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Effects of Seasons, Host Age, Size and Sex on Monogenetic Trematode, *Hamatopeduncularia indicus* of Host Fish, *Arius jella*

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Abstract: A total number of 220 *Arius jella* were examined for parasitic infection. The effect of some factors, on the incidence of parasitic infection on the host fish is carried out. The result of this study showed that, more than sixty percent of the examined host fishes were infected. The prevalence of infection was higher in female than male. The large sized fishes were more subjected to parasitic infection than smaller ones. A definite seasonal effect is noted, the summer found to be season of severe infection of fishes, where the percentage of infection was obviously higher than other seasons. The average prevalence (%), mean intensity and relative abundance were calculated to be 44.22, 2.26, and 0.88, respectively. The above results and their reasons corroborated with the findings of earlier researchers.

Key words: Parasitology. *Hamatopeduncularia indicus*, *Arius jella*,

INTRODUCTION

The stability of any parasitic community depends on a balance interaction between pathogens, hosts and their adjusted responses to their external environment. If any component of such system functions or behaves abnormally, the harmonious relationship becomes disturbed and may even result in the destruction of a stable system. The parasitic communities however did not come into existence all of a sudden. A long process of evolution over the past millions of years gradually led to their establishment. In parasitology the study of host parasite relationship is of great significance. As a

matter of fact this can be considered as an ecological subject for the reason that parasites constitute an important group of biotic factors affecting their hosts.

The dispersion of parasites influenced by various host factors. The presence of helminth worms in any host cause a number of pathological changes. Pathogenicity is the manifestation of alteration in the physiology; this study helps not only in understanding the mechanism of pathogenicity, but also gives an idea about the deficiencies in the nutritive values of the infected hosts.

Helminths as a parasite and fishes as a host constitute a big host parasitic aquatic fauna. Fishes are one of such hosts that act as definitive, paratenic or intermediate host in the life cycle of many helminth parasites. Parasitic infestation tends to decrease the growth rate resulting in stunting of the fish. The damage caused by helminthes to their hosts is generally related to the intensity of infestation and the depth of penetration with the host tissues. The present study attributes towards the extensive damage caused by *Hamatopeduncularia indicus* a gill ectoparasite of a fish *Arius jella* which also includes an indirect effect on its growth, development and reproduction. Thus, may leads to further decline in the population of the host fish.

MATERIALS AND METHODS

For the present study the fish, *Arius jella* were procured from the local markets in and around the Pune city. They were brought to the laboratory either in live or freshly killed condition and then preserved in 4% formalin solution. Fishes were sorted out in three groups in respect to their length and sex was recorded. To identify the infection and also to collect the parasites, the fish were dissected and the gills were examined. The parasites collected from the infected fish, enumerated and permanent slides were prepared by preserving them in 4% formalin after thorough wash with saline. Parasites stained with Alum carmine and at the end of the staining mounted with DPX mountant Pears¹. The monthly variation in total prevalence (%), mean intensity, relative abundance and comparison between sex and length were calculated. The parasites identified as mentioned in Systema Helminthum, Yamaguti².

Ecological analysis: The following terms studied as per the formula given by Margolis³.

$$\begin{aligned}
 (1). \text{Prevalence} &= \frac{\text{Total no. of host infected} \times 100}{\text{Total no. of host examined}} \\
 (2). \text{Mean intensity} &= \frac{\text{Total no. of host examined}}{\text{Total no. of infected host examined}} \\
 (3). \text{Abundance} &= \frac{\text{Total no. of parasites}}{\text{Total no. of host examined}}
 \end{aligned}$$

RESULTS AND DISCUSSION

Seasonal variations in prevalence, intensity and abundance: The author has examined reasonably large number of hosts in natural populations. The distribution and abundance of helminth parasite population, particularly from the infected gills of the host observed. The statistical data of

helminth parasite, *Hamatopeduncularia indicus* was accurately estimated and analyzed, mean density, index of infection were ascertained and interpreted carefully. Out of 220 specimens of *Arius jella*, 97 were found infected with *Hamatopeduncularia indicus*. The maximum prevalence (64.54%) was recorded in the month of April, 2012, while the minimum prevalence (25.45%) in the month of December, 2012. The host showed relative intensity ranged from (0.9 --3.4). The highest abundance (1.9) in March 2012 and the lowest (0.17) in November, 2012 (**Fig. 1, 2**). It was observed that the intensity of invasion was maximum in summer and minimum in winter. This may be due to feeding habit, availability of food, physiological changes and hydrobiological conditions. Williams and Jones⁴ explained that the feeding habit of the host account for the large percentage of the variations in the total numbers of parasites per host species. Hiware⁵ observed that the high value of incidence of infection of *Senga sp* in *Mastacembelus armatus* in the month of the summer. The finding of Amin⁶ reveals that season influences the parasitic infection in two ways. One is the influence, of change in atmospheric conditions on the definitive host causing physiological changes which in turn influences the occurrence of parasitic population and the other is the influence of season on the availability of the suitable intermediate host. Bauer⁷ showed that the hydro biological conditions of certain body of water affect its parasitic fauna both in the number of species, extent of infection and development of its parasites

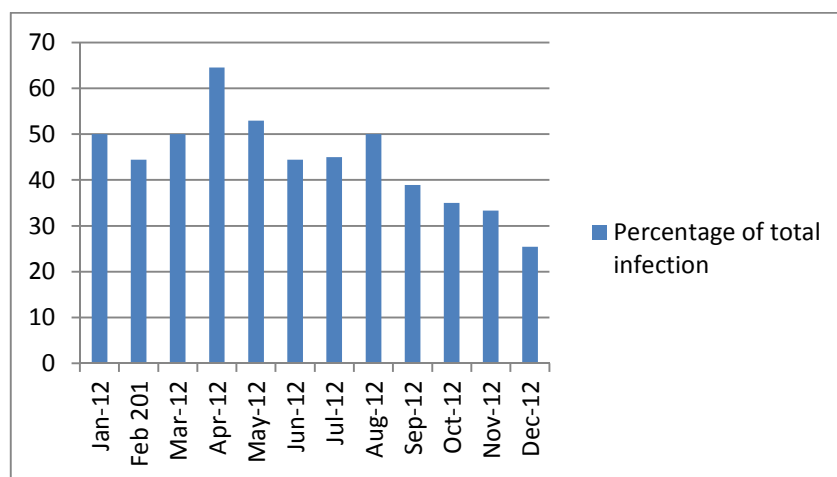


Fig .1: Percentage of total infection

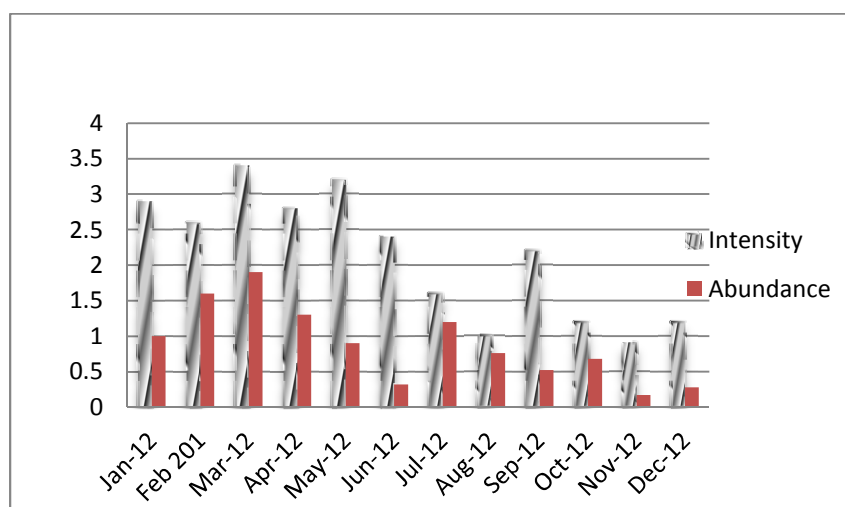


Fig.2: Monthly variations in abundance and intensity of parasite in *Arius jella*

Effect of host's sex: To evaluate the infection levels the fishes procured from random water bodies, dissected and separated sex wise on the basis of gonads. The incidence of helminth infection in the two sexes calculated separately (**Fig.3**). The available data was analyzed and it has revealed that the incidence of infection was invariably very high in the female host and it was very less in the male host of *Arius jella*. The month wise data presented the showing the infection levels of *Arius jella* indicated that both the sexes of the hosts were infected with the parasites throughout the year. Out of the total fishes examined, 69 were infected out of 126 female and 28 were infected out of 94 males. The incidence of infection (%) in the female and male was 54.76 and 29.78 during the study year. The mean intensity and abundance in female was 1.82, 1.53 and in male 3.35, 2.06 respectively (**Fig, 4**).

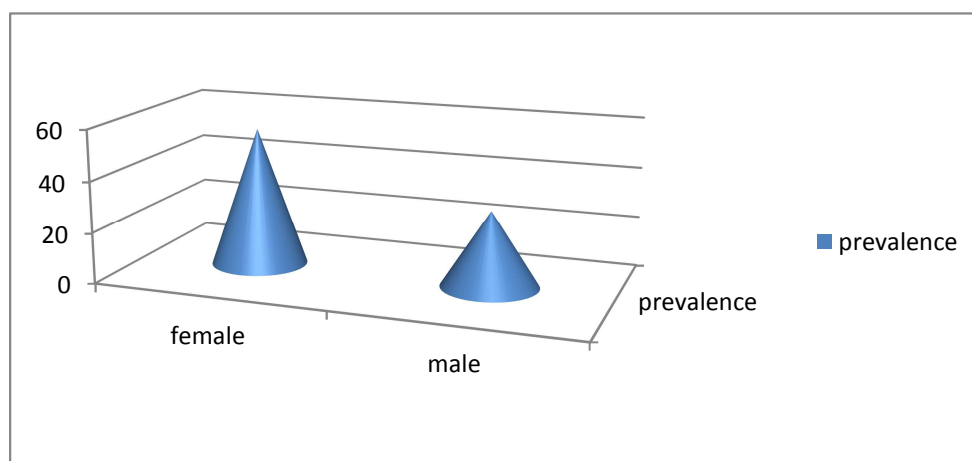


Fig. 3: Comparative percentage of prevalence between infected male and female

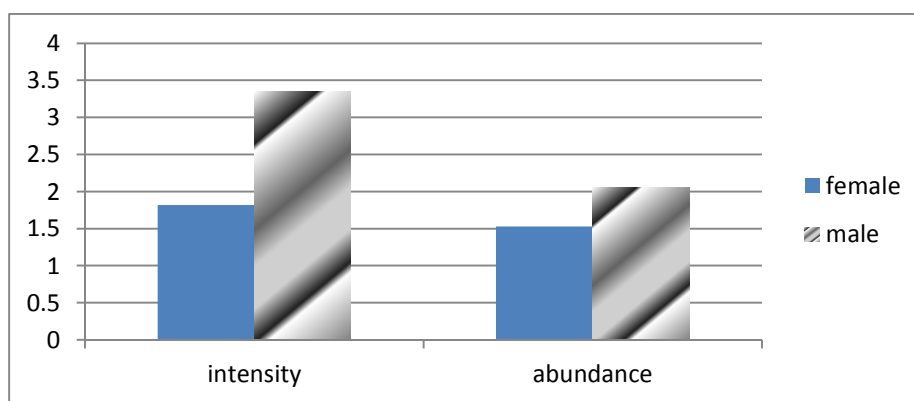


Fig. 4: Comparison of abundance and intensity between male and female *Arius jella*

The sex of the host has relevant bearing on the stability of host-parasite system. It has been confirmed by several authors Smith⁸, Sanwal and Agarwal⁹, Sinha¹⁰, Rajaiah¹¹ that the sex of the host has relevant effect on the regulation and periodicity of the parasites. The differences in the infection levels of the parasites in the male and female hosts may be due to the physiological changes in quantity and quality of the steroid hormone presumably androgens of male and estrogens of the female hosts. Kisieleska¹² observed that during summer the rate of infection is more in females than in males and observed that adult female showed higher infection than the younger ones. The differences in parasites fauna between animals of different sexes are less common and less well understood. The difference of distribution of parasites between the different sexes are not due to any one single factor, but due to combination of several including host's diet and their physiology.

Effect of host's size (length): Since there is some sort of relationship between the length of the fish and its age. It has attempted in this part of the work to find the relationship between length of the fish and the percentage of infected fishes. It is also investigated which length of *Arius jella* more infected with parasites than the others. The size of normal and infected fishes were grouped in length classes (i.e. from 8cm to less than 12cm, from 12cm to less than 16cm and 16cm to less than 20cm). **Fig. 5** illustrates 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 (length group from 8cm to less than 12cm) were relatively less infected than the other length groups and the percentage of infection increases with increasing fish length. It is concluded that, larger fishes were heavily parasitized than smaller ones. The invasion index and mean intensity with the increase size (length) of the host is attributed to two factors. One is the increased volume of food ingested by large fishes. Bashirullah¹³ and Dogiel¹⁴ reported that the degree of parasitism was obviously related to the food habit and age of the fishes.

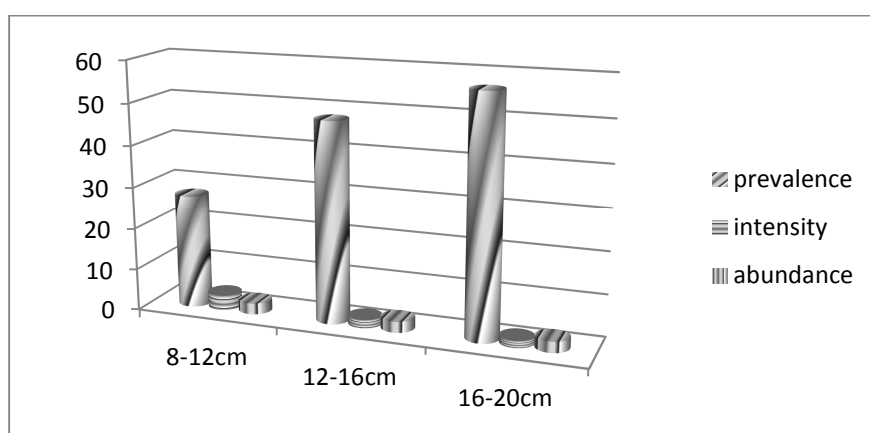


Fig .5: Prevalence intensity and abundance of parasite in different sizes of *Arius jella*

CONCLUSION

The infection of various helminth parasites of *Arius jella* have revealed more or less same pattern of infestation. On the basis of the year wise incidence of infection of *Hamatopeduncularia indicus* in the male and female host *Arius jella*. It was observed that *Hamatopeduncularia indicus* has preference to female hosts suggesting that the female hormones have some influence on recurrence and maintenance of parasites. The less infection in male host may be due to those male hormones that offer more resistance to the infection. The climatic conditions of the area in the particular season of the year may also have an impact on the infestation levels of the particular parasite in a particular sex. Undoubtedly the results of the present study are in agreement with the findings of above researchers.

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