

ANCHOR WORMS (LERNAEID PARASITES), *LERNAEA POLYMORPHA* YÜ AND *LERNAEA CYPRINACEA* L (COPEPODE : LERNAEIDAE) ON MAJOR CARPS AT DIFFERENT FISH FARMS IN PUNJAB, PAKISTAN

Sadar Aslam^{1*}, Sumaira Abbas², Muhsan Ali Kalhor³, Ahmad Shoaib⁴

^{1,2,4}Department of Fisheries and Aquaculture, University of Veterinary and Animal Sciences, Ravi Campus, Pattoki, Pakistan

³Faculty of Marine Sciences, Lasbela University of Agriculture Water and Marine Sciences, Uthal District, Lasbela Balochistan, Pakistan

*For correspondence: Sadar Aslam' Email: sadaraslam@gmail.com

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ABSTRACT : Development of ecofriendly environment free of parasites is very necessary for the best growth performance is very important step in the field of fisheries and aquaculture. A questionnaire was used to identify the number of the genus *Lernaea* present on major carps (local species of Pakistan) Rohu, *Labeo rohita* (Hamilton, 1822) *Morri*, *Cirrhinus mrigala* (Hamilton 1822), *Thaila*, *Catla catla* (Hamilton, 1822) and lernaeid ectoparasitic identification at different fish farms of the Punjab. *Catla catla* showed more prevalent to infestation than other species. In this study two species of *Lernaeid* ectoparasites i.e. *Lernaea polymorpha* and *Lernaea cyprinacea* were observed at different fish farms of Punjab. *L. polymorpha* was more prevalent specie. It is observed that the lernaeid ectoparasitic infections were associated with host body weight. The parasitic infestation increased as the body weight of the host fish increased. Physico-chemical parameters were saved for parasitic growth and fish survival However it is observed that the parasitic growth increase with increase in water temperature.

Keywords: Body weight, *Lernaea cyprinacea*, *Lernaea polymorpha*, Major carps, Prevalence

1. INTRODUCTION

Major carps are reared under semi-intensive culture conditions in earthen ponds in the province of Punjab Pakistan. Use of organic manure, inorganic fertilizers and addition of supplementary feed in fish ponds is a common practice to grow fish [6].

Copepoda are major groups of Crustacea that contain fish parasites [10] which include lernaeid parasites. The majority of the cyclopid family Lernaeidae have undergone extensive morphological adaptations hiding their close affinity with the genus *Cyclops* a well-known live-food. *Lernaea* species are globally distributed and common pests in freshwater fish particularly of cyprinids and other fishes. In central Europe, the numbers of *Lernaea* have recently declined and in North America, *Lernaea* species infect a number of cultured freshwater fishes [12].

L. cyprinacea Linnaeus (Copepoda, Lernaeidae), the anchor worm, is an ectoparasitic copepod that generally infects the gills and skin of various freshwater fishes. The species of *Lernaea* has nine stages in the life cycle, including three free-living naupliar stages, five copepodid stages, and one adult stage. A male and female adult's mate on the fish host, copulation occurs during the fourth copepodid stage. When the copulation was realized the male's presumably dying while the females metamorphose and insert the anterior region of the body into the host tissue and then produce eggs [9]. The adult females of the genus *Lernaea* exhibit an extreme modification of the cephalothorax. The mouth parts of the adult female are severely reduced, the body is elongate and vermiform, and the head is modified into four horn-shaped appendages, which are somewhat long and slender; the two outer or posterior ones are bifurcated and the anterior one is simple. The horns are used for attachment to the host and are buried beneath the epidermis. The abdomen is short and is bent dorsally. The genital pore is located at or near the posterior extremity and the egg sacs project well beyond the body. Only the adult female lernaeids are parasitic, whereas the males and immature forms of both sexes are free living. *L. cyprinacea* is capable of massive attacking, with high

pathogenicity and mortality, mainly during the summer season. Besides the effects of penetration, hemorrhages and ulcerations are also caused [3]. The most dangerous consequence of an intensive attack results in blood loss, intense lymphocytopenia, neutrophilia, increase of monocytes and secondary infections [14]. The disease is accompanied by marked emaciation and loss of weight. The index of mortality is high [8]. The risk of parasite pathogenicity depends on the affected organ, parasitism intensity, environmental conditions and concomitant infections, among other factors [13].

Lernaea polymorpha aggregate around the eye and causes destruction of the lens and can cause severe fin damage. Serious pathology of fish under crowded culture conditions can be caused by female *Lernaea* spp. that is highly metamorphosed vermiform ecto-parasites. Its head is equipped with antlers, the rest of the body and the egg sacs protrude into the water [12]. As a rule, *Lernaea* have been the cause of great economic losses of fish in many parts of the world. The adults of *L. cyprinacea* leave large holes with round openings in the muscle and skin allow the entrance of secondary microbial infections causing death of the fish [1].

The present study was aimed to find out the prevalence of *Lernaea*, its species identification on major carps at different fish farms of Punjab through survey analysis by the department of Fisheries and Aquaculture, Ravi Campus, Pattoki.

2. MATERIALS & METHODS

2.1 Model:

Fish; *Labeo rohita*, *Cirrhinus mrigala*, *Catla catla* (local species) were used as survey analyzing models.

2.2 Study Area:

The area of this study comprised of different fish farms in Punjab. All the fish farms of Punjab are not accessible because of restricted time. So the researcher selected a few fish farms in Punjab.

2.3 Instrument of Research:

A Questionnaire comprising of 16 questions were used as a tool of research for survey (3 months) at fish farms of Punjab regarding fish parasite *Lernaea* (2011) Research Project of

Table 1: Prevalence of Lernaeid parasite on major carps at fish farms of Punjab province

| Name of Fish farm | City | Parasite Specie | Affected fish/ total sample no. | | | Infested areas |
|-----------------------------------|---------------------------|--|---------------------------------|--------------------------|--------------------|-----------------------------|
| | | | <i>Labeo rohita</i> | <i>Cirrhinus mrigala</i> | <i>Catla catla</i> | |
| Fish nursery unit | Farooq Abaad | <i>L. cyprinacea</i> , <i>L. polymorpha</i> | 2/10 | 1/10 | 3/10 | Gills, skin, eye lens, fins |
| Ghandha Singh Nursery Unit | Kasur | <i>L. cyprinacea</i> , <i>L. polymorpha</i> | 0/10 | 2/10 | 2/10 | Gills, skin, eyes, fins |
| Fish nursery unit | Thatta Chilwa, Gujranwala | <i>L. polymorpha</i> | 1/10 | 3/10 | 4/10 | Eye lens, fins |
| Fish nursery unit | Chenawan | <i>L. polymorpha</i> | 0/10 | 0/10 | 2/10 | Eye lens, fins |
| Super Fish Seed Nursery (Private) | Chenawan | <i>L. cyprinacea</i> , <i>L. polymorpha</i> | 1/10 | 2/10 | 3/10 | Gills, skin, eyes, fins |

Table 2: Prevalence of *L. cyprinacea* and *L. polymorpha* in major carps with relation to body weight at different fish farms in Punjab, Average intensity: (+) = ≤ 3, (++) = 4 - 7, (+++) = ≥ 8.

| Name of Fish farm | City | Avg. Wt. (gm) | | | Intensity of parasitism |
|-----------------------------------|---------------------------|------------------|-------------------|-----------------|-------------------------|
| | | <i>L. rohita</i> | <i>C. mrigala</i> | <i>C. catla</i> | |
| Fish nursery unit | Farooq Abaad | 100 | 500 | 200 | + |
| Ghandha Singh Nursery Unit | Kasur | 1500 | 2000 | 120 | ++ |
| Fish nursery unit | Thatta Chilwa, Gujranwala | 100 | 200 | 200 | + |
| Fish nursery unit | Chenawan | 1500 | 2000 | 3000 | +++ |
| Super Fish Seed Nursery (Private) | Chenawan | 1000 | 120 | 1500 | ++ |

Table 3: Physico-Chemical Parameters at different fish farms during survey

| Fish farm | Air Temperature(°C) | Water Temperature (°C) | PH | DO (ppm) | Conductivity (µS/cm) | Salinity (g/L) | TDS (mg/L) |
|-----------------------------------|---------------------|------------------------|--------------|--------------|----------------------|----------------|--------------|
| Fish nursery unit | 30 | 28.2 | 7.61 | 4.25 | 0.416 | 0.5 | 245 |
| Ghandha Singh Nursery Unit | 30 | 27.2 | 6.85 | 4.01 | 0.453 | 0.5 | 271 |
| Fish nursery unit | 30 | 27.9 | 7.06 | 3.1 | 0.796 | 0.6 | 484 |
| Fish nursery unit | 30 | 28.7 | 7.32 | 4.5 | 0.378 | 0.4 | 228 |
| Super Fish Seed Nursery (Private) | 30 | 28.5 | 7.79 | 4.6 | 0.828 | 0.6 | 501 |
| Mean | 30 | 28.1 | 7.326 | 4.092 | 0.5742 | 0.52 | 345.8 |

the University of Veterinary and Animal Sciences, Ravi Campus, Pattoki.

2.4 Physico-chemical parameters

Various physical and chemical water quality parameters of fish ponds such as water temperature (°C), Air temperature (°C), dissolved oxygen (mg L⁻¹), pH, Electric Conductivity (µS/cm), TDS (mg/L) and salinity (g/L) were checked at daytime during the survey. Water temperature was recorded with a Celsius digital temperature meter. Dissolved oxygen was measured directly with a DO meter (Oxi 3205, Germany) and a portable digital pH meter was used to measure pH. TDS, Salinity and Conductivity were measured by a digital combine electric meter (Model LF 900, WTW).

Data Analysis:

The results were analyzed in a semi quantitative form, considering them as follows: +++ if the host had 8 or more parasites, ++ if the host had 4-7 parasites and + if the host has 1-3 parasites [13].

3. RRESULTS

In the areas studied, *L. polymorpha* infected more than *L. cyprinacea* (Table 1). *L. cyprinacea*, showed severe physical damage to fish where they caused ulcers and hemorrhages at the site of penetration. The parasites were found on various parts of the hosts' body surface and appeared as a small worm-like protrusions. It seems to show a preference for a particular body area for attachment; but the most heavily infected locations were found behind the gills, skin and the base of the pectoral fins. The lesions found were similar in all fish species. While the *L. polymorpha* seem to show

preference around the eye, caused destruction of the lens and severe fin damage. Moreover, In Major carps, *Catla catla* showed more prevalence to Lernaied parasite than other two fish species.

The prevalence of parasite increased with increase in body weight of fish (Table 2) and temperature with the summer season. The results were analyzed in a semi quantitate form, considering them as follows: +++ if the host had 8 or more parasites, ++ if the host had 4-7 parasites and + if the host has 1-3 parasites.

The mean values of air temperature (°C), water temperature (°C), PH, DO (ppm), Conductivity (µS/cm), Salinity (g/L), TDS (mg/L) were 30, 28.1, 7.326, 4.092, 0.5742, 0.52, 345.8 respectively (Table 3).

4. DISCUSSION

In view of the importance of good farm management and hygienic measures, we tried to find out the prevalence of Lernaied parasite in disease outbreaks at different fish farms of the Punjab province.

L. polymorpha showed more prevalence than the *L. cyprinacea*. It may be due to the fact that *L. cyprinacea* is more site and host specific than *L. polymorpha* while the *L. polymorpha* is facultative in nature [4]. In major fishes the *Catla catla* showed more susceptible of Lernaied parasites than the other fishes in the same habitat. *Catla catla* is column feeder and is more exposed to the developmental stages of parasites which are found at or near the bottom where temperature is relatively low as compared to upper surface. These results are in agreement with previous findings [16, 17].

The prevalence of parasite increased with increase in body weight of fish. It may relate to the greater surface area on which these Lernaied parasites can become established in the confined host and small fish are seldom infested [17]. According to this investigation, the minimum numbers of parasites were found on the smallest fish because of the small size of scales where parasites cannot maintain their proper hold onto the body of fish. These results are in agreement with previous findings [5, 15, 16].

The survey revealed the prevalence of parasite increased with increase in temperature with summer season. The prevalence of Lernaied species depends on water temperature, as the life cycle of most species of Lernaia is completed in 100 days at 14 °C and in 7-13 days at 28 °C, but the optimum temperature lies between 23 °C and 30°C. Temperature is considered of great significance, prevalence, abundance and medium intensity of parasites had a higher seasonal occurrence during warm months [7]. The prevalence and intensity of infestation reduced with decreasing water temperature and increased with increasing water temperature in summer season [11]. The relation between water temperature and prevalence of Lernaied parasites is in agreement with previous findings [12, 13].

The physico-chemical parameters of the fish farms were suitable for parasites growth and fish survival revealed the fact that the fishes may have high tolerance and resistance to the Lernaied infestation. These results are in agreement with [2]. It might be concluded that the environment at fish farms is suitable for fish farming activities.

5. CONCLUSION

The present study revealed the importance of the prevalence of Lernaied infestations is associated with fish body weight and it's Habitat, specie of parasite present in the ecosystem, water quality parameters and season variations. More studies on host parasite need to be investigated. These parasites have devastating impacts on fisheries. Although the infected fish are generally considered safe to eat but heavily infested might be used for anglers in touristic and recreational activities.

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