International Journal of Aquatic Science
ISSN: 2008-8019
Vol 12, Issue 03, 2021

A Study On The Biochemical Parameters Of Infected And Uninfected Fishes From Pechiparai Reservior

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Abstract: Reservoirs are considered as one of the valuable sources of fish production which have a major role in the inland fish production of our country. Inland fisheries sector of Tamil Nadu has about 3.71 lakhs ha of water spread area comprising reservoirs, major irrigation and seasonal tanks and ponds, estuaries, backwaters, which are suitable for both capture and culture fisheries.Xenentodon cancila a freshwater fish of Pechiparai reseivoir, Kanya Kumari District, Tamilnadu. is severely infected with the nematode parasite Philometra pellucida. The present investigation was carried out during January, 2017 to December, 2019. A total number of 221 fishes were collected between infected and non-infected fishes. In this study, the carbohydrate, protein and lipid content were estimated from liver, intestine, testes, ovary and gills of X. cancila (infected and non-infected fishes). The infected X. cancila provided low nutrients value than those of non-infected fishes. Infection with parasites in fishes had the highest effect on liver, intestine, testes, ovary and gills.

Keywords: Carbohydrates, proteins, lipids, Xenentodon cancila

1. INTRODUCTION

Xenentodon cancila, the freshwater garfish, is a species of needlefish found in freshwater and brackish water habitats. The air-breathing teleost, being carnivorous in nature, acts as an intermediate or final host of many helminth parasites. Parasitic infection in fish results in heavy mucous secretion and discoloration and in severe cases causes high mortalities, which results in huge economic losses to fisheries. The nematodes cause damage to the hosts by depriving them of digested food and by feeding on host tissues, sera, or blood. In some cases, direct mechanical damage results from them fixing to host tissues. Among fish nematodes, *Philometrapellucida* infection has attracted considerable attention as it has been reported in various regions of the world and these nematodes exhibit a great potential for transmission and pathogenicity.

The parasites may affect its host in various ways such as utilization of host's food, destruction of host tissue, abnormal growth, mechanical inferences, biological effects, various kinds of tissue reactions as well as the effects of toxins, poisons or secretion of parasites itself. Parasite has a wide range of distribution in all groups of animals. They are often described as occupying the aquatic, terrestrial – parasitic environments, and the body of another organism Joshi *et al*. (2002). Biochemical composition of fish shows very wide

variation from one species to another. Flesh from healthy fish contains 60-84 % water, 15-24 % protein and 0.1-2% fat.

Fish contain carbohydrates, vitamin A and D, iron, calcium and other mineral salts. The nutrients in fish are more than those found in eggs and poultry meat. Protein is an essential nutrient for both maintenance and growth of fish. The nutritive values of fishes can be greatly influenced by their chemical nature of their fats and other lipid components particularly cholesterol. Proximate composition has been reported to be a good pointer of physiology needed for routine analysis of fisheries Suchuwereck *et al*. (2002). Biochemical composition of fish shows very wide variation from one species to another, within the same species in different portions of the body, from season to season, according to age, size, growth etc.

The important constituents of the fish in their order of magnitude are moisture, protein, fat, and minerals. Chiocchia and Motais(1989). Depletion of carbohydrate in the infested fish may be due the feeding of blood by the parasite, which utilize blood as a source of energy reserve. When the levels of infestation increased, the biochemical components decreased.

Lipids are storage form of energy important dietary components because of their high energy value and also because of the fat soluable Vitamins and the essential fatty acids contained in the fat of natural foods.

The decrease of cholesterol due to parasitic infestation may be due to the fact thatthe host tries to produce more of nutrients and energy, through catabolism. Hence stored energy is being utilized to withstand the stress brought in by infestation Kalogeropoulos *et al*. (2007)

Proteins are important for body building growth, repair and maintenance of body tissues. Depletion of protein in host fish may be due to the conversion of protein resources for the release of energy to withstand the wear and tear created by the parasite. Since protein is an energy reserve, mobilization of energy may be satisfied immediately through the breakdown of protein. The significant drop in the protein content, might possibly be due to utilization of protein for the development and maturation of parasite Singh and Srivastava (2010).

The biochemical parameters are an important tool of diagnosis that reveals the state of health of fish species. The present study aimed to investigate the variations in the biochemical composition of selected infected and non-infected *X.cancila* fishes, which would form a baseline data for assessment of fish health.

2. MATERIALS AND METHODS

A total of 221 fishes were collected between infected and non-infected fishes collected randomly from Pechiparai Reservoir, during the period from 2017 to 2019. Fishes were transferred to the laboratory by using small containers containing water from Dam with aeration. Fresh fishes were dissected and examined microscopically for endoparasites. The tissue of the infected fish was collected, weighed and processed for biochemical estimations using standard methods. The estimation of protein content in the host tissues was carried out by Lowry's method (1951), the glycogen estimation by the method of (Kemp,1954) and lipid estimation as per method of Frings *et al*.(1972). The tissue of non-infected fish was taken as control.

The experiments were conducted in triplicates. All the values are given as the mean ± standard error of the mean. The values of the biochemical data between the control and infected groups of fish blood were compared.

3. RESULTS AND DISCUSSION

Biochemical estimations were carried out in liver, air bladder, intestine, testes, ovary and gills of *X. cancila* (infected and non-infected fishes).The infected *X. cancila* provided low nutrients value than those of non-infected fishes.

Table 1: Estimation on the protein content of non - infected and infected fishes

Tissue (mg/g)	**Non - infected**	**Infected**
Liver	89.6 ± 1.01	65.3 ± 1.01
Intestine	83.3 ± 1.01	52 ± 1.43
Testes	77.6 ± 1.02	50.3 ± 1.01
Ovary	85 ± 1.41	55.3 ± 1.01
Gills	72 ± 1.42	50 ± 0.37

Changes in Protein content has been analysed for both infected and normal fishes in theirvarious organs like liver, Intestine, Testes, Ovary and Gills (Table 1) and it showed drastic reduction in the protein content. Inliver,89.6 ± 1.01mg / g, protein was observed in non – infected fish and it was reduced to 65.3 ± 1.01 mg / g. In intestine it was reduced from 83.3 ± 1.01 mg / g to 52 ± 1.43 mg / g. Considerable amount of protein has been found reduced in other organs like ovary, testes and gills. Ashokan *et al.* (2013) recorded a reduction in total protein in liver in the case of helminthes (*Eucreadium* : Trematoda) infecting intestine of *Labeo rohita* The difference in nutritional components between infected and non – infected fish species indicates the heavy infestation of parasites, which decreases the nutritional value such as moisture, ash, fat, protein, and carbohydrate and energy production level. Depletion of protein in host fish may be due to the conversion of protein resources for the release of energy to withstand the wear and tear created by the parasite Dorucu, (2000).

Table 2: Estimation on the carbohydrate (glycogen)content of non - infected and infected fishes

Tissue (mg/g)	Non - infected	Infected
Liver	5.5 ± 0.48	4.0 ± 0.24
Intestine	7.0 ± 0.53	4.8 ± 0.20
Testes	4.8 ± 0.42	2.9 ± 0.36
Ovary	5.5 ± 0.78	3.7 ± 0.31
Gills	4.9 ± 0.36	2.9 ± 0.31

The Carbohydrate content of liver, Intestine, testes, ovary and gills reduced in infected fishes when compared to the normal fishes. The carbohydrate content of liver was reduced to 4.0 ± 0.24mg / g from 5.5 ± 0.48 mg / g in normal fish. Reduction in carbohydrate content was noticed (Table 2) in all the oragns studied and a drastic reduction was noticed in intestine, which may be due to the weakness of intestinal absorption due to the consumption of digested food by the parasites,(Kaddumukara *et al* . 2006). It is clear from the present results that there is a great effect for the nematode parasite on the biochemical contents of fish. There is a proportional relation between the increase in intensity of infection and the decrease in the level of carbohydrate contents.

Table 3: Estimation on the lipid content of non - infected and infected fishes

Tissue (mg/g)	Non - infected	Infected
Liver	6.1 ± 0.26	3.1 ± 0.36

Intestine	5.7 ± 0.17	3.6 ± 0.42
Testes	5.2 ± 0.41	3.9 ± 0.25
Ovary	5.1 ± 0.29	3.6 ± 0.42
Gills	4.7 ± 0.17	3.1 ± 0.22

The nematode infected fish was found to inflict a drastic reduction in lipid content in liver The value mentioned in (Table 3) showed a significant decrease (6.1±0.26mg/ g) when compared to the non – infected (3.1 ± 0.36 mg / g). The lipid content of non – infected fish testes was 5.2±0.41 mg / g and that of infected testes was 3.9 ±0.25 mg/ g. The lipid content of liver, intestine and gills decreased significantly in infected fish.Lipids serve as energy reserves to meet the metabolic demand for more energy to the fishes. The Percentage of protein and lipid in gonads of uninfected Powan was significantly higher than in infected fish (Mustafa,2000). (Rehulka, 2002) observed a decline in total protein and cholesterol in *Oncorhynchus mykiss*.Reduction of lipid content may be due to the utilization of lipid by host and parasite. Cholesterol which represent the stored energy is being rapidly utilized by the host fish to withstand the stress brought by infestation.

The difference of nutritional components between infected and non-infected fish species indicates that the heavy infestation of parasites may decrease the nutritional values such as moisture, ash, fat, protein, and carbohydrate and energy production level. Sultana *et al*. (1992) studied the seasonal variation effect of helminth infestation on protein and fat contents of *X. cancila*. They reported that the values of protein and fat content in the infected fishes were consistently lower than those for the healthy ones among the cases examined, which support the present findings of fat and protein contents in infected and non-infected *C. batrachus* and *X. cancila*. The results of this particular study also is in accordance with the previous studies.Latifa *et al*. (2005) reported higher moisture and protein contents in the juvenile of *Tilapia nilotica* than the adults, while fat value was higher in the adults.A total number of 221 *Xenentodon cancila* were collected randomly from the Pechiparai reservoir during the period of 2017 to 2019. *Philometra pellucida* infection have been detected in the liver, air bladder, intestine, testes, ovary and gills of the infected fish. Total protein, lipid and carbohydrates have been quantified using biochemical test. The obtained results showed that the total muscle protein of fish and total carbohydrates of bothintestine and liver decreased significantly in infected fish. This decrease may be due to the ability weakness of the intestinal absorption due to the consumption of digested food by the parasite.

This study reveals that the population of parasite burden and infestation rate in combination, reduces the carbohydrate, protein and lipid content of infected and non-infected

fishes. The nematode infestation can affect the nutritional quality of fish there by decreases the food value and marketability of fish.

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