Comparative study of endo-parasitic infestation in *Channa punctatus* (Bloch, 1793) collected from Hatchery and Sewage lagoon

Md. Jobaer Alam[1], Md. Rakibuzzaman[1], Mehedi Mahmudul Hasan[2]

[1]Department of Fisheries, University of Dhaka, Dhaka-1000, Bangladesh
[2]Department of Fisheries and Marine Science, Noakhali Science and Technology University, Sonapur, Noakhali-3802, Bangladesh
Email: jobaer_alamdu@yaho.com, rakib_214@yahoo.com, mehedi_nstu@yahoo.com

Abstract: The study was conducted to collect and identify endoparasites of *Channa punctatus* (Bloch,1793) from different water bodies of varying water quality in Bangladesh and to determine the prevalence and intensity of infestation brought about by the endoparasites in the hosts. The host fishes were collected from polluted water at sewage treatment lagoon in Narayangong and fresh water at Tongi Hatchery in Gazipur, 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 polluted 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 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 parasite groups were trematodes (*Genarchopsis bangladensis, Allogomtiotrema attu, Phyllodistomum* sp., *Neopecoelina saharanpuriensis*), nematodes (*Ascaridia* sp., *Procamallanus* sp.) and Acanthocephalan (*Pallisentis nandai*). Acanthocephalans were found in the fishes collected from sewage lagoon. Liver, stomach, intestine and body cavity of the host fishes were examined for parasites. Females were more infected than the males. The intensity and the prevalence were higher in host fishes collected from hatchery than the sewage water host fishes. The hosts of intermediate length and weight group were found to be more infected than smaller and larger length groups. [Nature and Science 2010;8(5):152-156]. (ISSN: 1545-0740).

Key words: Endoparasite, *Channa punctatu*, Hatchery, Sewage Lagoon

1. Introduction

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). 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 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). Elahi (1969) studied in some endo-parasites of fresh water fishes of the family channidae in Dhaka. He described *crowcrocacum pakistanensis* from the intestine of *channa marulius*. Bashirullah (1973) listed some helminth parasites in *Channa striatus* and *Channa marulius*. Chowdhury (1992) studied on the helminth parasites infestation and

histopathological changes in snake head fishes. She described cestode *Gangesia bengalensis* from the intestine of *Channa marulius;* nematode *Camallanus ophiocephali* from the intestine of *Channa striatus* and *Spirocamallanus* sp. in the intestine of *Channa striatus;* acanthocephalan *Pallisentis nandi* from the intestine, stomach and body cavity of *Channa striatus* collected from different fish markets of Dhaka city. Nahar (1993) reported incidence of endoparasites of *Channa striatus* and *Channa marulius* from Dhaka, Bangladesh.

The aquatic environment encompasses a wide variety of biological, chemical and physical parameters, which if altered beyond acceptable limits, such as under culture conditions, may weaken the fish leading to disease outbreaks (Roberts 1989). Fish play an important role in economy of Bangladesh. Mortality of fishes occurs due to heavy infestation of parasites. For that reason the present work was undertaken to investigate the prevalence and intensity of endoparasites of the host fish *Channa punctatus* (Bloch, 1793) in two different water bodies of varying water quality.

2. Materials and methods

The host fish, *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 treatment before disposal into the river (Hasan *et al*. 2006). Before dissection length, weight and sex of each fish were recorded. Then 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 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 under compound microscope. 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 cleaned 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, the parasites were cleaned with xylene and mounted in Canada balsam. Collected parasites were identified with the help of Yamaguchi 1963 and Soota 1983.

3. Results

In the sewage lagoon the temperature varied from 20.5° to 32.3°C, pH 7.7 to 8.5, and dissolved oxygen 7.0 to 8.5 mg/l (Hasan *et al*. 2006). 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 *C. 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. The intensity and the prevalence were highest in fishes of the hatchery than the sewage lagoon. 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 medle region and posterior region of the intestine; a few nematodes were also found in the body cavity of their host fishes.

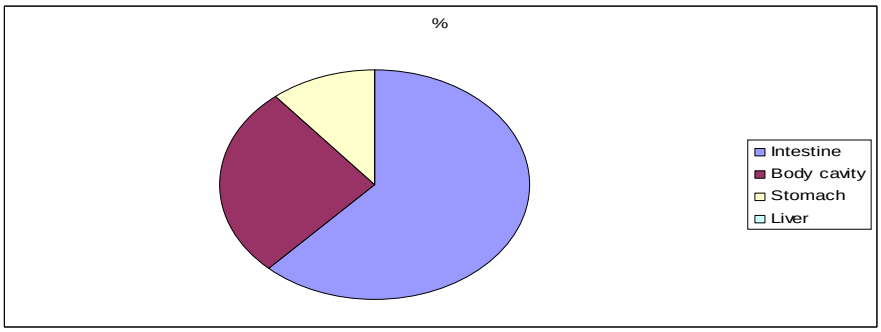

Figure 1: Parasites present in different organs of *Channa punctatus* collected from hatchery

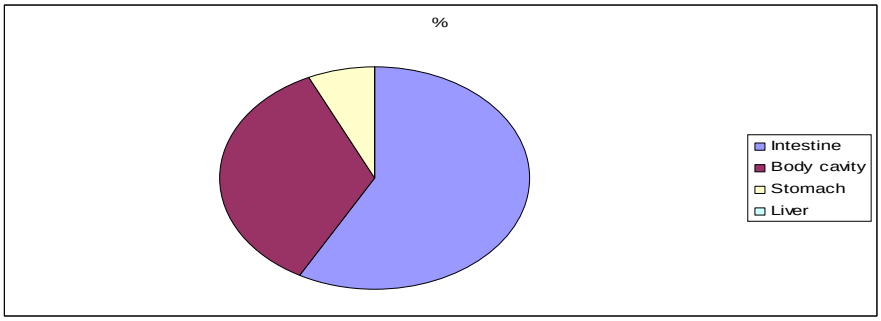

Figure 2: Parasites present in different organs of *Channa punctatus* collected from sewage lagoon

4. Discussion

The prevalence of endoparasites in the host fish *C. punctatus* was 91.30% in females and 88.88% in males, among them in polluted 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 *C. 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. It was observed that female fishes were more infected than the male fishes in this study.

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)

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).

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

5. Conclusion

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). 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). 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 also be given to the water quality because the prevalence of parasites can vary for different water bodies.

Acknowledgements

The authors are grateful to Dr. Mahmud Hasan, Chairman, Department of Fisheries, University of Dhaka and Ms. Wahida Haque, Assistant Professor, Department of Fisheries, University of Dhaka for their kind cooperation during the period of study.

Correspondence to:

Md. Jobaer Alam

Department of Fisheries

University of Dhaka

Telephone: +88-02-9661920 ext 7784

Cellular phone: + 88-01716218357

Emails: **jobaer_alamdu@yahoo.com**

6. References

[1] Ahmed, A. T. A. and Rouf, A.J.M.A. 1981. Acanthocephalan parasites of fresh water and estuarine fishes of Bangladesh. Proc. 3rd. Nat. Zool. Conf, pp 118-125.

[2] Aloo, P.A., Anam, R.O. and Mwangi, J.N. 2004. Metazoan parasites of some commercially important fish along the Kenyan Coast. Western Indian Ocean. J. Mar. Sci., 3(1): 71-78.

[3] Bashirullah, A.K.M. 1972. A brief survey of the helminth fauna of Certain marine and fresh

water fishes of Bangladesh. Bang. J. Zool,. 1 (1); 63-81.
[4] Chowdhury, A. K. 1992. Helminth parasite infestation of histopathological changes in snake-head fishes. M. Sc. Thesis. Department of Zoology, University of Dhaka, Dhaka.
[5] Davey J.T. and Gee, J.M. 1976. The occurrence of *Mytilicola intestinalis* Steuer, an intestinal copepod parasite of *Mytilus*, in the North- Southwest of England. J. Mar. Biol. Assoc. UK, 56: 85–94.
[6] Dogiel, V.A. 1964. General Parasitology, trans 1.2 Kabata. Oliver and Boyd. Edinburgh and London.
[7] Gupta, P. C. 1983. *Bifurcohaptor hemlatae* n. Sp. (Monogenea: Dactylogyridae) from a fresh water fish *Rita rita*, from Kanpur. Ind. J. Parasitol., 7(2): 233-235.
[8] Hasan, M…M., Ahmed, M.K., Hafiz, F., Hussain, A.M.I., Parveen, S. and Tinni, S.R. 2006. Load of heterotrophic and nitrifying bacteria in the sewage lagoon and the receiving river Buriganga. Bangladesh J. Microbiol., 23(2):93-97.
[9] Hoffman, G.L. 1967. Parasites of the Northern American fresh water fishes. University of California Press, Berkeley & Los Angeles.
[10] Khan, A. 1985: *Phyllodistomum ritai*, new species (Trematoda: Gorgoridae: Phyllodistominae) from a fresh water fish of Kalri lake, Sind, Pakistan. Proceeding of Parasitology, 1: 1-5.
[11] Mashego, S.N. 1989. Nematodes Parasites of *Barbus* species in Lebowa and Venda, South Africa S. Afr. J. Wild. Res., 9: 35–37.
[12] Moller, H. and Anders, K. 1986. Diseases and parasites of Marine fishes. Kiel: Moller. 365 pp.
[13] Paling, J.E. 1965. The population dynamics of the Monogenean gill parasite *Discocotyle sagittata Leuckart* on the Windermere trout, Salmo trutta L. Parasitology, 55: 67–69.
[14] Polyanski, Yu I. 1961. Zoogeography of parasites of the USSSR marine fishes. In: *Parasitology of Fishes* (English translation) (Eds. Dogiel, V.A. Petrushevskii, G.K & Polyanski, Yu I.) Edinburgh and London: Oliver and Boyd, pp. 230–246.
[15] Rahman, A. K. A. 1989: Fresh water fishes of Bangladesh. The Zooological Society of Bangladesh, pp. 189-191
[16] Rohde, K. 1993. Ecology of Marine Parasites, An Introduction to Marine Parasitology. 2nd Edition. CAB International.
[17] Roberts, R.J. 1989. Fish Pathology. Baillier and Tindall, London.
[18] Shafi, M. and Quddus, A..M..M. 1982. Bangladesh Matsha Shampad. Bangla Academy, Dhaka, pp. 198-200.
[19] Soota, T.D. 1983. Studies on nematode parasites of Indian vertebrates I. Fishes. Rec. Zool. Surv. India, Misc. Publ., Occas. Pap. No. 54.
[20] Yamaguchi, S. 1963. Systema Hellmouth. Vo-V. Acanthocephala. Interscience. Puble Inc. New York: 36-41, 96-104.

4/1/2010