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## Parasitic infestation on different regions of *Tilapia mossambica* collected from Kayamkulam Estuary, Kerala

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### Abstract

The present study reports parasitic infestation on different regions of *Tilapia mossambica*, an economically important food fish from Kayamkulam estuary, a shallow brackish water lagoon for a period of one year from November 2014 – October 2015. A total of 240 host fishes were examined, of which 36 hosts were found to be infected. 8 species of parasites were collected, comprising of *Ergasilus sp.*, *Dermoergasilus hoi*, *Caligus longipedis*, *Cystoopsis*, Tantulocardian, Metacercaria, *Argulus sp.* and *Lepeophtheirus sp.* The parasitological terms like prevalence and mean abundance were calculated to determine the abundance of parasitic species. The prevalence of parasitic infestation was 15% and the mean abundance of parasites was 1.07. The highest infestation were observed in the gills and lowest infestation in the intestine. Gills are the favorite site for the attachment of many fish parasites. The ecto parasites dominate the parasitic community and majority of parasites were seen on the gills of the host fish. Parasitic diseases in fishes seriously limit aquaculture production and its economic viability.

**Keywords:** Infestation, Kayamkulam, Mean abundance, Parasites, Prevalence

### Introduction

Parasites are a unique group of organisms which adapt to a parasitic way of life. These organisms associate temporarily or permanently with different species of animals and plants. Like humans and other animals, fish suffer from diseases and parasites. Fish parasites form a vital part of biotic communities within the aquatic systems. They have to be considered as an important determinant in ecosystem functioning by directly affecting specific physiological host function, thus altering host population dynamics and influencing community structure [9]. Parasites also can be used as biological tags in population studies. A lot of parasites cause severe physiological disturbances and pathological conditions in the host fishes [16]. Some parasites can severely stress fish populations to the point becoming biological and economical concern.

The various fishery development programmes depends to certain extent on the successful fish parasitological research, as the improvement of fish yield can mainly be achieved from healthy fish stock. As host fishes play an important role for parasites. Among the animals, fishes are the most important host for maintenance of many parasites. Most of the fishes have parasites. They not only serve as the host of different parasites but also serves as carrier of many larval parasitic forms that mature and cause serious diseases in many vertebrates including man. The parasites of fishes cause decrease in growth rate, weight loss and emaciation, affect yield of fish products (liver oil), spread human and animal diseases, delayed sexual maturity of fish and mortalities of fish [3]. The parasites which are found infecting the fishes comprised of protozoa, helminthes, monogenea, digenea, cestodes, acanthocephalan, nematode and crustacea. These parasites can be found on the skin, gills, operculum, tail and internal organs of the host fish [2].

Many physical, chemical and biological factors influence the increase and decrease of parasitic population. According to Rohde [14] older fish being larger in size offers more spacious microhabitat to parasites. Fishes generally harbor more parasites in summer and early autumn than in winter and spring. The fishes were found to be more susceptible to cestode infection during winter than drier season [7]. The prevalence of fish parasite is closely related to ecological conditions of the freshwater.

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The significance of water temperature is a common causative factor in sustaining ecological interaction in the host- parasite system. The annual temperature fluctuation in river water results in a marked influence on trematode population [9].

*Tilapia mossambica* is an economically important food fish from the Cichlidae family. *Tilapia mossambica*, which is originated from Africa, has become one of the major cultured fish in the world after carp fish [5]. This is because tilapia has the ability to tolerate a wide range of environmental conditions, allowing them to be introduced and distributed to many countries outside of Africa [10].

The present study was carried out to reveal the degree of parasitic infestation on different regions of *Tilapia mossambica*, an exotic fish collected from the Kayamkulam backwater, Kerala, India

**Materials and Methods**

The area selected for the present study was Kochiyde jetty region of Kayamkulam backwater, a shallow brackish water lagoon. Kayamkulam backwater lies between latitudes 9° 2' N and 9° 16' N and longitudes 76° 25' E and 76° 32' E. The backwater occupies area in both Alapuzha district and Kollam of the total 1, 652, 33 hectares. It has got connection with the Arabian sea by Vallivathukkal Tura, a pozhil separates the lake from sea by forming sand bar for three months in pre monsoon.

The host fishes selected for the study was *Tilapia mossambica*, an exotic fish. The fishes were obtained freshly from local fishermen within the study area. 240 fishes were studied for parasites. Each fish was examined microscopically for the presence of parasites. Identification of parasites were carried out by standard keys. The observed parasites were compared with the keys of freshwater parasites pictorial guide by Deborah *et al* [4]. The parasites were collected, recorded and counted. After analysis collected parasites were fixed in 4% neutral formalin and preserved in 70% ethanol. For statistical analysis prevalence and mean abundance were calculated.

Prevalence: Prevalence is the number of individuals of the hosts infected with particular parasites species or with total parasites divided by the number of hosts examined. Prevalence is expressed in terms of percentage (%).

$$\text{Prevalance} = \frac{\text{Number of infested fish}}{\text{Total no. of fishes examined}} \times 100$$

Mean Abundance: Mean abundance is the total number of individuals of a particular parasite species in a sample of particular host species divided by the total number of hosts of that species examined.

$$\text{Abundance} = \frac{\text{Total number of parasites}}{\text{Total number of fishes examined}}$$

**Results and Discussion**

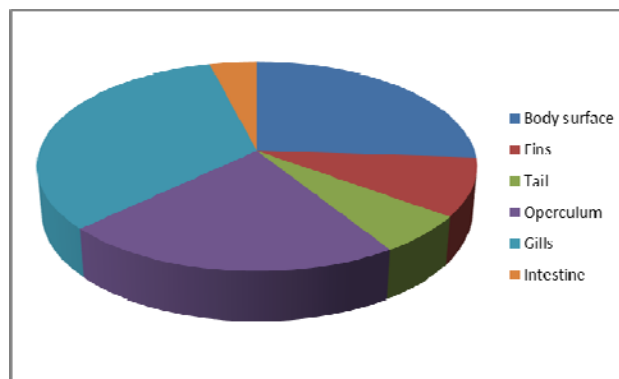
During the study, 240 host fishes from the Kayamkulam estuary were investigated for the presence of parasites and its occurrence on different body regions of the host fishes. Parasites were collected from the body surface, fins, tail, operculum, gills and intestine of the fish. Total 240 host fishes were examined, out of which 36 hosts were found to be infected. 8 species of parasites were collected comprising

*Ergasilus sps*, *Dermoergasilus hoi*, *Caligus longipedis*, Cystoopsis, Tantulocardian, Metacercaria, *Argulus sp.* and *Lepeophtheirus sp.* The highest infestation or higher percentage of parasites were observed on the gill (33%) and the lowest infestation of parasites were noted in the intestine (4%) (Table I and Figure I). The parasitic fauna was dominated with ecto parasites, in contrast to few endo parasites. The study showed that endo parasites were fewer in number than the ecto parasites. The gills of fishes provide suitable home for the attachment and survival of parasites. Maximum number of parasites were collected from the gills of host fish and considerable reduction in the respiratory surface area was noted. Gills were the favorite attachment site for copepod parasites like *ergasilus*, *dermoergasilus* and *caligus*.

The parameters like prevalence and mean abundance were noted. The prevalence of infestation was 15% and the mean abundance recorded was 1.07 (Table II). The regular examination of fishes were showed that the parasitic infestation was low during the study. A total of 257 parasites comprising 8 species were collected from the different regions of host fish.

**Table I:** showing the percentage of parasites on different regions of *Tilapia mossambica*

Site of occurrence	Percentage of parasites (%)
Body surface	26
Fins	9
Tail	6
Operculum	22
Gills	33
Intestine	4



**Fig 1:** Distribution of parasites on different regions of *Tilapia mossambica*

**Table II:** showing prevalence, mean abundance and mean intensity

Prevalence	15
Mean Abundance	1.07

Copepod parasites are common on fish hosts in marine and brackish water. The gills are a favorite site for the attachment of several parasitic copepods. They damage the gills by feeding on the delicate tissue of the gill lamellae or on the blood circulating within the lamellae, leading to the loss of respiratory surface area [11]. According to Vinoth *et al.*, 2010 copepod infestation can results in serious loss and damage of gill arches and reduces the respiratory surface area and causes respiratory disturbances in host fishes This findings agrees with the results of the present study. Copepods feed by browsing on fish gill epithelium or by ingesting blood from ruptured blood vessels [17].

Shivali *et al* <sup>[15]</sup> studied the histology of gills of *Labeo rohita* and *Hypophthalmichthys molitrix* infested by monogenean and copepod parasites and revealed that gills are the primary organ which directly reflects the water pollution, contamination and disease causing factors <sup>[15]</sup> which also agrees with the results of this work. The subject of organ specificity among fish parasites has been studied by various researchers. Site specificity of parasites may be due wholly or partly to physiological factors. In other cases, morphological adaptations are at least partly responsible for site preference <sup>[14]</sup>.

Most parasites reported in the present study were also reported by Amina *et al* <sup>(1)</sup>. Eight species of parasites were isolated and most of them are collected from the gill of the host fish and majority were ectoparasites.

### Conclusion

In conclusion, 8 species of parasites were recorded from the exotic fish, *Tilapia mossambica*. The ectoparasites were dominate over the endoparasites. The highest degree of infestation was observed on the gill of the fish and lowest degree of infestation was on the intestine. The parasitological terms like prevalence (15) and mean abundance (1.07) were calculated. *Tilapia mossambica* is an important food fish and the most widely distributed of tilapias. Several people in Kerala depend on fish for their livelihood. The Kayamkulam backwater directly serves as the means of livelihood of thousands of fishermen. Kayamkulam backwater supports a very good fishery of many of the endemic fish species. But in recent years most of these species are in the verge of extinction due to environmental pollution and other anthropogenic activities. The polluted environment favoured the growth of a large number of parasites and it decreases fish growth and at many times it become detrimental.

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