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# Parasite infection of three freshwater fishes in Dolu Lake, Silchar, Assam

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**Abstract**
Three freshwater fishes were examined for the present study. The percentage of infection was 62.5% and 45.45% for females and males, respectively in *Notopterus notopterus*, 31.25% for females and 17.46% for males of *Channa punctata* and 10% and 8.33% for females and males of *Heteropneustes fossilis* respectively. The result showed that females were more parasitized than males. It was found that the degree of infection increases with increasing length of *Notopterus notopterus*. In *Channa punctata*, the degree of infection was high in an intermediate length group. The degree of infection in *Heteropneustes fossilis* was higher in lower length group. However, different trends of parasite infection were observed in different sex and length groups of host species during different seasons of the year.

**Keywords:** Fishes, Helminthes, Sex, Length, Dolu Lake.

## 1. Introduction
It is an established fact that parasite causes infection and sometimes diseases of fish both in freshwater and marine environments. Therefore, it is an essential area for proper attention to be given by the scientists for sustainable fisheries and aquaculture production.
Sinderman [16] showed that the effect of worm larvae on the host fish included growth retardation, tissue disruption, metabolic disturbances and even death in heavy infections. Collard [5] found that adult fishes harbored a larger number and a greater diversity of parasites than pre-adults. Rumpus [13] discussed the seasonal fluctuation of parasites and the effect of the size, maturity and sex of fishes on the incidence and intensity of their parasites.
However, the influence of parasitic infection in relation to the length and sex of fish and season has been studied by many workers like Shomorendra *et al*. [14, 15] Chubb [4] Pennycuick [12] Jha and Sinha [8] Tavares and Luque [17].
In Assam, particularly in Barak Valley studies on the frequency of parasitic infection and its variation due to host species, seasons, sex and length of host are limited. The present study mainly fulfills the gaps in this direction.

## 2. Materials and Methods
### 2.1 Study area
Fishes examined in this study were collected from Dolu Lake which is situated $24^0$55'23.4''N and $92^0$47'21.5''E. The lake water ranges from 20–23 $^0$C during December- January and maximum is 31–32 $^0$C during June-July. The pH value fluctuates between 6.38 to 7.08. The maximum value was recorded during April.

### 2.2 Fish species
*Channa punctata, Notopterus notopterus and Heteropneustes fossilis* from Dolu lake were collected during four different seasons of the year. The samples were random to fulfill lengths representing the different fish lengths in the lake. The total length and sex were determined. The identification of each fish was determined after following Jayaram [7]. The external body surface and internal organs were thoroughly examined for parasites. After being relaxed the collected parasites were fixed in the fixatives prescribed for different parasite groups. Trematodes were fixed in AFA (alcohol-formalin-acetic acid) solution, stored in 70% alcohol. Acanthocephala were fixed and preserved in AFA, Cestodes in 5% formalin and nematode after immersing in hot 70% alcohol, were finally stored in 70% alcohol after following Bylund *et al* [2].

## 3. Results

### 3.1 Parasitic fauna of three different fish species from Dolu

#### i) Lake

A total of 358 helminth parasite individuals were recovered from all the three different fish species. Of these, 270 (75.41%) were nematodes, 6 (1.67%) were cestodes, 50 (13.96%) were trematodes and 32 (8.93%) were acanthocephalan. A total of 85 (23.74%) helminth parasites were recovered from *Channa punctata*, out of which 3 (3.52%) were cestodes, 50 (58.82%) were trematodes and 32 (37.64%) were acanthocephalan. 269 (75.13%) individuals of helminth parasite were recovered from *Notopterus notopterus* which all were nematodes. 4 parasite individuals were recovered from *Heteropneustes fossilis* out of which 1 (25%) were nematodes and 3 (75%) were cestodes. (Table-1).

#### ii) Host species

27.63% of the total three different species of fish examined were found to be infected with four different groups of helminth parasites. The degree of infection was found to be higher in *Notopterus notopterus* (54.35%) and lower in *Heteropneustes fossilis* where it showed 54.35% and 9.52% respectively. (Table-2).

#### iii) Sex

In three different fish species, the prevalence of infection was higher in females than that of males. The degree of infection was 62.5% and 45.45% for females and males, respectively in case of *Notopterus notopterus*. In *Channa punctata* the degree of infection was 31.25% for females and 17.46% for males. The degree of infection was 10% and 8.33% for females and males of *Heteropneustes fossilis* respectively.

#### iv) Seasons

A seasonal influence on the occurrence of helminth parasite infection in fishes was noted under investigation. In *Notopterus notopterus*, the degree of infection was found to be 25%, 77.8%, 70% and 60% during winter, spring, summer and autumn respectively. In *Channa punctata*, the degree of infection was found in winter as 20.6%, increasing gradually to 20.83% in spring and then decreasing to 19.23% in summer and again increasing to 37.03% in autumn. As for *Heteropneustes fossilis* the degree of infection was 7.7% in spring, 18.8% in summer and in the rest two seasons no infection was found. (Table-3).

#### v) Length

Percentage of infection increases with increasing length of *Notopterus notopterus* from 16.7% to 50%. In *Channa punctata* the percentage of infection was 12.5% in length group between 60 mm to 105 mm, 33.33% in 106 mm – 151 mm and 14.3% in 152 mm – 197 mm. In length group of 60 mm – 105 mm of *Heteropneustes fossilis* the percentage of infection was 16.7% and decreased to 6.5% in length group of 106 mm – 151 mm and again increased to 14.3% in length group of 152 mm – 197 mm. (Table-4).

**Table 1:** Parasite burden in fishes of Dolu Lake.

| Fish species | Nematode | Cestode | Trematode | Acanthocephala | Total |
|---|---|---|---|---|---|
| *Channa punctata* | - | 3 (3.52%) | 50 (58.82%) | 32 (37.64%) | 85 (23.74%) |
| *Notopterus notopterus* | 269 (100%) | - | - | - | 269 (75.13%) |
| *Heteropneustes fossilis* | 1(25%) | 3 (75%) | - | - | 4 (1.11%) |
| Total | 270 (75.41%) | 6 (1.67%) | 50 (13.96%) | 32 (8.93%) | 358 |

**Table 2:** The percentage of infection in different sex of fishes.

| Fish species | Female | | % of infection | Male | | % of infection | Total | | % of infection |
|---|---|---|---|---|---|---|---|---|---|
| | Normal | Infected | | Normal | Infected | | Normal | Infected | |
| *Notopterus notopterus* | 9 | 15 | 62.5 | 12 | 10 | 45.45 | 21 | 25 | 54.34 |
| *Channa punctata* | 33 | 15 | 31.25 | 52 | 11 | 17.46 | 85 | 26 | 23.42 |
| *Heteropneustes fossilis* | 27 | 3 | 10 | 11 | 1 | 8.33 | 38 | 4 | 9.52 |
| Total fish examined | 69 | 33 | 32.35 | 75 | 22 | 22.68 | 144 | 55 | 27.63 |
| | 102 | | | 97 | | | 199 | | |

**Table 3:** The percentage of infection in the fishes during different seasons.

| Season | Winter | | | Spring | | | Summer | | | Autumn | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fish species | N | I | % | N | I | % | N | I | % | N | I | % |
| *Channa punctata* | 27 | 7 | 20.6 | 19 | 5 | 20.83 | 21 | 5 | 19.23 | 17 | 10 | 37.03 |
| *Notopterus notopterus* | 9 | 3 | 25 | 2 | 7 | 77.8 | 3 | 7 | 70 | 6 | 9 | 60 |
| *Heteropneustes fossilis* | 4 | - | - | 12 | 1 | 7.7 | 13 | 3 | 18.8 | 11 | - | - |
| Total fish | 40 | 10 | 20 | 33 | 13 | 28.3 | 37 | 15 | 28.8 | 34 | 19 | 35.8 |

N= Norma, I= Infected, %= Percentage of infection

**Table 4:** The percentage of parasitic infection in relation to the length of fishes.

| Length groups (mm) | *Channa punctata* | | | *Notopterus notopterus* | | | *Heteropneustes fossilis* | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | I | % | N | I | % | N | I | % |
| 60-105 | 35 | 5 | 12.5 | - | - | - | 5 | 1 | 16.7 |
| 106-151 | 42 | 21 | 33.33 | 5 | 1 | 16.7 | 29 | 2 | 6.5 |
| 152-197 | 6 | 1 | 14.3 | 20 | 20 | 50 | 6 | 1 | 14.3 |

N= Normal, I= Infected, %= Percentage of infection

## 4. Discussion

The results revealed the presence of three different fish species (*Channa punctata*, *Heteropneustes fossilis* and *Notopterus notopterus*) of Dolu lake infected by four groups of helminth parasites viz; nematode, cestode, acanthocephalan and trematode. Of the groups of helminth parasite infecting *Channa punctata*, trematode had the highest percentage of infection in total followed by acanthocephalan and cestode. In case of *Heteropneustes fossilis*, cestode had the highest percentage of infections, followed by the nematode. In *Notopterus notopterus*, nematode had the highest. This finding supports earlier work of Mgbemena [10] who discovered a higher number of nematode infection on the freshwater fish *C. tilapia* while Akhamerov [1] who reported higher infection rate of cestodes in the fish *T. lazer* in the basin of the river Amur (Russia). However, some author observed that there was an exacting topographical relationship between a parasite and its host and this was probably an important factor in the mechanism of host specificity.

Females were more frequently infected with parasites than males in this study. This observation agrees well the finding of Collard [5] who found that female fishes were generally more parasitized than males. Thomas [18] noted that the trematode, *Mesocardium monody*, Dolfus, in Agama lizards, occurred most frequently in females. He said; this was probably due to females, eating more than males as a result of physiological and behavioural differences. As compared to males, females spend more than twice as much time in feeding and this diet contain a much higher proportion of invertebrates. This increase their chance of ingesting more infective intermediate hosts than the males [6] whereas several evidences suggest that the infestation of a number of parasites in females was the results of differences in their food habits and feeding behavior.

It can be noted from the data that the percentage of infection in three different fish species is more or less variable with the season of the year. The total value of infection for all three fish species is found to be highest in autumn (35.8%) and the lowest is in winter (20%). This finding supports in case of Autumn only in this study that on a seasonal basis, Moharram [11] said,' Autumn and Winter are the two seasons in which we meet the biggest number of infected fish with cope pods, as well as the greatest number of parasites per fish.

The increasing trend of percentage of infections with increasing length of *Notopterus notopterus* agrees to Khanum *et al*., [9]. They also suggested that the greater number of parasites in larger fish due to the larger surface areas of the gut, with more volumes of food eaten, selective feeding or any change in diet might also lead to higher infestation in different length groups. In *Channa punctata* the percentage of infection in relation to length of host agrees to Chandra [3] who reported higher abundance of *Pallisentis* sp in the intermediate length groups of fish. But in *Heteropneustes fossilis* the percentage of infection in relation to host length did not follow the above trends.

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