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Original Research Article

Helminthic Infestation Load on the Length, Weight and Sex of Freshwater Fish *Heteropneustes fossilis* from the River Gomti of Lucknow

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ABSTRACT:
The study was carried out to investigate, the helminth parasitic load in freshwater fish Heteropneustes fossilis. During present Investigation, three groups of helminth parasites- trematode, cestode and nematode were recovered from Heteropneustes fossilis. The prevalence of infection was calculated in relation to length, weight, sex-group of fish. Large sized fish were dominatingly affected by helminth parasites as compared to small sized fish. Female fish was more infected as that of male fish.

Keywords: *Prevalence, Heteropneustes fossilis, helminth, infection, Length, weight and sex.*

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INTRODUCTION

Heteropneustes fossilis (Bloch) is an indigenous air-breeding catfishes belonging to the family Heteropneustidae of the order Siluriformes. It is very popular and highly valued of the cat fishes in India. It is omnivorous in nature. It is not only accredited for its luscious taste and market value but is also highly venerated for nourishing and medicinal aspect. The species has very high content of iron (226 mg per 100 g) and fairly high content of calcium in comparison to many other freshwater fishes. Fishes are live in aquatic medium; many parasites are presence in this aquatic medium. So fish are infected with many parasites and cause diseases. Parasitic diseases of fish are very common all over the world, and are of particular importance (Robert and Janovy 2000). Fishes are affected by helminth parasites, which reduce the food value of host fish. The parasite prevalence, density of infection and intensity infection depend on many factors like parasites and its life cycle, host and its feeding habits and its physical factors of water body where the fish inhabit. Population dynamics is necessary to provide data for the prophecy of integrated methods to achieve the regulation of numbers of harmful parasites (Kennedy, 1974 and 1976).

MATERIALS AND METHODS

Study area: River Gomti, Lucknow.

Study organisms: *Heteropneustes fossilis*.

Collection of host fishes: During the collection period, a total of 394 live specimens of freshwater fish species *Heteropneustes fossilis,* were collected from different places in the Gomti River, Lucknow. These fishes were mainly collected from fisherman in different areas of river Gomti (Dolyganj, Hanuman setu, Pakkapul, Nishatganjpul, Gaughat, Gomti barrage).

Methodology: The host fish was anaesthetized by clove-oil or by cutting at the neck region. Before dissection the Total Length (TL), Standard Length (SL), and weight (W) of the fishes were recorded using stainless steel scale and weighing machine respectively. Each fish was dissected with a fine scissor used to make an incision and sex was determined. A slit was made on ventral side near the genital pore or anal region cut open towards the head up to the opercular region

Total and Standard Length measurement: The total and standard length of each fish was measured in centimeter (cm) using stainless steel scale. The total length was measured from the tip of the snout to the extreme end of the caudal fin, while standard length was measured length from the tip of the snout to the end of caudal peduncle.

Weight measurement: The weight was taken in grams using an electronic balance. Fish sample was weighed to the nearest gram (g) using weighing balance (Paperna 1996).

Sex determination:
The sex of the fish was determined by examination of genital pore and later dissection to expose the gonads.

Examination and Processing of parasites for identification: In the laboratory all samples were examined for the helminth parasites and processed as per standard protocol. The Trematodes were fixed in hot 10% formalin; cestodes were fixed in AFA solution following staining by borax carmine. After staining, parasites were washed with distilled water, dehydrated in ascending grades of alcohol, cleared in xylene and mounted in D.P.X.

Identification of parasites: The parasites were identified up to the class level (Trematode, Nematode and Cestode) by the method of Yamaguti (1961).

Studies on prevalence of Helminth parasitic infection in relation to length, weight and sex of fishes
To study different parameters of helminth parasites in food fishes *Heteropneustus fossilis*, an extensive survey has been made at different locations in River Gomti at Lucknow during year 2013 and 2014. Prevalence of helminth parasitic infection in relation to length, weight and sex of the food fishes was recorded and calculated according to Margolis et al., (1982).

$$\text{Prevalence} = \frac{No.\ of\ Host\ infected}{Total\ Host\ examined} \times 100$$

Statistical analysis: The Chi-squared Goodness of fit was employed in order to statistically determine if there was any significant difference between prevalence of infection and sex, and prevalence of infection and standard length of the samples, likewise between prevalence of infection and weight.

RESULTS

The helminthic infection in relation to size (length), weight and sex of host was analyzed. Of 394 *Heteropneustes fossilis* examined, 58 were found to be infected by helminth parasites. Overall 14.72% of the fish were found to be infected with the helminth parasites which belong classes Trematoda, Cestoda and Nematoda (Table 1-3).

Parasitic infection in relation to length of host fishes
The fishes of (normal and infected) were grouped in two length classes' viz., class I (10 – 14.9 cm.) and class II (15 – 19.9 cm.) etc. In the length class I (10 - 14.9) a total of 293 fishes were examined out of 42 fishes were found to be infected. The overall prevalence was 14.33%. In the length class II (15 – 19.9) a total of 101 fishes were examined out of 16 fishes were found to be infected. The overall prevalence was 15.84% **(**Table 1, Fig. 1). Chi square test revealed that there are significant differences in prevalence of helminthes among the two length classes of the examined hosts ($\chi 2$= 7.05; P<0.05).

Table 1: Relation between the hosts length and the prevalence of infection in *Heteropneustes fossilis* at Lucknow.

Class	Standard length (cm)	No. of fish examined	No. of fish infected	Prevalence
I	10 – 14.9	293	42	14.33
II	15 – 19.9	101	16	15.84
	Total	394	58	14.72

The prevalence observed between length in relation to parasitic infection was significant $\chi 2 = 7.05$; $P<0.05$

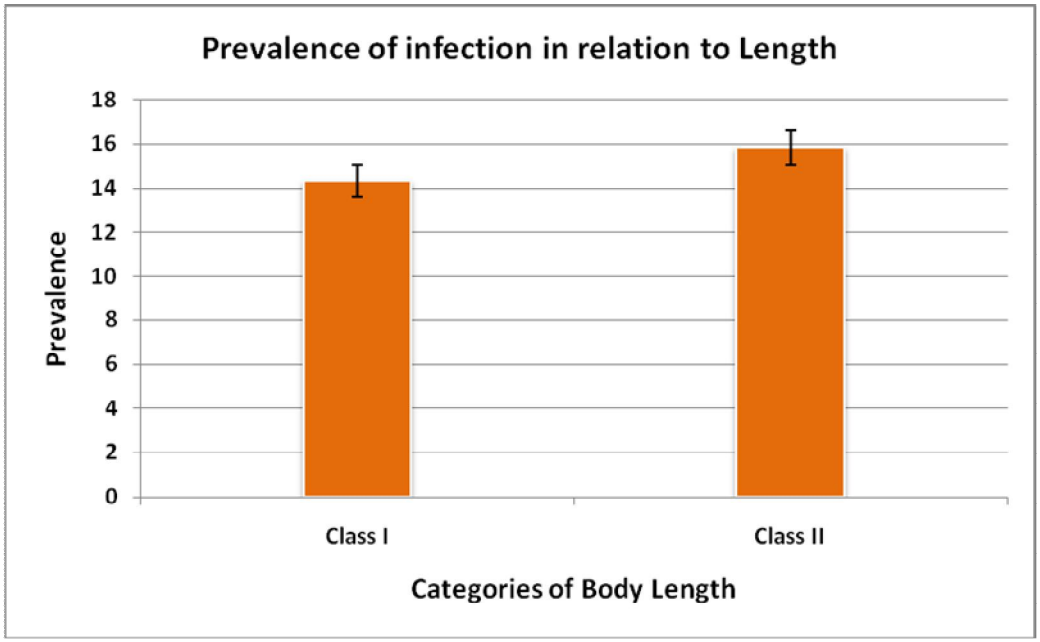

Figure 1: Relation between the host length and the prevalence of infection in *Heteropneustes fossilis*.

Parasitic infection in relation to weight of host fishes

The fishes of (normal and infected) were grouped in different weight classes viz., class I (15 – 34.9gm), class II (35 – 54.9gm), class III (55 – 74.9gm), class IV (75 – 94.9gm), class V (95 – 114.9gm) and class VI (115 – 134.9gm). In the weight class I (15 - 34.9) a total of 222 fishes were examined out of 30 fishes were found to be infected. The overall prevalence was 13.51%. In the weight class II (35 - 54.9) a total of 125 fishes were examined out of 19 fishes were found to be infected. The overall prevalence was 15.20%. In the weight class III (55 – 74.9) a total of 11 fishes were examined out of 3 fishes were found to be infected. The overall prevalence was 27.27%. In the weight class IV (75 – 94.9) a total of 8 fishes were examined. In this weight class the fishes were found to be free of infection. In the weight class V (95 – 114.9) a total of 18 fishes were examined out of 04 fishes were found to be infected. The overall prevalence was 22.22% and the weight class VI (115 – 134.9) a total of 10 fishes were examined out of 02 fishes was found to be infected. The overall prevalence of infection was 20.00% (Table 2, Fig. 2). Chi square test revealed that there are significant differences in prevalence of helminthes among the six weight groups of the examined hosts ($\chi 2 = 25.16$; $P<0.05$).

Table 2: Relation between the hosts Weight and the prevalence of infection in *Heteropneustes fossilis* at Lucknow.

Class	Body weight (gm)	No. of fish examined	No. of fish infected	Prevalence
I	15 – 34.9	222	30	13.51
II	35 – 54.9	125	19	15.20
III	55 – 74.9	11	03	27.27
IV	75 – 94.9	08	00	00
V	95 – 114.9	18	04	22.22
VI	115 – 134.9	10	02	20
	Total	394	58	14.72

The prevalence observed between Weight in relation to parasitic infection was significant $\chi 2 = 25.16$; $P<0.05$

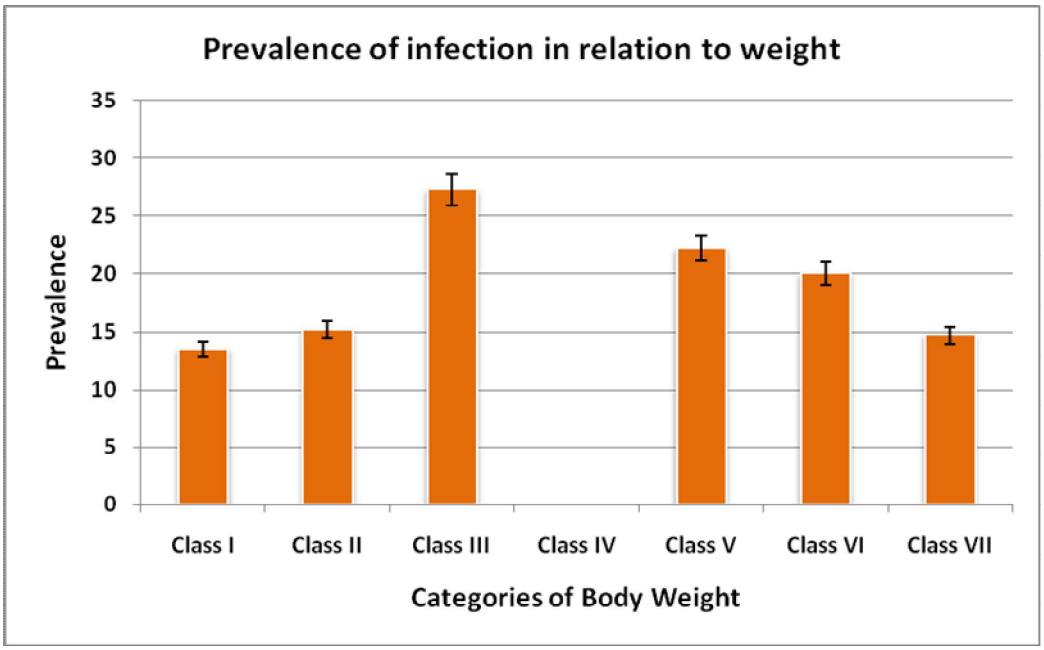

Figure 2: Relation between the host body weight and the prevalence of infection in *Heteropneustes fossilis*.

Parasitic infection in relation to sex of host fishes

A total of 233 male fishes were examined in which out of 30 fishes were found to be infected. The overall prevalence was 12.87% and a total of 161 female fishes were examined in which out of 28 fishes were found to be infected. The overall prevalence of infection was 17.39% (Table 3, Fig. 3). The prevalence of infection among sex (male and female) varied significantly ($\chi 2 = 8.14$; $P<0.05$).

Table 3: Relation between the host sex and prevalence of infection in *Heteropneustes fossilis* at Lucknow

Sex of fish (Host)	No. of fish examined	No. of fish infected	Prevalence
Male	233	30	12.87
Female	161	28	17.39
Total	394	58	14.72

The prevalence observed between Sex in relation to parasitic infection was significant $\chi 2 = 8.14$; $P<0.05$

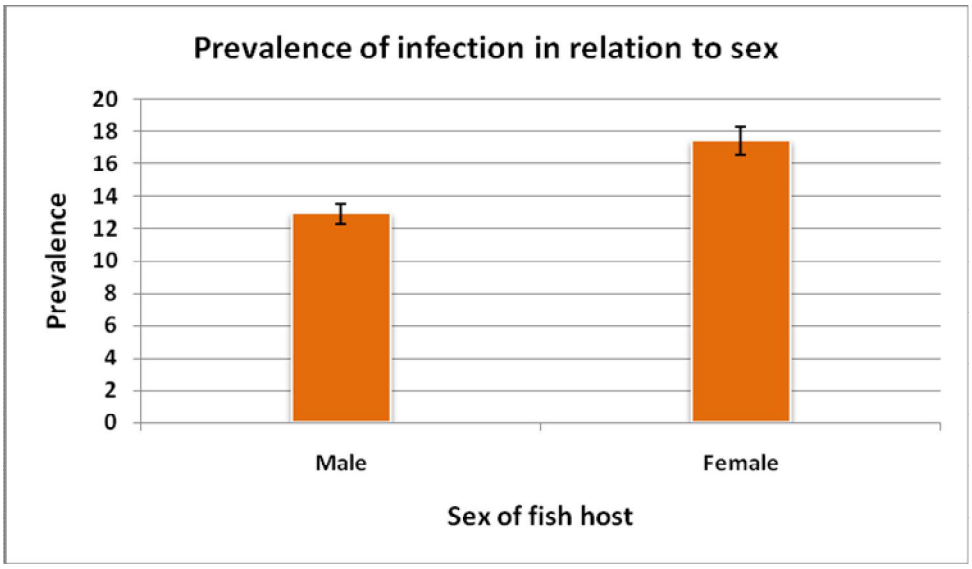

Figure 3: Relation between the sex of the host and the prevalence of infection in *Heteropneustes fossilis*.

DISCUSSION

Parasitic infection in relation to length of host fishes

The data indicated that the smallest fishes class I (10 – 14.9) was relatively less infected than the other length class (15 – 19.9) cm and the percentage of infection increases with increasing fish length. Although, there is a significant difference was found in both length classes (Class I and II) of fishes. Gaber *et al.*, 2015 the high incidence of infestation obtained in bigger fish is an indicator that size of the fish is important in determining the parasitic load compared to small fish, these data are similar to that obtained in previous reported by Mohammed *et al*., 2009 and Oniye and Aken'Ova, 1999 who stated that the prevalence was found to be increased as the fish grow, and that could be attributed to the longer time of exposure to the environment by body size.

Parasitic infection in relation to weight of host fishes

The data indicated that the intermediate fishes weight class III (55 – 74.9gm) was relatively highest infected than the other weight class and smallest weight class I (15 – 34.9) was less infected. Although, there is a significant difference was found in different weight classes of fishes. This increase in infection in intermediate weight class fishes was due to random selection of fishes. Paling, 1965; Meshego, 1989; Davey & Gee, 1976 also observed the same result due to the fish grows, the amount of food it consumes, which includes the larval stages of the parasites increases. Rahman and Parween, 2001reported maximum prevalence and mean intensity in intermediate size and smallest size group respectively in *Heteropneustes fossilis*, *Channa punctatus* and *Colisa fasciatus.* Manoj Kumar, 2014 has also reported similar finding in *Labeo rohita*, *Channa striatus* and *Channa punctatus* fish species.

Parasitic infection in relation to sex of host fishes

The data indicated that the male fishes were relatively less infected than female fishes. Although, there is a significant difference was found in the prevalence between sexes in relation to parasitic infection of fishes. The present work agrees with the reported work of T. S. Imam and R. A. Dewu, 2010 who reported higher parasitic prevalence in female *C. batrachus* in their works and attributed it to the physiological state of the females, as most gravid females could have had reduced resistance to infection by parasites. According to Holden and Reed, 1972 same recovered here most gravid females could have had reduced resistance to infection by the parasites.

CONCLUSION

The present study has shown that *H. fossilis* from the River Gomti harbor a wide range of parasites especially the helminth parasites. The study has established that the *H. fossilis* is one of the most heavily infected fish species with helminth parasites. This study thus highlights on the parasitic infection according to the length, weight andsex. We concluded that the freshwater fishes harbour a wide range of helminth parasites especially trematodes. Out of a total of 394 fish examined 58 were found to be infected with helminth parasites. The overall prevalence of parasites was found to be 14.72. The maximum infection of helminth parasites was found in the fishes weighing 55 – 74.9gm and in the fish length ranging from15 – 19.9 cm in case of *H. fossilis*. The maximum infection of helminth parasites was found in the female fishes as compare to the male fishes.

REFERENCES

1. Yamaguti S. (1961). Systema helminthum the Cestode of vertebrates. Int. Sci. pub. INC, New York and London, 2, 1-860.
2. Davey, J.T. and Gee, J.M. (1976). The occurance of Mytilicola intestinalis Steuer, an intestinal copped parasite of Mytilus, in the North – South West of England. *J. Mar. Biol. Assoc.* 56, 85-94.
3. Gaber, R.A., Garhy, M. El, Morsy, K. (2015). Prevalence and intensity of helminth parasites of African catfish Clarias gariepinus in Lake Manzala, Egypt. *Advances in Bioscience and Biotechnology,* 6(7), 464-469.
4. Holden, M. and Reed, W. (1972).West African freshwater fish, Longman Publishers, London, pp.45.
5. Imam T. S. and Dewu R. A. (2010). Survey of piscine ecto- and intestinal parasites of clarias species sold at Galadima Road Fish Market, Kano metropolis, Nigeria. *Bioscience Research Communications*, 22, (4).
6. Kennedy CR. (1976). Ecological aspects of parasitology. North Holland publishing company Amsterdam 10x ford.
7. Kennedy, CR. (1974). A checklist of british and iris freshwater fish parasites with notes on their distribution. *J fish Biol* 6(5), 613-644.
8. Kumar, M. (2014). Prevalence of trematode parasites in some species of genus *Labeo* and *Channa* of Bareilly district (Uttar Pradesh). *American international journal of research in formal, applied & natural science,* 8(1), 47-50.
9. Margolis, L., Esch, G.W., Holmes, J.C., Kuris, A.M. and Shad, G.A. (1982).The use of ecological terms in parasitology. *Journal of Parasitology*, 68.
10. Mashego, S.N. (1989). Nematode parasites of Barbus species in Lebowa and Venda. *South Africa J. Wild. Res.* 9, 35-37.
11. Mohammed, A., Kalu, A.U., Yem, I.Y., Kolndacha, O., Nyaku, R.E. and Sanni, A.O. (2009).Bacteriological Quality of *Clariasgariepinus* (Burchell, 1822) in Lake Alau, Borno State, Nigeria. *The Best Journal*, 6, 15-18.
12. Oniye, S.J. and Aken'Ova, T.O. (1999). The Dynamics of Adult and Larval Stages of *Rhadinorhynchus*(horridus- Luhe, 1912) in *Hyperopisus bebeoccidentalis* (hunther) from Zaria Dam. *Journal of Zoologic Society of Nigeria,* 1, 7-8.
13. Paling, J.E. (1965). The population dynamics of the Monogenean gill parasite *Discocotylesagittata Leuckart* on the Windermere trout, Salmotrutta L. *Parasitology.* 55, 67-69.
14. Paperna, I. (1996). Parasites, infections and diseases of fishes in Africa: An update. FAO / CIFA Technical Paper, No. 31.
15. Rahman, M. R. and Parween, S. (2001). Parasites infestation in relation to length *Heteropneustes fossilis, Channa punctatus* and *Colisafascitatus. Univ. J. Zool. RajshahiUniv.* 20, 53-56.
16. Roberts, L.S. & Janovy, J. (2000). Gerald D. Schmidt and Larry S. Roberts' Foundations of Parasitology, 6th Ed. McGraw-Hill International Editions, Boston.
17. Yamaguti S. (1958). Systema helminthum the digenetic trematodes of vertebrates. Int. Sci. pub. NewYork.
18. Yamaguti S. (1961). Systemahelminthum vol. 3part 1st and 2nd The Nematode of vertebrates. Int. Sci. pub. INC, New York and London.

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