COMPARATIVE STUDY OF ENDOPARASITIC INFESTATION IN *CHANNA PUNCTATUS* (BLOCH, 1793) COLLECTED FROM HATCHERY AND SEWAGE LAGOON

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Abstract: *The present study was conducted to identify and determine the prevalence and intensity of infestation brought about by the endoparasites in Channa punctatus (Bloch,1793) from different water bodies of varying water quality in Bangladesh. The prevalence of endoparasites in the host fish Channa punctatus was 91.30% in female and 88.88% in male fishes, among them in sewage water fishes the prevalence was 85.71% in female and 86.66% in male and in fishes collected from a hatchery the prevalence was 100% in both the male and female fishes. The intensities of infestation in Channa punctatus was 6.78 in female and 6.55 in male fish collected from hatchery; and in sewage water fishes the intensity was 3.50 in females and 1.15 in males respectively. Six parasite species were found from polluted water fishes and seven species of parasites were recorded from fresh water fishes. The intensity and the prevalence were higher in host fishes collected from hatchery than the sewage water host fishes.*

Keywords: *Endoparasitic, Infestation, Channa punctatus, Hatchery, Sewage, Lagoon*

1. Introduction

Parasites are important groups of organisms since it evolved independently in nearly every phylum of animals, from protozoa to arthropods and chordates, as well as in many plant groups. Fish parasitology is a rapidly developing field of aquatic science. This is due to the growing importance of aquaculture, concerns on pollution effects on fish health and a generally increasing interest in environmental biology (Moller and Anders 1986). It is now universally accepted that parasites present a continual and unaccepted threat to the well being of millions of people of the globe specially the people of the tropics and subtropics and to domesticate animals in all parts of the world. In any natural environment the parasites remain normally in a complex dynamic equilibrium with the free living communities of plants and animals (Hoffman 1967). Therefore, the host-parasite relationship is an important factor to know how numbers of parasites increase or decrease. Parasitic diseases, either alone or in conjunction with other environmental stresses, may influence weight or reproduction of the host, alter its population characteristics, and affect its economic importance (Rhode 1993).

The host species for this study was *Channa punctatus* which belongs to order channiformes and family channidae. These fishes are known as "Zeol fish" (Shafi and Quddus 1982). These are commercially important fishes in our country and comparatively cheap too. The parasitic fauna associated with *Channa punctatus* may vary due to excessive use of inorganic fertilizers and pesticides in cultivated lands, discharge of industrial effluents, inadequate waste disposal etc. which can indirectly cause changes in the aquatic environment.

Parasites occupy a definite position in the animal kingdom for their remarkable adaptations and damaging activities to host. The importance of parasite is related directly to the fish that may affect the general public health (Hoffman 1967).

Every parasite living in or on a fish extents some degree of harmful influence on its host. The normal growth of fish is interrupted or inhibited if they are heavily infected with parasites. The composition of the parasites of fish depends on various environmental factors

Date of submission : 18.02.2009 Date of acceptance : 19.11.2010

such as geographical location of the habitat, season of the year, physico-chemical factors of the water, the fauna present in and around the habitat etc. Dogiel (1964) suggested factors that directly influence parasitic fauna of fish include age, diet, abundance of fish, interdependence of members of parasitic fauna within the fish and the season.

The normal growth of the fishes is impeded if they are heavily infested with endoparasites.

According to Gupta (1983) injury of fishes can carry heavy infection of parasites that cause deterioration in the food of fish and may even result in their mortality. Besides there are a number of "helminth parasites" which are transmitted to man only through fishes. The similarity in parasitic fauna between species utilizing similar food was also noted (Dogiel 1964). The difference in feeding habits has considerable impact on intestinal parasites, but related species living together are likely to share a similar array of ectoparasites, in spite of their differences.

Study of parasites is scant and recent in Bangladesh. Attempts have been taken to explore the parasitic fauna of fishes of this country (Rahman 1989, Khan 1985, Ahmed and Rouf 1981).

So the main purpose of the present work was to have a comparative data on the prevalence and intensity of endoparasites in *Channa punctatus* (Bloch, 1793) from fresh water body and in sewage polluted water. The study was undertaken also to observe the variation of infestation in male and female fishes and in the different portions of the fish body.

2. Materials and Methods

Sampling:

Initially the host fish species of *Channa punctatus* (Bloch,1793) were collected using traps and gill nets from Tongi Hatchery, Gazipur and from sewage treatment lagoon at Narayangonj, Bangladesh which were selected based on availability of laboratory space (Aloo *et al*. 2004). In the lagoon the sewage water is kept for oxygenation and some treatment before disposal into the river (Hasan *et al*. 2006).

Parasitological studies:

The measurements of length and weight of fish were done by centimeter scale and the electric balance respectively and the fishes were dissected in order to collect the endoparasites. An incision was made along the mid-ventral line of the fish. The surfaces of the visceral organs and body cavities and serous membranes were examined for encysted larvae and parasites by using hand lens. All of the organs were removed intact and carefully from the body and put into formalin solution in petridishes. After separating, the internal organs (stomach, intestine, liver and body cavity) were examined individually for parasite in separate petridishes with formalin solution. The stomach and intestine were carefully opened by an incision and then were shaken to dislodge the parasites that might remain attached to the lining of the epithelium by their head ends. The epithelial layers of the stomach and intestine were scrapped with a scalpel to remove any parasite that might remain attached to the layers, and the liver and body cavity were shredded with a pair of forceps and needles. The collected parasites were then washed in fresh saline solution.

The contents of each petridish were then stirred well and allowed to settle in the bottom of the petridish. The sediment was then examined with a dissecting microscope. The collected parasites were washed in fresh water to clean any debris before making temporary mounts or permanent slides. For the purpose of fixation of nematode and acanthocephalan parasites hot glacial acetic acid and AFA (Alcohol Formol Acetic) were used respectively. The collected parasites were placed in hot fixative and left there for a few minutes. After fixation the parasites were preserved in 70% ethyl alcohol in vials for prolonged storage. Lactophenol was used in order to clean the nematodes and acanthocephalan parasites. The nematodes were kept in lactophenol for five to seven days for visibility of the internal organs. The acanthocephalans required four to five days to be cleaned of in lactophenol. The clean parasites (nematodes and acanthocephalans) were mounted on slides temporarily in lactophenol. To make permanent slides of acanthocephalan the parasites were stained

with borax carmine for one and half to two hours and then after dehydrating in alcohol graded series of 35%, 50%, 70%, 85%, 95% and 100%, the parasites were cleaned with xylene and mounted in Canada balsam. Collected parasites were identified by using a compound microscope (Aloo *et al*. 2004, Yamaguchi 1963, Soota 1983).

3. Results and Discussion

A total of 50 fishes (*Channa punctatus*) were collected from sewage lagoon and the hatchery to investigate the endoparasites of host fishes. Seven species of parasites were found among them three were identified to genus level. Among all of those four were trematodes, two nematodes and one acanthocephalan. In Channa punctatus four trematodes (Genarchopsis bangladensis, Allogomtiotrema attu, Phyllodistomum sp., Neopecoelina saharanpuriensis), two nematodes (Ascaridia sp., Procamallanus sp.), one acanthocephalan (Pallisentis nandai) were recovered.

In this study, the parasites were found in the different internal organs of the collected host species (Figure 1 and 2) from both sampling points. The number of parasites varied in the different organs of the hosts. Basirullah (1972) worked on some fresh water fishes of Dhaka and showed that *Encredium dacci*, *Camallanus adamsia*, *Camallanus ophicephali*, *Pallisentis* sp. were located in the intestine and *Genarchopsis* sp. in the stomach of *Channa marulius, Channa striatus, Channa punctatus, Channa gachu*. Chowdhury (1992) found all helminths except *Genarchopsis* sp. in the median region and posterior region of the intestine; a few nematodes were also found in the body cavity of their host fishes.

The prevalence of endoparasites in the host fish *Channa punctatus* was 91.30% in females and 88.88% in males, among them in sewage water fishes the prevalence was 85.71% in female and 86.66% in male and in fresh water fishes the prevalence was 100% in both the male and female fishes. The intensities of infestation in *Channa punctatus* was 6.78 in female and 6.55 in male fish collected from hatchery; and in fishes of the sewage lagoon the intensity was 3.50 in females and 1.15 in males (Table 1). The intensities varied significantly in the different water bodies. The cause of higher intensity in female fishes may be ecological habitat and sex hormones responsible for depressing the level of infestation. According Aloo *et al*. (2004) the main reason for the differences in parasitic load with sex is physiological. In the present study, it was found that the prevalence and intensity of parasites of different groups varied for water quality and sex of hosts (Table 2).

Polyanski (1961) reported that the major factors determining the fish parasite fauna as well as intensity and prevalence of infestation in aquatic environments can be summarized as being: the diet of the host, lifespan of the host, the mobility of the host throughout its life including the variety of habitats it encounters, its population density and the size attained, with large hosts providing more habitats suitable for parasites than small ones. In most cases intensity does not differ for sex in same habitat, but it is observable that intensity differs strongly for habitat. It also differs from species to species. In this study, the hosts of intermediate length and weight were found to be more infected than the hosts of smaller and larger length. One major reason is that as the fish grows, the amount of food it consumes, which includes the larval stages of the parasites, increases (Paling 1965, Mashego 1989, Davey and Gee 1976). It was observed that female fishes were more infected than the male fishes in this study.

Intestinal parasites inhibit the digestive activity of the host and indirectly inhibit vitamin and blood sugar metabolism and growth; parasites in the liver affect glycogen metabolism and growth (Rhode 1993). The intensity and the prevalence were highest in fishes of the hatchery than the sewage lagoon.

Since fish play vital role in the economy of Bangladesh, more emphasis should be given on such type of negative interactions that can cause huge damage to the fish population and more importance should be given to the water quality because the prevalence of parasites can even vary for different water bodies.

Table 1: Prevalence and intensity of infestation in the fishes of hatchery and the sewage lagoon

Sex of fish	Hatchery		Sewage lagoon	
	Prevalence (%)	Intensity (± SD)	Prevalence (%)	Intensity (± SD)
Male	100	6.55 (± 4.91)	86.66	1.15 (± 2.33)
Female	100	6.78 (± 5.54)	85.71	3.50 (± 4.01)

Table 2: Prevalence and intensity of different groups of parasites in host fishes

Name of parasites	Hatchery				Sewage lagoon			
	Prevalence (%)		Intensity		Prevalence (%)		Intensity	
	Male	Female	Male	Female	Male	Female	Male	Female
Genarchopsis bangladensis	45.45	55.55	1	1	12.50	0	1.5	0
Allogomtiotrema attu	45.45	55.55	1.8	1.5	6.25	7.14	2	2
Phyllodistomum sp.	18.18	44.44	3	1.5	0	7.14	0	2
Neopecoelina saharanpuriensis	36.36	33.33	2	2	12.50	14.28	1	1
Ascaridia sp	100	100	1.27	1.22	43.75	57.14	1.14	1.5
Procamallanus sp.	90.90	100	2.4	2.4	50	64.28	1.12	1.66
Pallisentis nandai	36.36	22.22	1.75	2	0	0	0	0

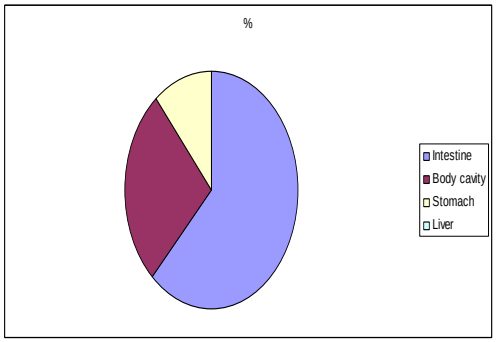

Fig.1: Parasites present in different organs of *Channa punctatus* collected from hatchery

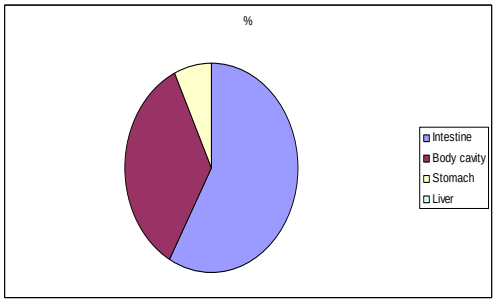

Fig.- 2. Parasites present in different organs of *Channa punctatus* collected from sewage lagoon

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