

A Comparative Study of Helminths Parasites in Catfishes

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Abstract: Fish is one of the best sources of proteins for human beings, so it is important that they should be healthy and free from infections. Fishes are often found infected with a parasites; Trematoda, Nematoda, Cestoda, and Acanthocephala; causing infectious diseases. Among different fish diseases, Gyrodactylussalaris, Ichthyophthiriusmultifiliis, flukes, are most prevalent in fish population that causes great mortality. In case of severe infection by parasites, fish development is hindered causing emaciation of affected fish. The major parasitic groups found in freshwater fishes are trematodes, cestodes, acanthocephalans and nematodes. In the present study, the prevalence of helminth parasites has been observed two freshwater fishes *Channa punctatus* (Bloch) and *Wallago attu*. Live fresh specimens of *Channa punctatus* (Bloch) and in *Wallago attu* of all sizes, weight and sex were collected from river gomti, Lucknow and transported from the sampling area to the laboratory in aerated container in dechlorinated water. A total of 180 fishes were examined for the presence of helminth parasites in which a total no. of parasites found in *Channa punctatus* was 100 and in *Wallago attu* was 80. In case of *Channa punctatus* (Bloch) 31% of total collected fishes and in *Wallago attu* 13.7% of total collected fishes were found to be infected with helminth parasites.

Keywords: Survey, Helminth parasites, Freshwater fishes, *Channa punctatus*, *Wallago attu*.

1. Introduction

Fishes are good source of protein that can be digested easily. These are important components of ecosystem from ecological, medicinal, nutritional and economical point of view. A majority of freshwater fishes carry heavy infection of parasites (Trematodes, Nematodes, Cestodes and Acanthocephalans) which cause deterioration in the food value of fish and even result in their mortality. Besides these, there are a number of helminth parasites which are transmitted to human beings only through fish (Gupta, 1959). These parasites use the fish for their shelter and food, and destruct every organ resulting in pathogenic effects (Dogiel, 1958). Parasites interfere with the nutrition; metabolism and secretory function of alimentary canal, damage nervous system (Markov, 1961), and even upset the normal reproduction of the host (Faust, 1949). Verma *et al.* (2013) studied the parasitic infection index in edible fish i.e., *Catla catla*, *Channa punctatus* and *Cirrhinus mrigala*, in extensive survey made at different places in river Yamuna at Agra in the rainy seasons during year 2009 and 2010. Recently, Qadri *et al.* (2013) have made some attempts to explore the fauna of helminth parasites in three commercially important catfishes, *Wallago attu*, *O. pabda* and *A. seenghala* in regions of Bhopal. *Wallago attu* and *Channa punctatus* both, are common food catfishes. The *Channa punctatus* is very economical with high nutritional value and market demand because of its relatively low cost and high availability; and *Wallago attu* are the easily available in the fish market. Due to their feeding habit, fishes can act as an intermediate or a final host for many helminth parasites. To obtain healthy and quality meat fish, it is essential that the fish should be free from all types of infections like viral, bacterial, and parasitic. The major parasitic groups found in freshwater fishes are trematodes, cestodes, acanthocephalans and nematodes. Since human preferring white meat source is utilizing these fishes, so it is important to study the prevalence

of parasites in these fishes. The present study is aimed to investigate the burden and effect of helminth parasites in freshwater catfishes *Wallago attu* and *Channa punctatus* (Bloch) obtained from River Gomti in Lucknow, U.P.

2. Materials and Methods

- 1) **Study area:** Gomti River, Lucknow.
- 2) **Study periods:** July, 2012 – December, 2012.
- 3) **Study organism:** Freshwater fishes (*Channa punctatus* and *Wallago attu*).
- 4) **Collection of host fishes:** Live fresh specimens of *Channa punctatus* and *Wallago attu* of all sizes, weight and sex were collected from River Gomti in Lucknow. The specimens were brought in the laboratory alive in a small container with water and maintained in glass aquaria.
- 5) **Methodology:**

a) Total and Standard Length and Weight measurement:

The total and standard length of the fish were measured in centimeter (cm) using a measuring board. Fish were weighed to the nearest gram (g) using weighing balance (Paperna, 1996).

b) Examination for Helminth Parasites:

In the laboratory all samples were examined and processed as per standard protocol. External examination of each fish for the helminths ectoparasites was conducted using hand lens. Each gill was examined individually for the presence of parasite. Fishes were opened up dorso-ventrally and all the internal organs were examined separately. The entire digestive system was removed and placed in a petri dish with saline for further examination.

c) Processing of parasites for identification:

The Trematodes were fixed in hot 10% formalin, cestodes and acanthocephala were fixed in AFA solution following staining by borax carmine. After staining,

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parasites were washed with distilled water, dehydrated in ascending grades of alcohol, cleared in xylene and mounted in D.P.X. Helminth parasites were identified up to class level on the basis of available taxonomical characters as described by Yamaguti, 1958; 1961; 1963.

d) Formula and statistical Analysis

Prevalence, Abundance and Mean density, Index of infection were determined by following the formula proposed by Margolis et al.(1982).

$$\text{Prevalence} = \frac{\text{Total no. of infected fishes}}{\text{Total no. of fishes host examined}} \times 100$$

$$\text{Abundance} = \frac{\text{Total no. of fish hosts examined}}{\text{Total no. of parasites recovered}}$$

$$\text{Mean density} = \frac{\text{Total no. of infected host examined}}{\text{No. of host infected} \times \text{No. of parasites collected}}$$

$$\text{Index of infection} = \frac{\text{No. of host infected} \times \text{No. of parasites collected}}{\text{Total host examined}}$$

Statistical analysis (Chi-squared test) was done by SPSS 16.0 version software.

3. Results and Discussion

The results obtained in the present study are depicted in table 1 to 7 and figure 1 to 7. A total no. of 180 specimens of the two species of freshwater catfishes *Channa punctatus* and *Wallago attu* were examined, for the presence of helminth parasites. Out of a total of 180 fishes, 31(31%) *Channa punctatus* and 11 (13.75%) *Wallago attu* were found to be infected with different helminth parasites. (Figure 1)

Table 1: Species wise prevalence of helminth parasites

Fish species	No. of fish examined	No. of fish infected	No. of parasites	Prevalence
<i>Channa punctatus</i>	100	31	60	31
<i>Wallago attu</i>	80	11	18	13.75
Total	180	42	78	

1: Prevalence of parasites in Catfishes, *Wallago attu* and *Channa punctatus*

To observe parasitic infection in two edible fish species viz., *C. punctatus* and *Wallago attu* were collected from River Gomti, Lucknow and examined critically. Out of 100 specimens of *C. punctatus* were examined, 31 were found infected with helminth parasites. Whereas 11 out of 80 specimens of *Wallago attu* were found to be infected. The

maximum prevalence (31%) showed by *C. punctatus* while (13.75%) shown by *Wallago attu*. (Table 1, Fig. 1). Recently, Verma et al., 2013, also recorded prevalence of helminth parasites in same fish *C. punctatus* they were found to be infected with three species of helminth parasites, the parasites were associated with gill, stomach and intestine of fishes respectively and Qadri et al 2013, also reported prevalence of helminth parasites and compare with the other fish.

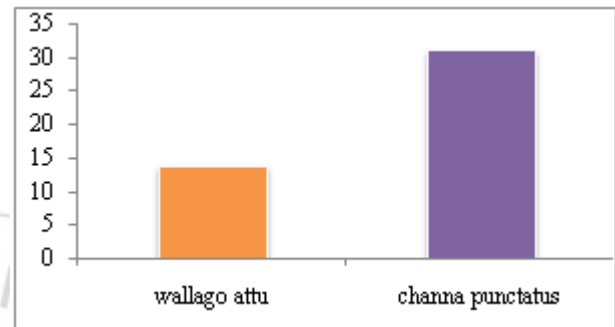


Figure 1: Prevalence of parasite in two catfishes, *Wallago attu* and *Channa punctatus*

Relation between host (*Channa punctatus*) length and parasitic infection-

It was observed that an increase in the size of fish host was accompanied with an increase in parasitic infection. The larger fishes (11-14.9cm) were more heavily infected than the smaller fishes (7-10.9cm). Figs.2.shows the increase in the Index and mean intensity with the increase in size (length) of the host. Kaur et al. observed that the similarly, the large fishes (<15 cm) were more heavily infected than the smaller fishes (>10cm). Arme(2002) further explained the reason for gradual increase in intensity of infection with increase in size (length) and according to the author it may be due to the accumulation of plerocercoids in fish as they grow and it is accepted that the plerocercoids may survive in fish for several years.

Chi square test revealed that there was significant difference in prevalence of helminth parasites among the three length classes of the examined host.

Table 2: Relation between standard length and different indices of parasitic infection in *Channa punctatus*.

Length group	No. of fish examined	No. of fish infected	No. of parasites	Prevalence	Abundance	Mean density	Index of infection
7-10.9	29	8	10	27.5	0.34	1.25	2.7
11-14.9	55	18	39	32.7	0.70	2.1	12.7
15-18.9	16	5	11	31.2	0.68	2.2	3.4
Total	100	31	60	91.4	1.72	5.55	18.8

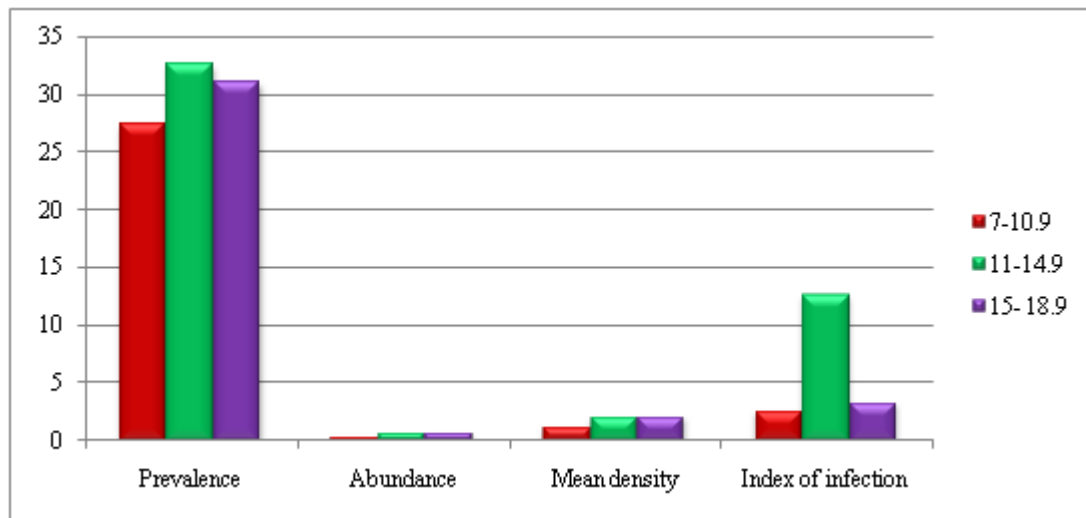


Figure 2: Relation between standard length and different indices of parasitic infection in *Channa punctatus*.

Relation of host Body weight and parasitic infection: - In relation to studies on host body weight and parasitic infection, it was observed that the percentage of infection increased with increasing weight. The bigger fishes (71 to 90 gm) were more heavily infected than the smaller fishes (20 to 50 gm) (Table 3, Figure 3). Parallel observations were stated by Ayanda (2009) and Olurin and Samorin, (2006), According to these workers, the heavier the fish, the greater the vulnerability to parasitic infection. This observation could

be recognized to the fact that larger fish provides larger surface area for the infection to multiply in numbers than the smaller ones. Another plausible reason could be that the relation may be the result of changes in diet from phytoplankton and zooplankton to insects, larvae, snails, worms and crustaceans for food as smaller fishes grow into larger ones (Obano *et al.*, 2010b). Chi square test revealed that there were significant differences in prevalence of helminthes among the three weight classes of the examined host.

Table 3: Relation between body weight and different indices of parasitic infection in *Channa punctatus*

Body weight	No. of fish examined	No. of fish infected	No. of parasites	Prevalence	Abundance	Mean density	Index of infection
20-50	60	21	42	35	0.7	2	14.7
51-70	35	8	15	22.8	0.42	1.8	3.4
71-90	5	2	3	40	0.6	1.5	1.2
Total	100	31	60	97.8	1.72	5.3	19.3

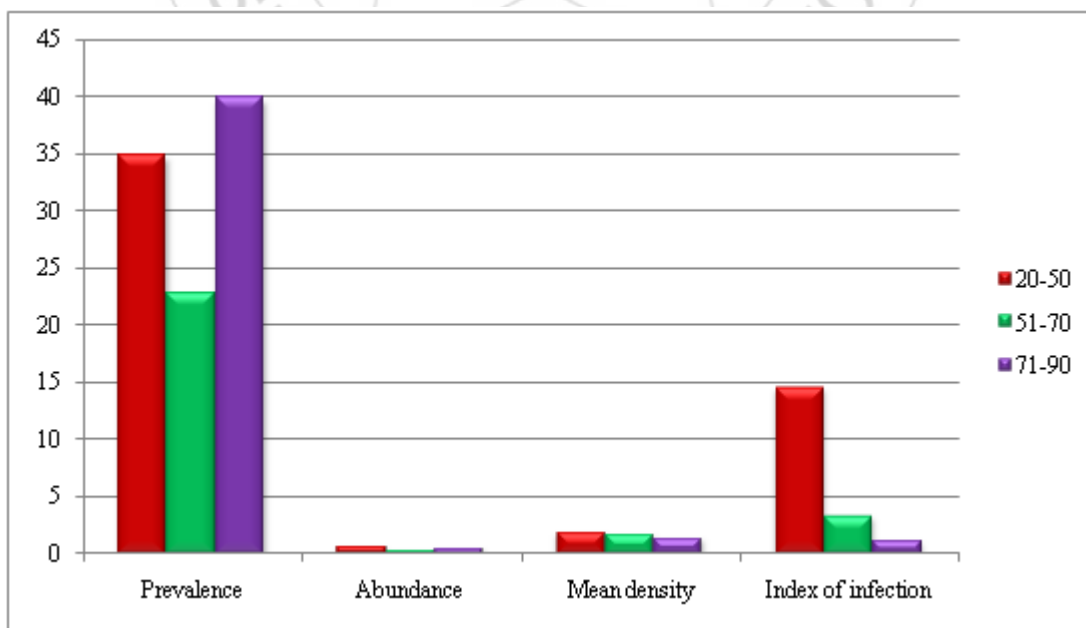


Figure 3: Relation between body weight and different indices of parasitic infection in *Channa punctatus*

Relation between host Sex and Parasitic infection—The total fishes were (*Channa punctatus*) examined, 18 out of 55 females (32.72%) were found infected with parasites as compared to 13 out of 45 (28.88 %) males (**Table 4, Figs. 4**). Present study was revealed that female host was observed to be more infected than males. Similar reports were also observed by Thomas (1964) Chandra (1985) Khanum and Parveen (1997) and Rahman and Saidin (2011). These workers

concluded that this relation may be due to lower physiological resistance of female fishes as compared to the males. According to Dobson (1961) female are more susceptible to parasite infection during breeding season. Chi square test revealed that there was non-significant the differences in prevalence of the infection in males and female of the examined host fishes.

Table 4: Relation between body sex and different indices of parasitic infection in *Channa punctatus*

Sex	No. of fish examined	No. of infected fish	No. of parasites	Prevalence	Abundance	Mean density	Index of infection
Male	45	13	21	28.88	0.46	1.61	6.06
Female	55	18	29	32.72	0.52	1.61	9.49
Total	100	31	50	61.6	0.98	3.22	15.55

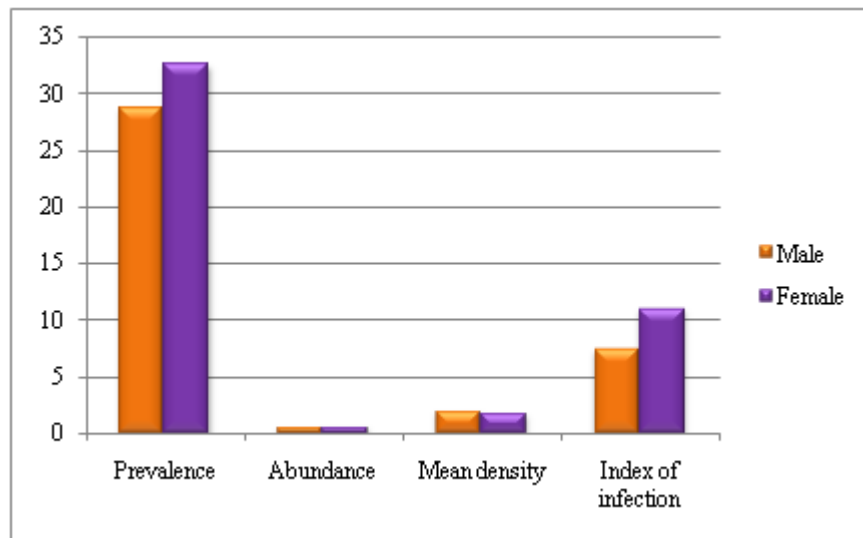


Figure 4: Relation between body sex and different indices of parasitic infection in *Channa punctatus*

Relation between host (*Wallago attu*) size (length) and parasitic infection: In this study, we observed the relationship between length of the fish and the percentage of infected fishes. It is also investigated which length of *Wallago attu* more infected with parasites than the others. The size of normal and infected fishes was grouped in length classes (17 to 21.9, 22 to 26.9 and 27 to 31.9). (**Table 5, Fig. 5**) showed that the percentage of infection of both the normal and infected fishes in each length group. It can be concluded from the given data that the smallest fishes in length group from 17cm to 21.9cm) were relatively less infected than the other length groups and the percentage of infection increases with

increasing fish length. It was concluded that, larger fishes were heavily parasitized than smaller ones. Bashirullah (1973) and Dogiel (1961) also reported that the degree of parasitism was obviously related to the food habit and age of the fishes.

Chi square test revealed that there was no significant difference in prevalence of helminths among the three length classes of the examined host.

Table 5: Relation between standard length and different indices of parasitic infection in *Wallago attu*.

Length group	No. of fish examined	No. of fish infected	No. of parasites	Prevalence	Abundance	Mean density	Index of infection
17-21.9	24	2	5	8.3	0.20	2.5	.41
22-26.9	40	7	9	17.5	0.22	1.2	1.5
27-31.9	16	2	4	12.5	0.25	2	0.5
Total	80	11	18	38.3	0.67	5.7	2.41

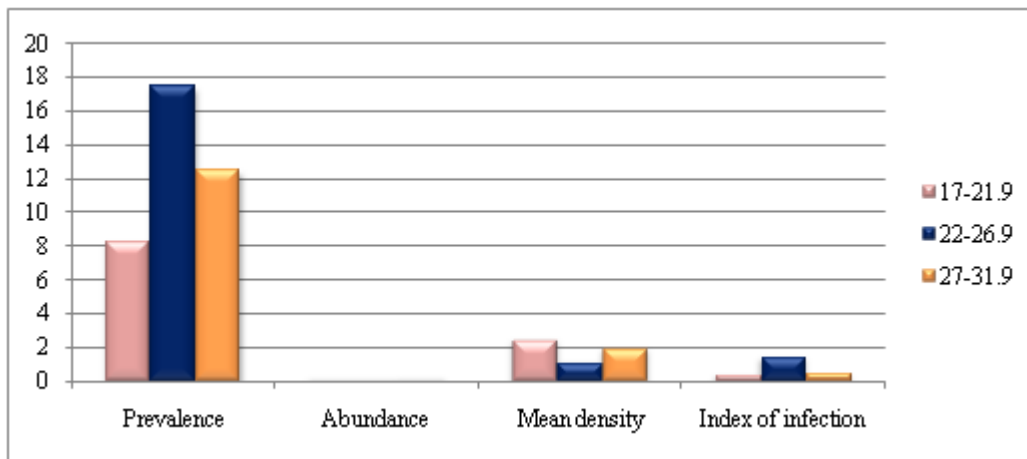


Figure 5: Relation between standard length and different indices of parasitic infection in Wallago attu.

Relation between host (*Wallago attu*) Body weight and parasites—We observed that the bigger fishes (151 to 210gm) were more heavily infected than the smaller fishes (30 to 90gm). Table 1 and Figure 6: shows prevalence, abundance, mean density of parasitic infection and index of infection according to body weight of *Wallago attu*. Highest Prevalence (30%) was observed in the body weight range of 151 to -

210gm with Abundance of 0.7, Density of infection of 2.3 and Index of infection of 2.1. There was an observed increase in Incidence of infection with increase in body weight. Chi square test revealed that there were significant ($P < 0.05$) differences in prevalence of helminthes among the three weight classes of the examined host.

Table 6: Relation between body weight and different indices of parasitic infection in Wallago attu .

Body weight	No. of fish examined	No. of fish infected	No. of parasites	Prevalence	Abundance	Mean density	Index of infection
30-90	55	4	6	7.2	0.1	1.5	0.43
101-160	15	4	5	26.6	0.3	1.2	1.3
161-220	10	3	7	30	0.7	2.3	2.1
Total	80	11	18	63.8	1.1	5	3.83

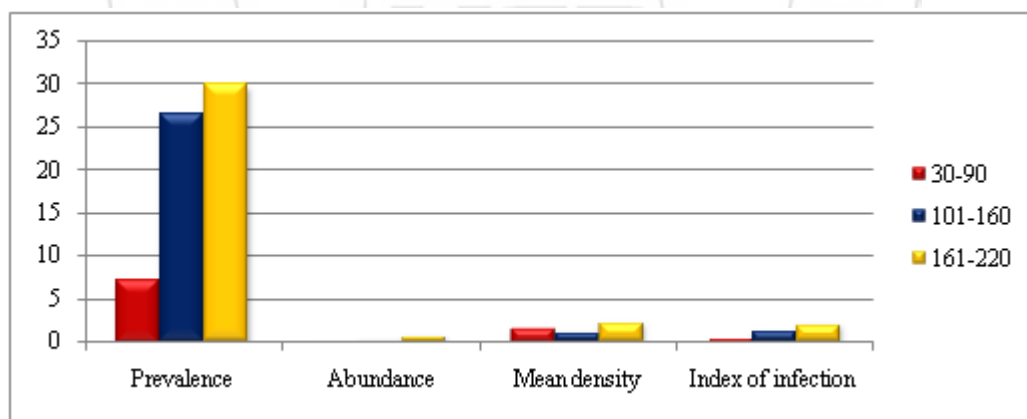


Figure 6: Relation between body weight and different indices of parasitic infection in Wallago attu

Relation to Sex of host and parasitic infection:—Out of the total fishes examined, 5 were infected out of 35 female and 6 were infected out of 45 males. The Prevalence of the parasitic infection (%) in the female and male was 14.2 and 13.3 respectively during this period. The abundance, density and

index of infection in female was 0.2, 1.4 and 1 and in male .24, 1.8 and 1.46 respectively (Table 7, Fig. 7). Chi square test revealed that there was no significant difference in prevalence of the infected males and female of the examined host fishes.

Table 8: Relation between sex and different indices of parasitic infection in Wallago attu

Sex	No. of fish examined	No. of infected fish	No. of parasites	Prevalence	Abundance	Mean density	Index of infection
Male	45	6	11	13.3	.24	1.8	1.46
Female	35	5	7	14.2	0.2	1.4	1
Total	80	11	18	27.5	0.44	3.2	2.46

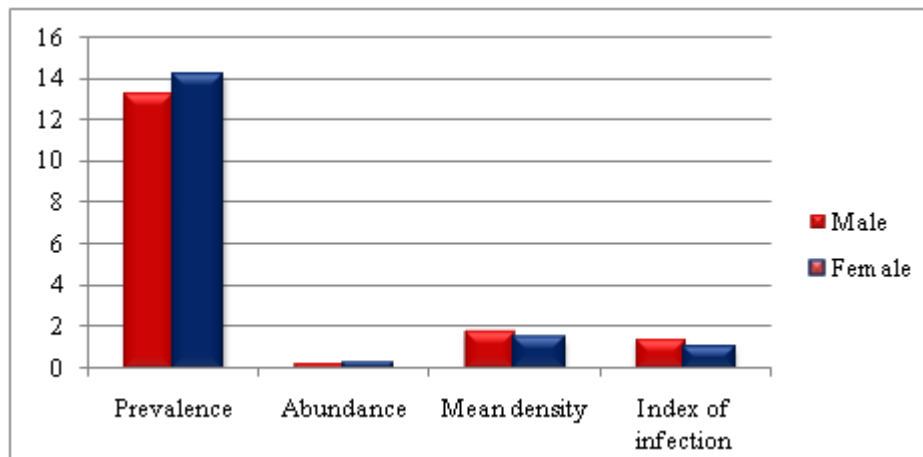


Figure 7: Relation between sex and different indices of parasitic infection in Wallago attu

4. Conclusion

The present study has shown that two catfishes from the River gomti harbor a wide range of parasites especially the helminth parasites. The study has established that the *Channa punctatus* fish is one of the most heavily infected fish species as compared to *Wallago attu*. This study thus highlights on the parasitic infection according to the length, weight and sex. We concluded that the freshwater fishes harbour a wide range of helminth parasites especially trematodes and acanthocephala. Out of a total of 180 fish examined 42 were found to be infected with helminth parasites. The overall prevalence of parasites was found to be 23.3. The maximum infection of helminth parasites was found in *Channa punctatus* in comparison *Wallago attu*. The maximum infection of helminth parasites was found in the fishes weighing 71-90g and in the fish length ranging from 11-14.9cm in case of *channa punctatus*. The maximum infection of helminth parasites was found in the fishes weighing 161-220g and in the fish length ranging from 22-26.9cm in case of *Wallago attu*.

5. Future Scope

Fishes are an important source of protein that consumed by human being. But majority of freshwater fishes carry heavy infection of parasites which cause deterioration in the food value of fish and even result in their mortality. The fishery industry also plays an important role in the Indian economy as they provide employment opportunities. However, due to the occurrence of these parasites, the physiological activities of the infected fishes are hindered and their growth is retarded. Beside this, there is always the possibility of their transfer to the human beings by consumption of infected fishes. Therefore, it is important to carry out the prevalence of helminth parasites in fishes.

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