race but also render these diseases to human beings.

In addition the great stress has been placed recently on the development of Heteropneustes fossilis to make a scientific assessment on the role of helminthes as potential pathogen in Darbhanga, Bihar. Therefore, to get a clear image of infection and effect of disease observations of infected tissue and haematological and biochemical parameters of Heteropneustes fossilis have been made in the present study.

## MATERIALS AND METHODS

About fifty Heteropneustes fossilis with average body weight 50–70 gram per fish were obtained from Dighi Tank, Darbhanga and transported to laboratory and reared in big aquaria, fed on chopped goat liver. Fish

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were kept for one week for acclimatization and pathological examination. Routine examination of skin, muscle, gills, viscera and eyes were made through naked eye followed by detailed examinations under dissecting microscope.

Blood was collected by cardiac puncture with the help of tuberculin syringe with middle number 21. TC & DC per $mm^3$ were determined as suggested by Blaxhall and Daisley (1973). Plasma was obtained after centrifugation of blood and was further analysed on the same day. Plasma glucose was determined by Anthrone method (Seifter et. al; 1950). Total plasma protein was determined by Biuret method (Gornall et. al; 1949). Plasma $Na^+$, $K^+$, $Ca^{++}$ & $Cl^-$ were measured by flame emission photometry (Wooton, 1974).

## RESULTS AND DISCUSSION

The present observation reported the effect of Diplostomulum infection on skin, haematological and biochemical change of H. fossilis. The microscopic examination of skin releated hemorrage hyperemia, patches and nacrosis in superficial area of body musculature and skin (Fig. 1, 2 & 3).

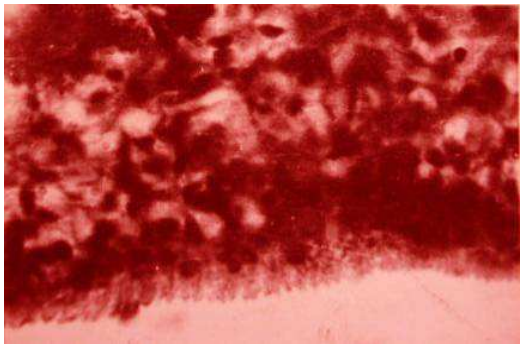

**Fig.1: Section of young Diplostomulum parasite showing columnar cells & indicating secretary phase of parasite cyst formation (H&E x 700)**

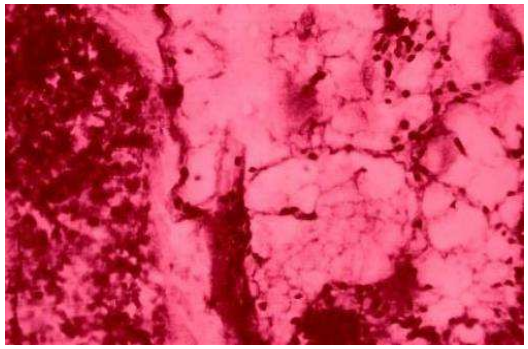

**Fig.2: Section of mature Diplostomulum parasite in the muscle of the fish host (H&E x 700).**

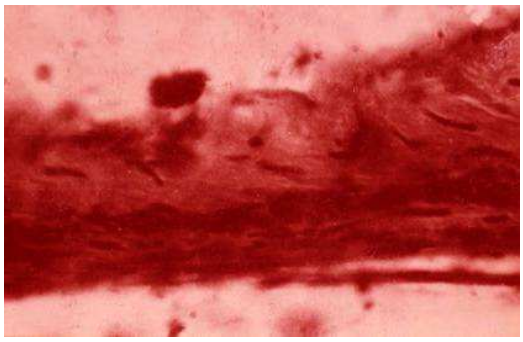

**Fig.3: Section of the cyst wall encircling the Diplostomum metacercariae in the muscles & elaborated by fish host (H&E x 700).**

The present finding showed correlation with experiment of Dubey (1980); Arastu and Nomani (2012); Alam et. al. (2013).The blood of Heteropneustes fossilis contains a large number of elliptical or circular nucleated erythrocytes. The number of erythrocyte blood haemoglobin, PCV, TLC, ESR & blood pH showed a markable variation between normal and infected fish. The result showed correlation with Alam et. al; (2009 a). A significant increase in sodium and potassium was observed and decrease in calcium and chloride were noticed in Heteropneustes fossilis infected by Diplostomulam. The decrease in total

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plasma protein was noticed also (Alam et. al. 2009 b).

The value of haematological and biochemical parameters of infected Heteropneustes fossilis are shown in table.

**Table: Effect of Diplostomulum infection on haematological and biochemical parameters of Heteropneustes fossilis.**

| **Parentheses** | **Normal** | **Infected** |
|---|---|---|
| Weight of animal | 72.4±3.67 | 48.5±5.72 |
| Erythrocyte no. $10^6$/mm$^3$ | 5.93±0.34 | 3.48±0.27 |
| Leucocyte no. $10^4$/mm$^3$ | 7.23±1.66 | 9.5±2.45 P<0.05 |
| Blood haemoglobin mg/100 ml | 15.66±4.10 | 9.27±3.82 P<0.05 |
| Plasma haemoglobin mg/100 ml | 26.27±2.89 | 189.92±45.5 P<0.001 |
| Haematocrit value | 36.4±1.86 | 21.7±4.04 P<0.05 |
| Blood p$^H$ | 7.04±1.23 | 7.61±1.20 |
| E.S.R. mm/hr | 4.20±0.20 | 8.66±0.27 P<0.001 |
| Protein | 2.64 ± 0.11 | 1.05 ± 0.02 P<0.001 |
| Glucose | 73.92 ± 22.10 | 69.75 ± 18.25 |
| **Plasma electrolyts** | | |
| 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 |

RBC, Hb, WBC were significantly different ($P < 0.05$). The ESR of blood was increased significantly ($P < 0.001$). Blood pH showed an increasing trend but the increase was not significant. The decrease in RBC, Hb concentration in infected fish

Heteropneustes fossilis might be related with high metabolic activities of fish. In present study, the total WBC count was found to be significantly increased (Alam et. al. 2009a). In various pathological conditions the ESR increases. The present study provide general information on the impact of helminth parasite and also fruitful for the producer of air breathing fishes.

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