

# PREVALENCE OF ECTOPARASITES DURING REPRODUCTIVE BIOLOGICAL STUDIES OF HOSTCHANNA STRIATA FROM KEENJHAR LAKE

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## Abstract:

Snakehead fishes are a member of Channidae family. *Channa striata* is one of the most important fish belonging to Channidae family. *C. striata* is a commercially important fish and it has a high market price in the fish market in Pakistan. The fish are sometimes affected by parasites which cause severe damage to fish growth and significant economic loss in its production. Pollution is the main factor for the spread of such parasites and the experimental fish became their host. In order to check the ectoparasitic prevalence in male and female populations of *Channa striata* from Keenjhar Lake, district Thatta. The study suggested the highest prevalence during summer, in the month of June was 21.66 and the lowest prevalence was 3.33 recorded in January. Among the infected fish, the number of female fish was higher than that of male fish. Two ectoparasites were found *Argulus* sp. and *Lernaea* sp. The most infected parts of fish were the scales, fins, and gills where most of the parasite population was seen.

**Keyword:** Channidae *Channa striata*, *Argulus* sp, *Lernaea* sp, Keenjhar Lake

## INTRODUCTION

Snakehead fishes are widely consumed throughout South East Asia, China, Pakistan, and India because of their good taste in meat and high nutrient values such as the presence of prostaglandins, thromboxane, and Omega-6 fatty acid. Parasitic infection constitutes a significant economic loss in fish production (Gautam et al., 2018). Fishes are very cheap and a good source of protein and essential nutrients (Sikoki and Otobotekere, 1999). The fishing industry has a chief role in the development of the economy of Pakistan by engaging 400,000 people directly in the fishing business and an additional 600,000 in the ancillary industries (Ebrahim, 2014). The largest river in Pakistan, the Indus River, and its all tributaries are the central capture point of freshwater fish in Pakistan (FAO, 2009). Snakehead fishes are one of the main group of fishes, Snakehead belongs to Channidae family. The Channidae family of fishes contains two genera, the genus *Channa* and *perchanna*. The fishes of the genus *Channa* are the Snakehead fishes. The snakehead fishes are very famous all over Asia because of their taste and high market price, most customers prefer to buy snakehead over any other fish (Mirza, 1982; Rahman, 1989) because these fish are not only used as food but also for the medicinal purpose (Mat-Jais et al., 1994; Michelle et al., 2004; Zafar et al., 2012). *Channa striata* is locally called Karo Shakur in Sindh which is commonly sold in local fish markets and is the most

preferable fish in fish- markets of Asia (Haniffa et al., 2004; Marimuthu et al., 2009). This fish has the ability to survive in very harsh and unfavorable conditions (Ng and Lim, 1990). Snakehead prefer to live in rivers and ditches (Dosi et al., 2019; Widyastuti et al., 2020; Gustiano et al., 2021; Saura et al., 2021), these fish can get ecto and endo parasitic infestation when living in an unstable environment (Harmah et al., 2018). The health condition of the Snakehead depends upon its health and its environmental conditions (Ode, 2014). In aquaculture, infections in fish caused by the parasites can affect the fish health and the normal growth of fish is badly effected (K. K. Harris, A). The main cause of the infections is the environmental factors that weaken the fish immunity power and become a reason for various pathogens to easily get in the body of fishes (Eissa, 2002).The parasitic infections in fish caused by three factors a) host's weak immunity b)infectious pathogens c) polluted Environment (Nova et al., (2015). Stripped Snakehead *C. striatus* play an important role in the freshwater fishery of Pakistan. The parasite attack on fish is a major cause of fish loss and its production. The present study was undertaken to analyze the prevalence of infection in male and female *C. striatus*, caused by different ectoparasites.

## **MATERIAL AND METHODS**

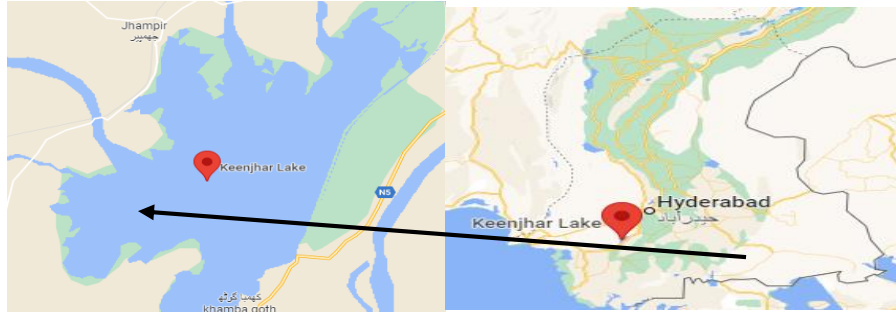
### **Study location and Sampling**

Keenjhar Lake is one of the large lakes in Pakistan. It is located in Thatta District. The lake is not only a good source of fishing but it also provides leisure and boating facilities to visitors. The lake is an important reservoir of water that is supplied to Karachi city. Its maximum length is 24 km and its maximum width is 6 km. Its surface area is 13,468 ha and its maximum depth is meters. This freshwater lake has been polluting day by day due to the waste dumped by a large number of picnickers and waste from local populations living beside Keenjhar Lake. The visitors dump their waste like plastic bottles, plastic shoppers, and residual food items that cause the pollution in the lake. The pollution in the lake in turn causes problems to its biodiversity.

The current study was carried out to check the Ectoparasitic infestation in a snakehead fish *Channa striata*. A total of 360 Individuals of *C. striata* were collected from the lake for the study of ectoparasitic infestation during the period January 2020 to June 2021.

### **Experimental procedure**

The collected fish specimens were brought to the Fisheries Science laboratory, University of Sindh, Jamshoro. The fish were observed by taking smears from gills, fins, and skin. Gills were taken out and placed in a Petri dish along with distilled water then the gills were examined under a microscope. All smears were observed under a light microscope at 40x -100x magnification. (LABOMED, model Lx 400, USA). The crustacean parasites were preserved in 5 % formalin for 1 hour after then were transferred to 70% alcohol. The specimens of Crustacean parasites were cleared with 85 % lactic acid and then their slides were prepared by using jelly glycerin.



**Figure 1: Study area location of Keenjhar Lake.**

### **Morphometric Characters of Male and female of *Channa striata***

Sex classification of the Experimental fish was firstly identified on the bases of external morphology which shows that (female-stouter Abdomen and male-sharper abdomen) and later it was confirmed by Dissection and the direct identification and examination of the gonads. Male fishes had gonads with white textured whereas the female had yellowish gonads with visible eggs.

### **Identification of ectoparasites**

The taxonomical studies of the collected ectoparasite specimens were carried out by studying and comparing the similarities of ecoparasite morphology using keys and illustrations given by Kabata (1985), Noble and Noble (1989), and Nurcahyo (2014).

### **Prevalence formula: $N/n \times 100$**

N: Total number of infected fish and n: Total number of fish examined

The supporting parameters in this study were taken from the size, body length, body weight, and genital of fish. The measured parameter in this study used a Guidelines infection category based on prevalence by Williams (Williams E H J et al 1996) and was shown in Table 1.

**Table 1: Guidelines infection Categories Based on Prevalence. By Williams (1996)**

No	Prevalence	Category	Information
1	100-99%	Always	Very severe infection
2	98-90%	Almost Always	Severe infection
3	89-70%	Usually	Moderate infection
4	69-50%	Very often	Infections are very frequent
5	49-30%	Generally	Common infection
6	29-10%	Often	Frequent infections
7	9-1%	Sometimes	Moderate infection
8	<1-0,1%	Rarely	Infection is rare
9	<0,1-0,1%	Very rarely	Infection is very rare
10	<0,01	Almost never I	Infection never

## RESULT

During the research period, 360 fish were collected out of 360 fishes only 35 were found to be infected by ectoparasites. Out of 35 infected fishes, 23 were females and 12 were males. During the study period of six months, it was observed that the ratio of females is highly infected than that of males. Among the infected female, some females were gravid, who were found infected during the breeding period. Out of 23, 6 gravid females were found. The rate of infestation was high in the summer season than in the winter season. This is an indication that with the increasing temperature parasites get a chance to grow and reproduce with the fall in temperature parasitic infestation rate slowly decreases and very few parasites were collected during the winter season. In the present study, it was noticed that the highest parasitic prevalence was found in the month of June when fish breeding is at its peak. It indicates that fish are more vulnerable to parasite infestation during the breeding period. The lowest ratio of infected fish was recorded at 3.33% in the month of January while the highest ratio of infected was recorded at 21.66 % in June. It was noticed that most of the fishes were affected by ectoparasites like *Argulus* sp, and *Learn aeasp*, the most infected parts of experimental fish were the gills, skin, and fins.

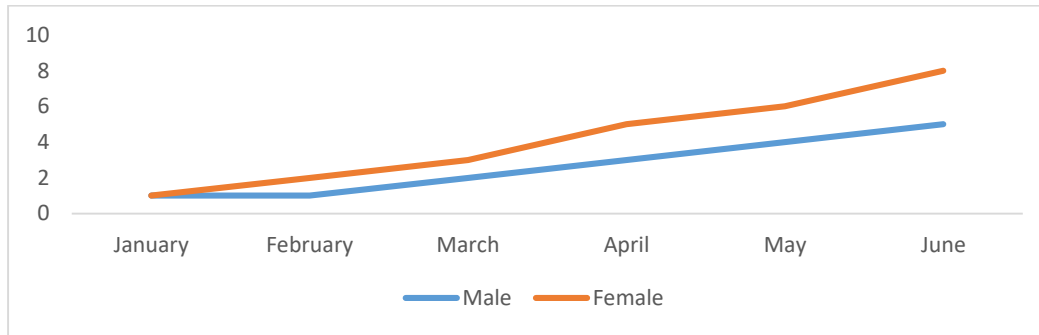
**Table 2: Monthly percentage of parasitic infection from January 2020 to June 2020**

Months	Examined fishes	number of infected fishes	Percent %
Jan	60	2	3.33
Feb	60	3	5
March	60	5	8.33
April	60	8	13.33
May	60	10	16.66
June	60	13	21.66
Total	360	41	11.38

## SEX-RATIO OF INFECTED FISH SPECIMENS

The ratio of infected male individuals was recorded very as low at 3.33 % in January while the highest infected ratio among males was recorded at 11.38 % in the month of June. The lowest ratio of infected females has recorded also 3.33 % in the month of January and highest ratio was recorded at 13.33 in the month of June respectively. The lowest ratio of infected males has recorded also 3.33 % in the month of January and highest ratio was recorded at 8.33 in the month of June respectively. The breeding period of fish reaches at its peak in the summer season and it was found that the fish is also infected during this period when fish spend more energy on the development of gonads and mating.

**Figure. 2: Male and female fish infestation number and percentage during the study period**



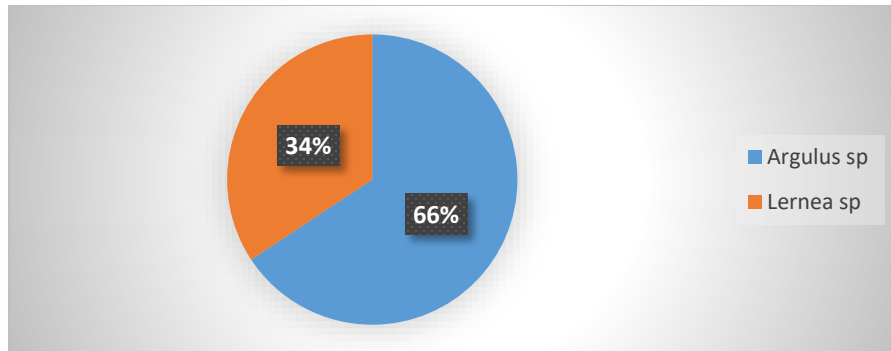
**Table 2: Length-weight group of infected male and female *Channa striata* collected during the reproductive biological studies**

Length Group (cm)	No of Infected Fish in the group	Male		Female		Combine Sex	
		Average length (cm)	Average Weight (g)	Average length (cm)	Average Weight (g)	Average length (cm)	Average Weight (g)
30 to 35.00	14	33.4	460.5	35.0	476	50.9	698.5
35.01 to 40.00	10	35.5	480.0	37.01	660.0	54.00	810
40.01 to 45.00	6	40.01	702.0	41.7	680.0	60.86	1042
45.01 to 50.00	4	43.5	816.0	47.2	1040.0	67.1	1336
50.01 to 55.00	2	51.1	1189	53.0	1224.1	77.55	1801.05

### Collected Ectoparasites

Total 38 ectoparasites were collected from infected fish. Two species of Crustaceans parasites were collected during the study one is *Argulus* sp. and *lernea* sp. The *Argulus* sp is commonly known as fish lice. *Argulus* sp cause causes diseases in fishes. Most of the *Argulus* sp were collected from fishes during the summer than in winter. The fish were examined after the catch very quickly because as the fish get out of the water *Argulus* sp may leave the fish. *Lernea* sp is also a crustacean parasite it is called an anchor worm, like *Argulus* sp the *lernea* sp were collected in large numbers during the summer than in winter. Both ectoparasites were found on Scales, gills, and fins of the fish. The infection caused by both parasites was observed with naked eyes. The infection indicates that the infected fishes were not in a good health and the parasites cause a lot of damage to the scales and gill areas of the fish.

**Figure 3: Comprasion of *Argulus* and *Lernea* collected from Experimental fish**



**Figure 4: Infected experimental fish and their affected parts**



## DISCUSSION

The present research suggests that seasonal prevalence of ectoparasites in *Channa striata* fish from January 2021 to June 2021. The current research shows that parasitic infestation was high in summer than in winter. Gun kovski and khudolei (1989) researched that as the temperature rises so as the higher parasitic infestation observed in fishes. (Richart et al., 2010) researched that female fish were more infected by ecto parasite *Grydactylus turnbilli* than males. (Karvonean and Lindstrom, 2018) suggest that the female sand gobies became readily infected and also had a high number of parasites than males. During the research, two crustacean ectoparasites were found *Argulus* and *lernea*. (Zulfahmi et al., 2021) found ectoparasite in *Channa striata*. Lopez found *Lernaea* from *Channa striata* from Laguna de Bay. Khan et al., 1991) found that *Argulus* sp and *Lernaea cyprinaceaparasites* mostly found in Pakistan. Most of the ectoparasites were found in skin fins and gills and the ectoparasitic infection in *Channa striata* causes discoloration of its fins and skin hemorrhages (Nurliza et al., 2002). Snakehead gills are



the most defenseless organs for the ecto-parasitic infection than its fins and skin. Additionally, the same thing was noticed and reported in catfish (*Clarias gariepinus*) and hairtail fish (*Trichiurus lepturus*) (Fautama et al.2019; Rahmat et al., 2020). Parasites are a wide range of distribution in all phyla of animals. In Pakistan a lot of, literature is available on the taxonomy of different parasites in fish (Bilqees, 1971; 1974; 197; Bilqees and Khanum, 1970; Bilqees and Kazim, 1974; Bilqees and Jabeen, 1986; Khan and Begum 191; Khatoon and Bilqees, 1996).

## CONCLUSION

The research shows that parasitic infestation was higher in the month of June and was observed lower in the month of January. As the temperature raises so the ectoparasites get a chance to spread in the fish because the increasing temperature supports the spread of ectoparasites in the fish. The female fish were more infected in comparison to males. The crustacean parasites *Argulus* sp and *Lernea* sp are the most harmful parasites because they damage the fish scales and fins and also they cause severe damage to fish's gills.

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