

**PREVALENCE AND MORPHOLOGICAL IDENTIFICATION OF *LERNAEA* SPECIES
IN (*Hypophthalmichthys molitrix*), IN FISH PONDS OF DISTRICT CHARSADDA KPK
PAKISTAN.**

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ABSTRACT:

A consistent increase in the demand for fish meat in the market is the key to gaining high interest from researchers in the field of aquaculture. For this purpose, this study was carried out in district Charsadda Khyber-Pakhtunkhwa Pakistan which is one of the known agricultural lands of the province and covered by three different rivers that is river Jindi, river Kabul, and river Swat, due to such enrichment of freshwater basin we investigated the prevalence and morphological identification of lernaeid parasites of (*Hypophthalmichthys molitrix*) specie. Which is high mortality-causing parasites in fish species especially in juveniles. During our study based on morphological characteristics, we identified

four different species of lernaeid parasites which includes *L. cyprinacea* with the highest prevalence percentage (42%). followed by *L. palyrnorpha* with a prevalence percentage of (22%) *L. lophiara* with a prevalence percentage of (14%) and the less prevailed *lernaea* parasite reported in our study *L. arcuata* with a prevalence percentage of (11%).

Keywords: Aquaculture, Prevalence, Mortality, anti-parasitic, Lernaeid, Infestation, catastrophic diseases.

1. INTRODUCTION:

Pakistan has considerable fisheries resources, including offshore and coastal fisheries, and there is also potential for industrial fisheries (Nazir *et al.*, 2018). With the ever-increasing demand for lower-cost protein sources, fish is

receiving more and more attention as a result the fish must be free of all forms of diseases and parasites in order to produce healthy and high-quality fish meat (Bash *et al.*, 2001). Parasites, one of the main detrimental factors, having ability to cause serious damage to the fish and a heavy loss to aquaculture (Chiary *et al.*, 2014). Fishes are not an exception for having parasites; almost every living organism is having at least one parasite or one species of parasite (Dobson *et al.*, 2008). The Lernaeidae family of crustacean parasites is found in freshwater and marine fish all over the world, Lernaeids are classified into 14 genera and having round about 110 species (Ho., 1998). Parasitic crustaceans are increasingly becoming serious problems in both cultured and wild fish populations (Yanong *et al.*, 2002). The crustacean copepods are invariably ectoparasites usually blood feeders on the gills, fins and skin of the host and causing serious pathogenic effect (Laster & Hayward., 2006). *Lernaea* sp. has been reported to cause significant losses to fish farmers in many countries (Rogers., 1979). It causes lernaeciosis, a disease that has major pathogenic consequences for its hosts. (Hua *et al.*, 2019). Among Lernaeidae, *Lernaea cyprinacea* is the most prevailed and dangerous than other sister species (Bilal *et al.*, 2021). *Lernaea cyprinacea* is a parasitic

copepod that infects a variety of freshwater fish species. Outbreaks of these ectoparasite infestations could result in widespread mortality of parasitized fish. *L. cyprinacea* is primarily found in pelagic species. Small benthic fish species have fewer records (Ahnelt., 2018). Studies on *Lernaea* anchors were conducted decades ago, and they are a useful tool for classifying *Lernaea* species. However, it is not suitable to entirely rely on the anchors during the classification of these ectoparasites (Hua *et al.*, 2019). According to an analysis, this parasite originated in Asia and moved over the world by the movement of farmed species by clinging to anchors (Innal & Avenant., 2012). This parasite has now been recorded in Eastern Australia, Asia, Southern Africa, and Europe, among other places (Hoffman., 2019). Lernaeid copepods are among the most dangerous parasites of freshwater fish, particularly juvenile fish, which can be killed by a single infection (Kabata., 1985). The parasites assault, producing vast destruction and catastrophic diseases in fish, eventually leading to extinction, as well as being damaging to human health after intake (through the food chain). The goal of this study was to find out how common ectoparasites are in fish fingerlings from the

Cyprinidae family, which have a high market value in Pakistan (Habib *et al.*, 2019).

2. MATERIAL AND METHOD:

2.1. Study area

In the present survey, we examined 80 fishes (*Hypophthalmichthys molitrix*) in different fishponds in the district of Charsadda, Khyber-Pakhtunkhwa Pakistan. The selected district lies between 34.1682° N latitude and 71.7504° E longitude with a total area of 996 km² map is given in Fig 1.



Figure 1: Map of Charsadda Khyber-Pakhtunkhwa Pakistan.

2.2. Fish collection and processing

Fish samples were brought from different ponds and rivers to the laboratory department of zoology, Bacha Khan university Charsadda. their morphometric analysis was done by taking total length [TL], fork length [FL], standard length [SL], anal length [AL], preorbital length [POL], postorbital length [POL], head length [HL] and body depth [BD] while using digital scale the samples

were weighted. *Lernaea* parasites were removed with the help of fine forceps and preserved in 5% formalin (Tasawar *et al.*, 2009). For morphological studies of lernaea parasites, permanent mounts were made (Cable., 1977).

3. RESULTS AND DISCUSSIONS:

3.1. Lernaeid Parasites of (*Hypophthalmichthys molitrix*)

During our study, we investigated 80 fish samples of (*Hypophthalmichthys molitrix*) brought from different ponds and rivers of district Charsadda Khyber-Pakhtunkhwa Pakistan in oxygenated bags, out of which 59 fish samples were infested by different lernaeid parasites after morphological studies under microscope identification process has been done by using the key (Kabata., 1985). During morphological studies, we identified four Lernaeid species which include, *L. cyprinacea* (prevalence 27.5 %) *L. palyrnorpha* (prevalence 21.2 %) *L. lophiara* (prevalence 17.5%) *L. arcuata* (prevalence 11.2%) Different species of the genus *Lernaea* have also been reported from different parts of the world (Berry *et al.*, 1991). Investigation of the prevalence of copepod ectoparasites on 332 species of freshwater fishes, finding 110 species of Lernaeid copepods and 14 Lernaeid genera

(Ho., 1998). Despite the fact that significant work has been done in numerous parts of the world, including Pakistan (Bjorn *et al.*, 2006). *L. polymorpha*, *L. cyprinacea*, *L. oryzophila*, and *Lernaea spp.* four *Lernaea* species were found by (Tasawar *et al.*, 2009) in Multan Khyber-Pakhtunkhwa Pakistan. *L. cyprinacea* infestation was observed by (Tufail *et al.*, 2017) in Pattoki, Pakistan. The total numbers of each lernaeid species is given in table 1 which are reported in our study. The prevalence percentage of each *Lernaeid* species reported during our investigation has been calculated by equation 1. The prevalence percentage of each species is given in table 1. And microscopic observation of the parasite and its host is given in figure 3.

Prevalence

$$= \frac{\text{number of infested fishes}}{\text{number of fishes examined}} \times 100\% \quad (1)$$

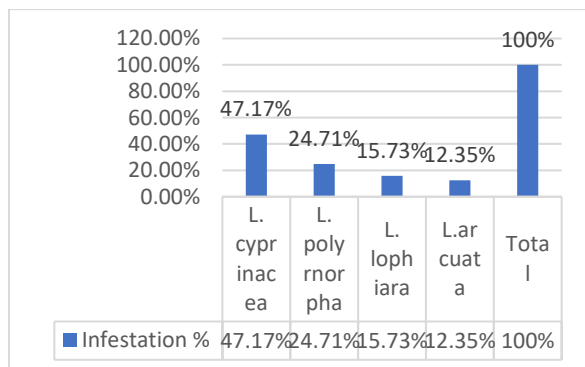


Figure 2: Prevalence percentage of *lernaea* species.

Table 1: Prevalence percentage of *lernaea* species.

Lernaea species	No of fish samples	No of fish infested	No of parasite recovered	Infestation %
<i>L. cyprinacea</i>	80	22	42	47.17%
<i>L. polymorpha</i>	80	17	22	24.71%
<i>L. lophiara</i>	80	11	14	15.73%
<i>L. arcuata</i>	80	09	11	12.35%
Total	80	59	89	100%



Figure 3: (a) fish infested by lernaeid parasites, (b) observation of *L. cyprinacea* under microscope.

4. CONCLUSION:

From the above data, it is concluded that *Hypophthalmichthys molitrix* of the district Charsadda is vulnerable to *lernaea* species, among the reported lernaeid parasites, *L. cyprinacea* prevailed with the highest percentage (42%) followed by *L. palyrnorpha* (22%) and less prevailed species was *L. arcuata* (11%). And as a whole percentage calculation of lernaeid parasites recorded 73.75 percent out of 100 percent which is very high and remarkable and known that *lernaea* species are mortality causing agent so the department of fisheries district Charsadda, should provide anti-parasitic chemicals to fish ponds owner to prevent economical loss in aquaculture and to produce better fish and their healthy meat to market.

5. CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

6. ACKNOWLEDGEMENT

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7. AUTHOR CONTRIBUTIONS:

AK presents the idea, IU supervised and wrote the manuscript, and the rest of the authors helped with lab work.

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