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Damaging effects of different Ectoparasites with comparison on the Carp fish (*Cyprinus Carpio*) of Hatchery Badin Sindh-Pakistan

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Abstract:

Fishes are often found infected by a wide variety of Ectoparasites. They can be parasitized by protozoan, termatodes, nematodes, cestodes acanthocephalans and crustaceans. Carp or Gulfam fishes are omnivorous, with a high consumption of benthic

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organisms, such as water insects, larvae of insects, worms, molluscs, and zooplankton. A total of 263 fish specimens belonging to 10 fish species with highest Gulfam fish (Cyprinus carpio) in numbers were found during the study period from August 2012 to July 2013. The Ectoparasites including Argulus, Leaches, and Lernaea damaged the fish skins, gills and fins, with (66.6%) highest infection rate in Gulfam (C. carpio), (50%) in Rohu (Lebeo rohita), and (11.7%) infection rate found in Morakhi (Cirrhinus mrigala). The results revealed that out of 263 examined fish specimens, 47 (17.9% of the total sample) fishes were found to be infected by both Argulus and Leaches kinds of parasites. The results further observed that the highest infection 47.1% was observed in the month of October with second infection 32% in the month of July, and no any fish was infected in the month of May. Further the present study depicted that females were infected more by parasites with 61.7% as compared to male fishes (25. 5%) and unsexed fishes (12.8%), respectively.

Key words: Carp or Gulfam fishes (Cyprinus carpio), Ectoparasites, Argulus, Leaches, Lernaea, damaging effects, Badin-Sindh-Pakistan

INTRODUCTION

Fishes are the organisms that represent one of the main inhabitants of the aquatic systems, and are widely exposed to MCYSTS by both directly and passively, leading them to subsequent mortality (Carbis et al. 1996; Ernst 2008). At most, fishes typically either ingest cyanobacteria or prey that has already fed on cyanobacteria (Tencalla et al. 1994; Fisher and Dietrich 2000). To a few extents, fishes can also absorb the toxins directly from the water (Phillips et al. 1985; Smith et al. 2008). The common carp [*Cyprinus carpio* Linnaeus (1758)] locally called as Gulfam, is a commercial carp and presumably known as a group spawner fish and has been one of the oldest domesticated species of fish used for food (Memon and Sheikh

2003). According to the FAO statistics of 2004 (Peteri 2006), production of farmed common carp was ca. 13% (3,387,918 tonnes) of the total global freshwater aquaculture production.

Historically, Carps are very versatile and are found in Europe, Asia and the Middle East, however, in North America, Canada and Australia, carps are considered a significant pest. Characteristically, Carp are large, shiny, and scatting scales, and are strongly recommended for domestic culture due to omnivorous habit and breed available all over the year in confined water. Its body is deeply and moderately compressed by laterally, head short and depressed protractile mouth with smooth lips, feeds on larvae of insects, mollusks, worms and shoots of submerged weed, attains a maximum size of 75 cm and 6.5 kg Weight. Carps can be parasitized by protozoan trematodes, nematodes, cestodes, acanthocephalans and crustaceans. The presence of Crustacean and leech Ectoparasites, population on Carp fishes causes its high infestation such as high mortality, weight loss and reduced fecundity rate. However, parasites do not cause health problem in cooked fish being eating raw fish may cause stomach pain and vomiting (Ruize 1991). The number of studies has been conducted on infection rate of fishes by Ectoparasites (Campbell et al. 1980) around the globe such as, Garrey and Maxwell, 1982; McKinnon and Featherston, 1982; Prukhin, 1985; Margolis and Kabata, 1989; Pinnegar et al. 2001; Coyner et al. 2002, 2003. During its life span fish parasites may pass through one or more intermediate hosts, and often a final avian or mammalian host (Moles 2007). Parasites are known to be used as potential indicators for an environmental quality and they usually respond in number of ways to anthropogenic pollution. For fishes, parasites are known to cause none or limited pathological changes in the wild fish but in cultured fishes they may become as pathogenic. Although mollusks are believed as sentinel organisms to monitor the concentration of bio metals in

aquatic ecosystem but there are certain parasites, particularly intestinal acanthocephalan of fish which can accumulate heavy metals to concentrate orders of magnitude higher than those in the host tissues of an environment (Sures 2001). A lot of studies have been revealed on the activities of fishes in relevant to their ecto parasites (Hoffman 1967; Russel 1974; Murchelano and Bridges 1976; Mccain et al. 1978; and Munday et al. 2003).

Laboratory-controlled experiments studying on the effects of different microcystins on the common carp (*Cyprinus carpio*) have been revealed various histopathological alterations (Mitsoura et al., 2013). Herein, we present damaging effects of some of the ecto parasites on the carp fish present at Hatchery of Badin district of Sindh- Pakistan.

MATERIALS AND METHODS

Fish sampling:

A Total of 263 specimens of fishes were sampled from carp fishing Hatchery District Badin Sindh Pakistan during the period from August 2012 to July 2013. Each month, the fish specimens were picked randomly from the fish action hall at the hatchery 2-3 kg (15- 30) and were brought into laboratory and washed with tap water and keep in the freezer till further processed.

Identification of Fish Species:

The species of fishes were identified following the methods of (Bianchi 1985; Talwar and Jhingran 1991).

Parasites Identification:

The parasites were identified to the group level following the literature of (Chatterjee 1980).

Measurement:

The total length of fish was measured as 0.1 cm from the tip of snout to the posterior tip of the caudal fin.

Gross examination of fish:

After measuring the length of fish the external surfaces of each fish were examined thoroughly for abnormalities such as discoloration of skin, erosion of scales and laceration as well as for the presence of Ectoparasites.

Determination of sex:

In order to determine the sex, the individual fish was dissected from abdominal region and color and texture of gonads were examined. Male gonads were milky-white in color and in mature males the milt extruded on pressure while female gonads appeared yellowish, pinkish or reddish in color and in mature females, eggs were visible. The fish in which the gonads looked thread-like were termed as unsexed.

RESULT

Parasites are rich in shell and fin fishes and are parasitized by the several groups of faunal species. The groups of parasitic fauna include the crustaceans, infect in its composition and it produces largely determined by the host mode life try for food. The environmental conditions are determined by the general characters of the parasites and the health of host fishes the richness of host variety of living conditions that exists in the mangroves. Ecosystem makes the parasites very interesting not only from the taxonomic and parasitic point of view but also form in ecology.

Species composition of fish:

A total of 263 fish specimens belonging to 10 fish species were found during the study period from August 2012 to July 2013. The species abundance for various fishes during the study period is shown in (Table.1). The Gulfam fish (*Cyprinus carpio*) was abounded in highest numbers (total number=81) samples, followed by the *Labio rohita* (total numbers=39) (Table.1).

Gross abnormalities in fish:

The only gross abnormality was observed in fish and was denuding of skin with red or gray spotos on it. The skin of the fish was found to be devoid of Ectoparasites.

Fish Species infected by Ectoparasites:

The study showed that all of the fish specimens were found infected with the Ectoparasites including Argulus, Leaches, and Lernaea. These Ectoparasites damaged the fish skins, gills and fins. The highest infection rate (66.6%) was observed in Gulfam (*Cyprinus carpio*) and Rohu (*Lebeo rohita*) with (50%) infection rate, however, the lowest infection rate (11.7%) was found in Morakhi (*Cirrhinus mrigala*).

Table. 1 Fish species abundance for various fishes examined during August 2012 to July 2013 from Carp fish Hatchery District Badin, Sindh-Pakistan

S. No	Species	Total number
01	Rohu (*Lebeo rohita*)	39
02	Thaila (*Catla catla*)	19
03	Morakhi (*Cirrhinus mrigala*)	18
04	Gulfam (*Cyprinus carpio*)	81
05	Black rohu (*Labeo calbasu*)	18
06	Cireah (*Labeo gonius*)	19
07	Groj (*Mastacembelus armatus*)	17
08	Shakur (*Channa punctatus*)	18
09	Shakur (*Channa marulus)*	16
10	Shakur (*Channa straitus)*	18
Total		**263**

Prevalence % of parasitic infection in fish:

Each month 15-35 fish specimens were examined for parasitic infection during the period from August 2012 to July 2013. Out of 263 examined fish specimens, 47 (17.9% of the total sample) fishes were found to be infected by two kinds of parasites i.e., Argulus and Leaches. Out of 47% infected fishes, 37% were infected by Argulus and 10% by Leaches parasites (Table.2).

Table. 2 Carp fishes infected by the arugulas and the leaches parasites during August 2012 to July 2013

S. No	Months	Total Number of Fishes infected	Infected by the Argulus	Infected by the Leaches
01	August	02	00	02
02	September	04	02	02
03	October	08	07	01
04	November	05	04	01
05	December	04	03	01
06	January	05	04	01
07	February	03	03	00
08	March	03	03	00
09	April	02	02	00
10	May	00	00	00
11	June	06	06	00
12	July	05	03	02
Total		**47**	**37**	**10**

The highest prevalence of infection was observed in the month of October when 47.1 % of infected fishes were observed throughout the study period. The second highest prevalence of infection 32% was obtained in the month of July, 2013. However, in the month of May no any fish was found to be infected by the parasites (Table.3).

Table. 3 Monthly percentage of parasitic infection during August 2012 to July 2013

Months	**Total Number of examined fishes**	**Total Number of infected fishes**	**Percent %**
August	15	02	13.3
September	15	04	26.7

October	17	08	47.1
November	19	05	26.3
December	20	04	20.0
January	21	05	23.8
February	21	03	14.3
March	30	03	10.0
April	35	02	5.7
May	24	0.0	0.0
June	25	06	24.0
July	21	05	32.8
Total	**263**	**47**	**17.9**

SEX–RATIO OF FISH SPECIMENS AND THEIR PARASITIC INFECTION:

As shown in the (Table.4), the data results that throughout the study, not only female and male fish individuals were present but also in the unsexed fishes. On the whole the sex-ratio was favored for females throughout the study period with only the exception in the months of August and May when the females shared 50.0% of the samples tested. Among the 47 infected fish specimens, the percentage of females infected by parasites was 61.7%, while 25. 5% of male fishes were found to be infected by parasites. However, the percentage of unsexed fishes infected by parasites was lowest 12.8% (Table.5).

Table. 4 Total numbers of the females, males and unsexed fishes examined during August 2012 to July 2013

Months	Total number	Number of females	Number of males	Number of unsexed
August	15	08	04	03
September	15	11	02	02
October	17	13	04	00
November	19	14	03	02
December	20	15	05	00
January	21	13	07	01
February	21	13	05	03
March	30	25	03	02

April	35	25	06	04
May	24	13	08	03
June	25	16	07	02
July	21	15	02	04

Table. 5 Percentage of males, females and unsexed fishes infected by parasites

Sex	Number of infected fishes	Percent
Males	12	25.5
Females	29	61.7
Unsexed	06	12.8
Total	47	100.0

Fig.1 Ecto parasites named as argulus, leaches, and lernae, respectively found in Carp Fishes

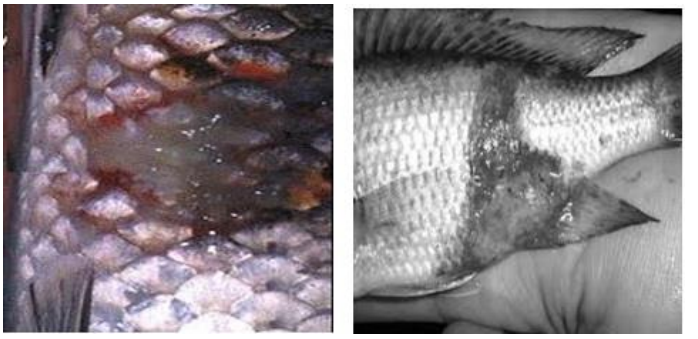

Fig.2 Damaging symptoms in carp fishes after infected by Ecto parasites

Fig.3 The healthy Carp fish (*Cyprinus Carpio*)

DISCUSSION

The present study reports the seasonal prevalence and intensity of parasites in carp fish species during August 2011 to July 2012. In Pakistan adequate literature is found available on taxonomy of parasites in infected fishes (Bilqees, 1971, 1974, 1976; Bilqees and Khanum, 1970; Bilqees and Kazimi, 1974; Bilqees and Jabeen, 1986; Khan and Begum, 1991; Khatoon and Bilqees, 1996).

In the present study the parasitic damages in fishes were found highest in late summer (September-November) and lowest prevalence was found in the early summer (April–May). Fatima and Bilqees (1989) studied the seasonal variation in the intensity of parasitic infection on various edible fishes by nematodes and acanthocephalan from the carp fish hatchery Distinct Badin and they reported that highest rate of infection was observed in the month of June, when 83.38% of fishes were infected. Seasonal variation in the intensity of parasitism in various fresh water fishes was studied by Linton (1914) and he reported market periodicity in the occurrence of parasites in

fishes. Akhter et al. (1997); Chandra et al. (1997); Hussain et al. (1994); and Banu et al. (1993) found increased incidence of parasitism in fishes during winter month in Bangladesh waters. Milbrink (1975) observed two peaks of parasitic infection, Reimchain (1982) found that the highest incidence of parasitic infection was from February-May, when 81% of the carp fishes were infected. Carvalho et al. (2003) studied the host parasite relationship between the crustaceans and fishes from pantanal wetland. Brazil reported that the parasites prevalence was observed to increase in rainy season (Spring–Summer) and decreased in (Autumn-Winter). The seasonal variations in the prevalence of parasitism by nematodes and cestodes was also reported in to two serranid species, *Crinus margila* and *Chana pantents* of Iskenderun bay turkey (Gene et al. 2005). In the present study the only gross abnormality was observed in fish was the denuding of skin with red or grey sports on it, through this was found very rare. However Scott (1975) reported that in case of heavy infections with large number of (Copopeds).

In Pakistan, infestation in carp fishes resulted that the highest parasitic infections were found in the fishes by the leaches (76.7%). Among the 47 infected fish specimens, the percentage of female infected by parasites was higher 61.7%, than in males with 25.5%. Carvajal et al. (1979) revealed that percentage of hake, merluccius gaya infected by arugulas larvae was higher in females than in males.

The number of studies on the existence of trichonid parasites on both male and female fishes is rare and almost no statically significant difference in their existence is found (Ozer, 2000). Present study further characterized that the monthly mean intensity was highest in April (9.5) and the lowest value in May (0). For various size–classes, the mean intensity was highest in the lesser size–classes as compared to greater size-classes (Data not Shown). These results showed that there was

no relationship between the length sizes of fishes and intensity of parasitism and resembles with the results of those Ward et al. (2002), who studied the effects of parasitism and body lengths on positioning within wild fish shoals and reported that there was no relationship between body lengths.

CONCLUSION

The present study concluded that Ectoparasites including Argulus, Leaches, and Lernaea damaged with (66.6%) of highest infection rate in Gulfam (*Cyprinus carpio*) as compared to other tested fish species. The months of October and July were infected more in comparison to other studied months. The study further concluded that female fishes were damaged maximum than of those males and unsexed fishes.

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Conflict of interest declaration:
The authors have declared that no conflicts of interests exist.

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