E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2018; 6(5): 116-120

www.fisheriesjournal.com
Received: 16-07-2018
Accepted: 17-08-2018

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Identification of Ecto-parasites in silver carp (*Hypophthalmichthys molitrix*) and common carp (*Cyprinus carpio*) at fishery development Center Bhairahawa, Rupandehi, Nepal

Archana Prasad, Sahendra Yadav and Jash Hang Limbu

Abstract
This study was carried out at Fishery Development Center, Bhairahawa, Nepal between pre-monsoon and post monsoon. Altogether 60 live host fishes (30 pre and 30 post monsoon) were examined. Total 60 fish samples were divided in 3 groups, 20 were small (<18 cm), 20 were medium (18-28 cm) and 20 were larger (>28 cm) in size. During study period total 321 parasites were recorded from 28 fish samples. Among them two protozoans (*Trichodina*, *Ichthyophthirius multifiliis*), two monogeneans (*Dactylogyrus*, and *Gyrodactylus*) and two crustaceans (*Argulus* and *Lernaea*) were collected from skin, mucus, fins and gills. Prevalence, intensity and abundance of parasites were analyzed. Silver Carp were more susceptible to infection then Common Carp. The number of *Dactylogyrus* ssp. Was highest (57%) and *Gyrodactylus* spp. Was lowest (0.6%). Prevalence, intensity and abundance of fish parasites were found to be related to different length group of the host. The high prevalence (75%) was recorded from small fishes. However, highest mean intensity (21.87%) and abundance (8.8%) of parasites were recorded in large fishes. The highest prevalence (63.33%), mean intensity (20.41%) and abundance (9.73%) of parasites were recorded pre-monsoon.

Keywords: Argulus, *Cyprinus carpio*, *Lernaea*, parasite

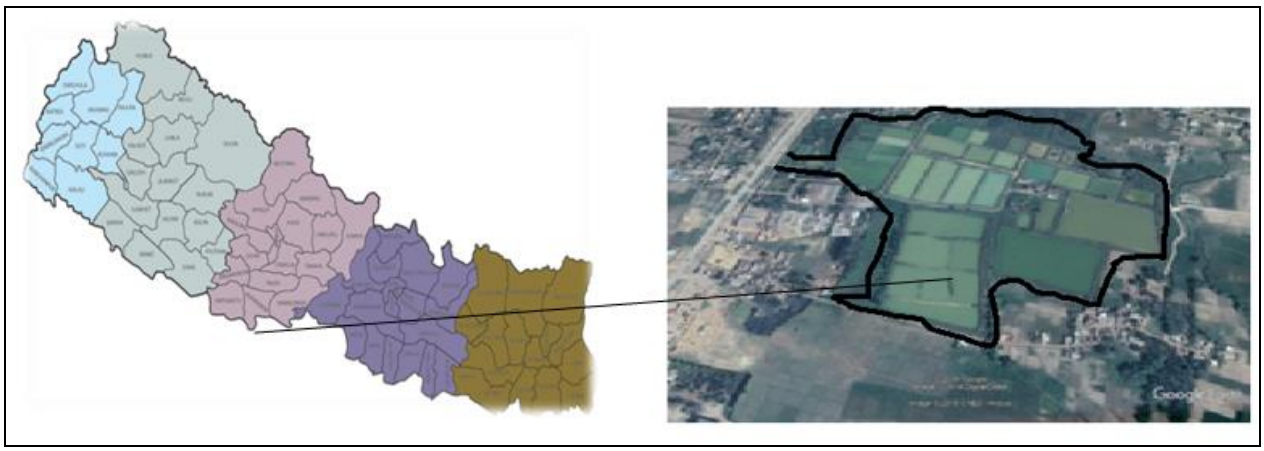
1. Introduction
The fish farming directly and indirectly helps to improve social and economic condition of Nepalese people. About 200 fish species are found, of which around 190 are indigenous and remaining are exotic (Sharma, 2008) [1]. The introduced exotic fishes are Common Carp, Silver Carp, Bighead Carp, Grass Carp and Catla (FAO, 2016) [2]. The distribution of parasites varies in different species of fish, seasonally and from one water body to other (Rai, 1986) [3]. Some parasites change the feeding behavior, mating behavior, and other social behavior of host in order to enhance the effectiveness of transmission of parasites (Poulin, Nichol and Latham 2003; Seppala, Krvonen and Valtonen 2005) [4, 5]. The common parasites of fishes include protozoans, bacteria, fungi and viruses. The diseases caused by protozoan are Trichodiniasis, Ichthyopthirius, Myxosomiasis, and Apiosomiasis (Jha and Bhujel, 2012) [6]. Among bacterial disease, the major diseases are tail and fin rot, columniaris and gills disease (Nepal *et al.*, 2002 and Jha and Bhujel, 20012) [7, 6]. The white spot diseases caused by *Ichthyophthirius multifiliis* is one of the most important fish parasites infecting in skin, fins, gills and eyes (Eiras, Pavanelli and Takemoto 2013; Ozer 2002; Ozer and Erdem 1999) [8-10]. The most common helminthes parasites are *Dactylogyrus* sp., *Gyrodactylus* sp., *Procamallnus* sp., *Piscicola* sp. and *Cariophullaeus* sp. Commonly reported crustacean disease are caused by *Lernaea* sp. and *Argulus* sp. (Jha and Bhujel, 20012) [6]. The common fungal diseases are Saprolegniasis and Epizootic ulcerative syndrome (Dahal *et al*., 2008) [11]. Klinger and Floyd (2002) [12], Aksoy and Dorcu (2006) [13] concluded that parasitic protozoan, helminthes and crustaceans were found in skin, gills and fins.
Ahmed (1981) [14] reported that several species *Dactylogyrus* sp. may become pathogenic interfering with feeding and respiration in small fish. Zitnan (1978) [15], Pojmanska and Chabros, (1993) [16] concluded that the infection of *Dactylogyrus* spp. were higher in small length fish and in the largest size fish and lower in medium size fish. Jalali and

Barzegar (2006) [17], Bhuiyan, Akther and Musa (2007) [18], Ozan, Kir and Barlas (2008) [19] and Raissy, Ansari and Jalali (2010) [20] reported that the prevalence of infection is higher in medium sized fish. The disease may occur in acute form mainly in larvae and fingerlings causing ulcers, sub-epithelial oedema, displacement of the secondary lamellae in the gill filaments, hyperplasia and mononuclear inflammatory infiltration. Nematollahi *et al*. (2013) [21] concluded that, mean intensity of *Dactylogyrus* spp. Varied significantly among the seasons. The maximum mean intensity was recorded in winter.

2. Materials and metnods

2.1 Study Area

Fishery Development Centre (FDC) was established in 2018 B.S. It is located at Padasari- 5, Rupandehi, Nepal. It covers 23 hectares area at an altitude of 610 m and lies between latitude 27.59° N and longitude 83.45° E. There are 48 ponds in the study area. Among them 41 ponds are being used for hatchling, fries and fingerling production and seven ponds are useless. In FDC, there are eight species along with *Tilapia* sp. (Annual report of FDC, 2072/2073).



(**Source:** Google earth)

Fig 1: Map of Nepal showing FDC, Bhairahawa

Fig 2: FDC Padasari 5 –Thutipipal

2.2 Parasite sample collection

The samples for parasites observation were collected from the host body surface including scales, fins, skin, fin base and operculum etc. and then were examined for ecto-parasite according to (Mofasshalin *et al.,* 2012) [22]. Then collected samples were prepared as wet mount and temporary slides and observed under microscope for parasites.

2.3 Methods used for collecting, fixing, staining, and mounting of parasite specimens were as follows.

Protozoan and crustacean were collected and mounted as Fernando *et al.* (1972) [23]. The monogeneans were collected according to Gussev (1985) [24].

2.4 The identification of parasites

Protozoans were fixed and identified according to Lom and Dykova (1985) [25] and Van as and Basson (1989) [26]. Helminthes were identified as per Manwell (1961) [27] and Yamaguti (1963) [28]. Identification of crustaceans was carried out according to the methods given by Gussev (1985) [29] and by consulting with taxonomic experts of parasitology.

2.5 Data analysis.

Total number of parasites was determined directly by numerical count. The number of fish sampled, prevalence, mean intensity and abundance values of protozoa, helminthes and crustacean parasites were analyzed and interpreted according to Margolis *et al*. (1982) [30] and One way ANOVA was used to compare the data among months and size classes.

3. Results

During study period total 321 parasites were recorded from 28 fish samples. Among them two were protozoans (*Trichodina*, *Ichthyophthirius multifiliis*), two were monogeneans (*Dactylogyrus*, and *Gyrodactylus*) and two were crustaceans (*Argulus* and *Lernaea*) from skin, mucous, fins and gills. The highest prevalence 75% was recorded in small fishes and high mean intensity abundance were 21.87% and 8.8% recorded in large fish. The highest prevalence, mean intensity and abundance 63.33%, 20.41% and 9.73% were recorded in pre-monsoon.

Table 1: Identified fish parasites and their site of infection

S.N	Parasites		Total No. of parasites recorded	%	Sites of infection
1	Protozoa	*Trichodina* spp.	38	11.83%	Gill, skin
		Ichthyophthirius multifiliis	4	1.25%	Skin, fin
2	Monogenea	*Dactylogyrus* spp.	183	57%	Gill
		Gyrodactylus spp.	2	0.6%	Skin, gill
3	Crustacea	*Argulus* spp.	17	5.3%	Skin, fin
		Lernaea spp.	77	23.98%	Skin, fin and operculum
		Total genus = 6	Total =321	Total=100%	

Table 2: Prevalence, Mean intensity and Abundance of fish parasites in different length group of fishes

S.N.	Calculated value	Below 18 cm long (%)	Between 18-28 cm (%)	Above 28 cm (%)
1	Prevalence	75	30	35
2	Mean intensity	6.66	5.25	21.87
3	Abundance	6.05	1.65	8.8

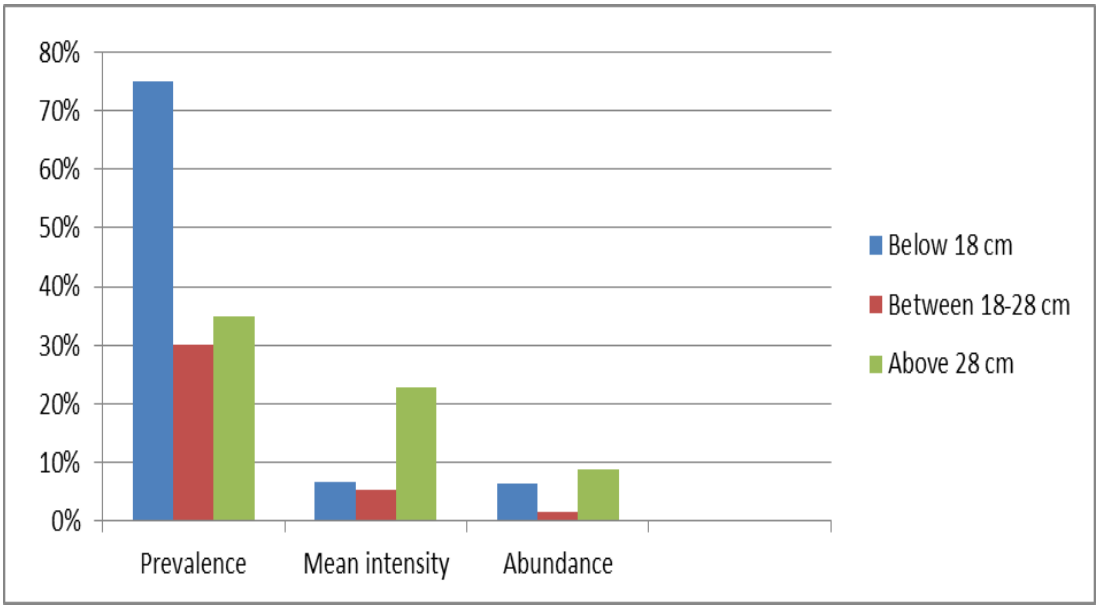


Fig 3: Prevalence, mean intensity and abundance of fish parasites in different length group of fishes.

Table 3: The average Prevalence, Mean intensity and Abundance of fish parasites (pre and post monsoon)

S.N.	Calculated value	Pre-monsoon	Post monsoon
1	Prevalence	63.33%	30%
2	Mean intensity	20.41%	2.11%
3	Abundance	9.73%	0.96%

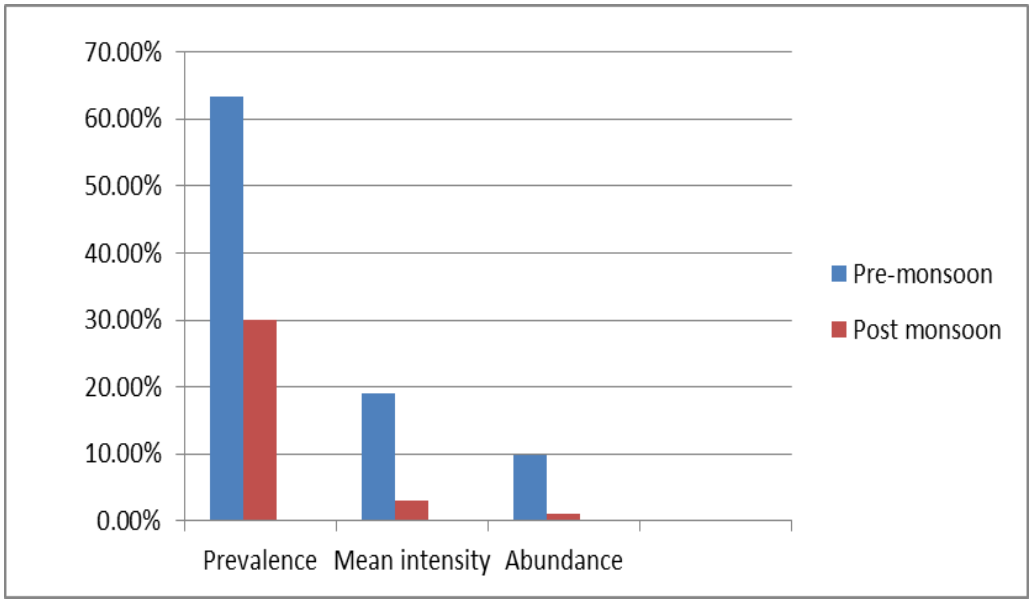


Fig 4: Prevalence, mean intensity and abundance of parasites.

4. Discussion

4.1 Parasites recorded in FDC

In this research work six genera of fish parasites were recorded as *Trichodina*, *Ichthyophthirius multifiliis*, *Dactylogyrus*, *Gyrodactylus*, *Argulus* and *Lernaea*. Results of this study showed similarity with other research such as Ozer and Erdem (1999) [31] and Ozer (2002) [2] that these parasites are more common fish parasites found in almost all water bodies. Protozoan, helminthes and crustaceans parasites were found in skin, gills and fins (Klinger and Floyd 2002; Aksoy and Dorcu 2006; Jha and Bhujel 2012) [12, 13, 6].

4.2 Length wise fluctuation in prevalence, mean intensity and abundance of parasites

Dactylogyrus spp. were higher in small length fish (<18cm) and in the largest size fish (>28cm), and lower in medium size fish (18-28cm) which was support of Zitnan (1978) [15], Pojmanska and Chabros, (1993) [16] which may become

pathogenic interfering with feeding and respiration in small fish (Ahmed 1981) [14]. The prevalence of infection is influenced by size of fish host, fish maturity, temperature and oxygen concentration of water.

This research is dissimilar with result of Jalali and Barzegar (2006) [17], Bhuiyan, Akther and Musa (2007) [18], Ozan, Kir and Barlas (2008) [19] and Raissy, Ansari and Jalali (2010) [20] concluded the highest value of prevalence of infection was recorded from the intermediate length group (18-28cm).

4.3 Seasonally fluctuation in prevalence, mean intensity and abundance of parasites

The most commonly found parasite was *Dactylogyrus* spp. with highest prevalence before rainy season (Ozan, Kir and Barlas, 2008) [19].

Results of this study also show dissimilarities with Zitnan (1978) [15], Pojmanska and Chabros (1993) [16] and Chandra (2004) [32] reported the prevalence of ectoparasites is more in small fish of carp species during winter months. Mean intensity of *Dactylogyrus* spp. varied significantly among the seasons with maximum in premonsoon than in winter as reported by Nematollahi *et al*. (2013) [21].

5. Conclusion

These parasitic infection and infestation occurrence might be due to their feeding preference, environmental problems and poor water quality. The most common fish parasites included protozoans (*Trichodina*, *Ichthyophthirius multifiliis*), monogeneans (*Dactylogyrus*, and *Gyrodactylus*) and crustaceans (*Argulus* and *Lernaea*). The parasitic infection and infestation were highest in large followed by small group fishes. However, parasitic infection in medium size fish was low. The prevalence, mean intensity and abundance of fish parasites were high before rainy season. The untreated domestic sewage was responsible for an increase in the abundance of *Trichodina* spp. and *Gyrodactylus pleuronecti*. Exotic fishes may introduce exotic parasites or diseases to native fishes which may lead to a serious decline in populations or render the commercial species unfit for human consumption.

6. Acknowledgement

We are grateful to Ramesh Chand Gupta (Head of Fishery Development Centre) and Ms. Ruchi Shriwastov (Laboratory Officer of Fishery Development Centre) for their valuable guidelines and support.

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