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Effect of helminth parasitic load on the length weight-ratio of fresh water fish, *Channa striatus*

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ABSTRACT

Present investigation was carried out to investigate, the helminth parasitic load in freshwater murrel *Channa striatus*. During present investigation, three species of helminth parasites were recovered from host fish. The prevalence, intensity and abundance were calculated in relation to sex, length-group, condition factor and LWR of host fish. Large sized fishes were dominatingly affected by helminth parasites as compared to small sized fishes. Thus the negative allometric growth was observed among infected fishes. Male host fishes were predominantly infected as that of female host fishes.

KEY WORDS: PREVALENCE, CHANNA STRIATUS, HELMINTH, PARASITES

INTRODUCTION

Parasitic diseases reduce fish production by affecting the normal physiology of fish and can result in mass mortalities of fish if remained unmonitored (Fagbenro *et al*., 1993). Fish disease and histopathology, with broad range of causes, are increasingly being used as indicators of environmental stress since they provide a definite biological end-point of historical exposure (Steniford *et al*., 2003). Helmintho-fauna infections in fishes have been reported to have marked relationship with sex and size (Ezenwaji and llozumba 1992; Machado *et al*., 1994; Saliu, 1998; Guidelli *et al*., 2003; Araoye, 2005;Lizama *et al*., 2005, 2006; Hassan *et al*., 2010; Omeji, 2012).

The use of Length Wight Ratio for assessment of fish maturity, growth and production is important and the growth in animals is considered in terms of increase in volume. The volume is represented by weight, which is related to the cube of linear dimensions (Fatioye, 2005). Condition factor is also a useful index for monitoring of feeding intensity, age, and growth rate in fish. It is strongly influenced by both biotic and abiotic environmental conditions and can be used as an index to assess the status of the aquatic ecosystem in which fish live (Anene, 2005).

According to Esiest (2013) parasitic worms can cause swollen abdomen in fishes thereby contributing to either pseudo weight and length of fishes and can also lead to stunted growth thereby reducing the length and weight of the fish. Therefore the present research was carried out to reveal the possible effect of helminth parasitic loads on condition factor and LWR of *Channa striatus*.

MATERIAL AND METHODS

1.Collection of host fishes and helminth parasites:

The host fish *Channa striatus* were brought to the laboratory either in living or freshly killed condition from the local fish

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markets. They were identified; their sex and standard length were recorded. Accordingly, the fishes were grouped into 3 length (size) groups viz. smaller size (6 - 10 cm), medium size (10.5 15 cm) and large size (15.5 20 cm). The fishes were examined for the presence of helminth parasites by adopting the methods employed by Mayer and Olsen (1975), Cable (1977) and Madhavi *et al.*, (2007).

Fish specimens were dissected out in physiological saline (0.75% NaCl solution) for collecting helminth parasites. Cestodes collected from intestine were fixed in AFA solution (alcohol - 85 ml, formalin 10 ml and acetic acid 5 ml) kept individually on plain slide, covered with coverslip and slight pressure was exerted on the coverslip to press the specimen slightly and stained with aceto-carmine to prepare permanent slides. Taxonomical identification of helminth parasites was done by adopting the works of Yamaguti (1959).

Ecological terms were studied as per the procedure of Margolis *et al.*, (1982).

2. Length-Weight Relationship (LWR)

Parameters of the length-weight relationship of identified fish species were estimated using the equation:

$$W = a L b \quad \text{.....(1)}$$

Wwhere, W = Weight of fish (g)

L = Length of fish (cm)

a = y-intercept or the initial growth coefficien

b = Slope or the growth coefficientt

The values of constants a and b were estimated after logarithmic transformation of Eq. (1) using least square linear regression to give: logW = log10 a + b log10L.

1.Condition Factor: The condition factor was calculated by the formula:

$$\text{Condition Factor (K)} = 100W/ L3$$

Where, W= weight in grams;

L= total length (cm)

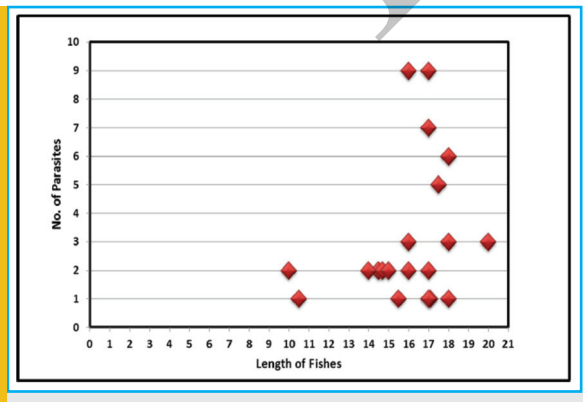

FIGURE 1: Variations in the length of host fish and in no. of parasites in *Channa striatus*.

RESULTS AND DISCUSSION

1. Variation in infection among different size groups

Present observation revealed that minimum number of parasites occurs in small sized host which gradually increases in large sized host (Fig. 1). In male host fishes maximum percentage of prevalence (69.2 %) was observed in large sized fishes (? 16 cm) followed by 60% prevalence in medium sized fishes (13 16 cm). while minimum percentage of prevalence (40 %) was observed in small sized fishes (Fig. 2).

In female host fishes maximum percentage of prevalence (100 %) was observed in large sized fishes (? 16 cm) followed by 20% prevalence in medium sized fishes (13 16 cm). Whereas no infection was observed in small sized fishes (Fig. 3).

2. Variation in infection between male and female fishes

Out of twenty nine, observed male specimens of *C. striatus,* seventeen specimens were found infected. The prevalence was highest (58.62 %) in male than female hosts (*C. striatus*). In case of males of *C. striatus* mean percentage of prevalence was calculated to be 58.62 %. Whereas, the mean intensity and mean density was calculated to be 3.76 and 2.2 respectively (Fig. 4). The density of the parasite was maximum (2 to 3 parasites/ host) in male as compared to female hosts (only 1/ host). Out of fifteen, observed female specimens of *C. striatus,* only six specimens were found infected. Females of *C. striatus,* mean percentage of prevalence was calculated to be 40.00 %. Whereas, the mean intensity and mean density was calculated to be 2.0 and 0.8 respectively (Figs. 5, 6 and Tab. 1).

3. Length-weight relation between infected and uninfected groups

INFECTED MALE

The values obtained for the weight length relationship showed that infected and uninfected *C. striatus* were isometric in their

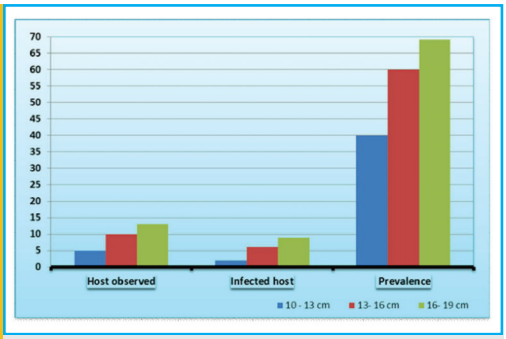

FIGURE 2: Variations in the host observed, infected host and in no. of parasites in different size (length) groups of male *Channa striatus*.

Table 1: Showing the mean (±SD), correlation and significance between infected male and female.

Sex	Mean Length	Mean number of parasites	Correlation	t-value
Male	16.52±1.3351	4.63±3.2	-0.090	-0.223 (Insignificant
Female	16.42±0.965	3.40±1.35	-0.154	-0.271 (Insignificant)

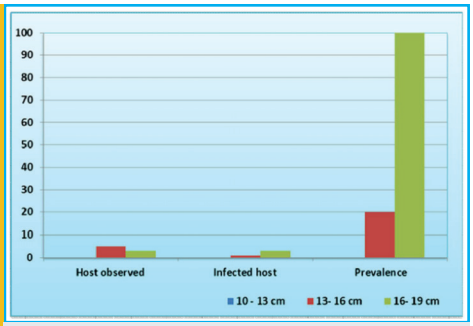

FIGURE 3: Variations in the host observed, infected host and in no. of parasites in different size (length) groups of female *Channa striatus*.

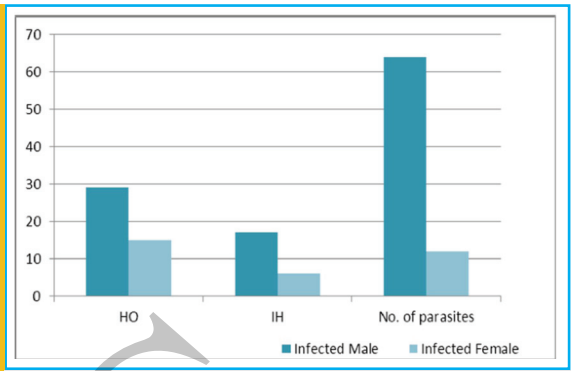

FIGURE 4: Comparison in host observed (OH), infected host (IH) and no. of parasites (PC) between infected male and female *Channa striatus*.

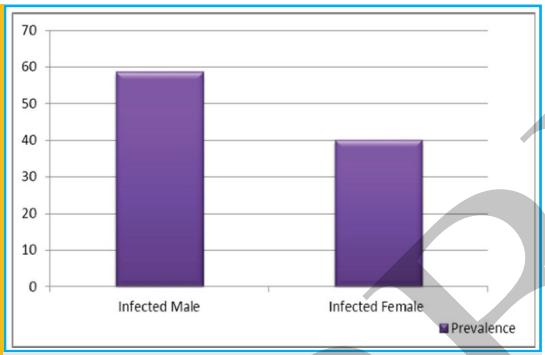

FIGURE 5: Comparative percentage of prevalence between infected male and female *Channa striatus*.

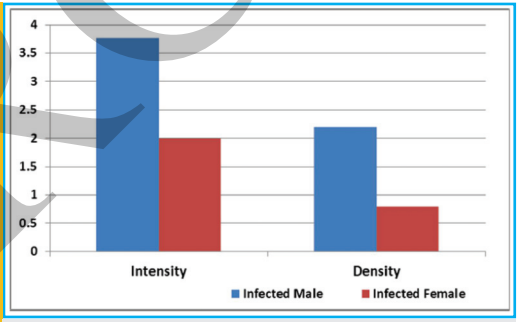

FIGURE 6: Comparative variation in intensity and density between infected male and female *Channa striatus*.

growth. The growth coefficient (b) values obtained for the infected male species is 2.588 and differed significantly from 3.0, which indicates that most of the infected male species have negative allometric growth.

INFECTED FEMALE

The growth coefficient (b) values obtained for the infected female species is 2.408 and differed significantly from 3.0, which indicates that most of the infected female species have negative allometric growth.

4.Condition factor between infected and uninfected groups

Condition factor for infected males ranged between 0.73 to 2.135, and for females ranged between 0.95 to 1.341. In males, the condition factor of host is 1.035 (mean) as compared to uninfected host fishes (1.25). Thus, only slight variation was seen in the condition factor of male host specimens. Condition factor of female host specimens is calculated to be 0.95 (mean) as compared to uninfected host fishes (1.341). Thus female host showed variation in condition factor (Fig. 7). Khurshid and Ahmad (2013) have revealed that the length of the host was affecting the prevalence and mean number of parasites per host. The results of present study are similar to the findings of Hine and Kennedy (1974) showed an increase in mean worm burden with an increase in fish length. During present investigation minimum number of parasites was recovered from small sized host and maximum prevalence was showed by male host fishes. Amin (1986) observed varying results in the parasitic abundance in different length groups of fish, may be due to changes in the feeding capacity of different ages of the host.

In fisheries science, the condition factor is used in order to compare the "condition", "fatness" or wellbeing of fish. It is

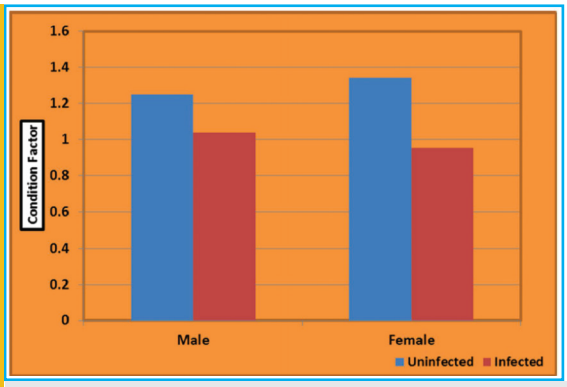

FIGURE 7: Comparison between the condition factor of infected and uninfected host of *Channa striatus*.

based on the hypothesis that heavier fish of a particular length are in a better physiological condition (Bagenal and Teshc, 1978). Condition factor is also a useful index for monitoring of feeding intensity, age and growth rate in fish. It is strongly influenced by both biotic and abiotic environmental conditions and can be used as an index to assess the status of the aquatic ecosystem in which fish live (Anene, 2005).

Esiest (2013) studied length-weight relationship and parasites of *Chrysichthys nigrodigitatus* in Cross River Estuary Itu local government area Akwa Ibom State, Nigeria and explained that parasitic worm burden and intensity of infection low and independent of length and weight.

CONCLUSION

Helminth parasites are dominating among murrels especially *Channa striatus*. The prevalence, intensity and abundance of endo-parasite helminthes directly affected the condition factor and growth rate of the fish which is attributed to its environmental conditions.

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