

Study of Demographic Pattern and Prevalence of Digenetic trematode Parasite in the Fresh Water Fish *Channa punctatus* of the Rohilkhand Region

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Abstract: Fish in an important article of food throughout the globe & also serve as a host to a number of pathogens. Most of the Fishing Industry yield a number of by products of commercial importance. Fishes suffers from various ectoparasitic & endoparasitic diseases. Parasite play an important role in the growth of Fishes & other animals. Taking into consideration that no systematic work has been carried out on trematode, fish diversity of Rohilkhand region so there is no record on the impact evaluation of demographic parameter of parasitism in fish trematode Community.

Keywords: *Channa punctatus*, *Genarchopsissingularis*, Trematode parasite, Demographic pattern & prevalence

1. Introduction

Fishes are the most diverse form of vertebrates on earth. Fishery is of great importance to human beings. Most of the fishing industries yield a number of by - products of commercial importance. The aquatic environment where fish resides is of paramount importance for fish growth. Disease is a major constraint in modern aquaculture system. The fishes being aquatic and cold blooded vertebrates suffer from various ectoparasitic and endoparasitic diseases which broadly can be classified as pathogenic and nonpathogenic origin of disease. Infect pathogens are always present in aquatic environment or on fish body, but they can cause diseases only when weakening of host allows pathogen for multiplication in the fish body resulting in manifestation of various fish disease. Parasites play an important role in the growth of fishes and other animals, at birth parasitic incidence in animal is almost nil. Fresh water fishes reveal that a considerable work has been done particularly on the taxonomy, systematic and life cycle of digenetic trematode parasites. In the past few years attempts have been made to study the biodiversity of trematode parasites associated with fishes in different countries of the world. Taking into consideration that no systemic work has been carried out on the trematode fish diversity of this region so far and more over there is almost no record on the impact evaluation of demographic parameters of parasitism in fish trematode community.

Some of the Pioneer workers working on digenetic trematodes infecting fishes are – Srivastava & Jauhar (1983), Chopra et al. (1983). Johari and Tripathi (1990). This work on the proposed problem will compare the relationships between abundance and host size in a single trematode species parasitizing different host and in various trematode species parasitizing the same host.

2. Material and Methods

The materials have been obtained from the fresh water fishes of Bareilly region. The fishes were collected from local fish market at River sites of Ramganga, Nakatia, Begul, Chaudhari ponds and Rajkiya Matasya pond. For the collection of digenetic trematodes the visceral organs like intestine, stomach, liver, kidney, urinary bladder and heart of the fish were dissected out separately in petridishes containing 0.7% physiological saline. Then the worms were picked up with the help of a micro - dropper and transferred to a slide to flattened them. The liveworms were examined under a microscope particularly for the excretory system and contents of cirrus sac. For permanent preparations the worms fixed in Bouin's fluid, stain with acetocarmine, cleared in clove oil and mounted in canada balsam. All the measurements were taken from the fixed specimens by using as micrometer in millimeter values in bracket indicate ranges. Sketches were made with the help of a camera lucida. For studies seasonal variation the fishes were examined throughout the year for the selected species of trematode parasites. At the time of collection of fishes the length and weight were measured using scale and weight machine respectively. All the time of collection of fishes, the water analysis were also carried out besides gathering information on the type of climate/day, depthness of water body, availability of aquatic vegetation extent of clearness of water etc.

The index of invasion (I. I.) was calculated using the following formula.

$$I.I. = \frac{A+B}{100}$$

Where A = Percentage of infection

B = Mean number of worms per host.

The fishes were carefully examined if they were infected and the infected organs were separated and the symptoms related to infection were also noted. The extent of damage to

the organs was co - related with the rate of infection by examining the number of worms.

Topography of Study Area

District Bareilly (Fig.1) is a plain slopping area from North to South but its sub division Aonla is sloping from West to South. District shows subtropical climates. It falls in Northern temperate zone and is nearer to tropics so the hills of Himalayas influence its climate due to which it is generally cold in winter and hot in summers. In this region Ramganga is the main river which originates from Garhwal Himalayas and flows from west to east. The river affects Southern part of Bareilly district. The river separates Faridpur and Aonla sub divisions. In South, Ramganga receives Nakatia and Deorania rivers. (Table - I). Metrological features over the year showing in the table II and III.



Figure : 1) MAP OF BAREILLY DISTRICT SHOWING DIFFERENT COLLECTION SITES SELECTED FOR STUDY

Table I: Showing the location and selected water bodies of Bareilly region

	Location	Distance from the main Bareilly city (km)	Type of water body
1	Bareilly	10 Km	River Ram Ganga River Nakatia Chaudhari Pond
2	Nawabganj	28 km	River Bagul
3	Faridpur	20 km	River Kailash
4	Aonla	33 km	RajkiyaMatasya Pond
5	Baheri	48 km	River Bhargura

Table II: General characters of fish collection sites in different of Bareilly region during Jan.2015 to Dec.2015

Sr. No.	Various Parametres	RG. R.	N. R.	BHG. R.	Habital Type K. R.	BEG. R	CP	RMP
1	Size	>100 m	>60 m	> 50 m	> 50 m	> 80 m	> 20 m	> 15 m
2	Depth*	0.1 - 4 m	0.1 - 2 m	0.1 - 3 m	0.1 - 2 m	0.1 - 3 m	0.5 m	0.6 m
3	Current	Moderate	Slow	Moderate	Moderate	Moderate	None	None
4	Shade	0%	0%	0%	0%	0%	5%	10%
5	Bottom	Sand	Sand	Sand	Sand	Sand	Mud	Mud
6	Ph	7.3 - 8.0	8.2 - 8.4	7.4 - 9.0	7.6 - 9.2	7.0 - 8.0	7.2 - 7.9	7.3 - 7.4
7	Temperature (°C)	12.5 - 27.5	15.3 - 28.3	12.0 - 28.0	12.6 - 27.6	12.3 - 28.3	12.0 - 28.0	15.0 - 30.0
8	DO ₂ (mg/l)	5.2 - 6.0	6.2 - 7.0	6.3 - 8.0	6.5 - 8.0	6.3 - 7.6	4.4 - 6.0	4.0 - 5.0
9	Hardness (mg/l)	250 - 300	310 - 400	390 - 400	350 - 400	250 - 390	200 - 295	220 - 300

RG R: Ram Ganga River, NR.: Nakatia river, BHG. R. Bhargua river, K. R.: Kailash River, BEG, R: Begul river, CP: Chaudhari Pond, RMP Rajkiya Matasya Pond

Table III: Showing climatological data of bareilly distict between January 2015 to December 2015.

Month	Temperature (°C)		Humidity (%)		Rainfall (mm)	No. of Rainy Days
	Minimum	Maximum	Minimum	Maximum		
April	21.76	37.79	27.23	55.76	22.4	3
May	26.08	38.08	42.77	65.47	92.8	7
June	25.68	32.68	69.5	80.86	260.5	20
July	25.10	32.35	77.67	87.19	419.5	24
August	33.42	32.61	78.74	88.22	758.4	19
September	24.16	33.12	69.26	86.53	86.8	11
October	21.15	33.49	60.61	82.32	0.0	Nil
November	15.7	29.42	59.00	82.80	Trace (less then 0.1 mm)	1
December	9.39	24.52	67.48	84.16	0.6	1
January	8.60	19.70	67.20	91.83	24.2	5
February	9.89	22.90	53.80	84.41	52.9	4
March	15.76	30.16	37.20	68.20	2.9	6

In collaboration with Meterologicalcentre, Amosy Airport, Lucknow.

3. Results and Discussion

Table IV: [PARASITE HOST LIST]

Digenetic Parasite	Host	Location
<i>Genarchopsissingularis</i> Srivastava, 1933	<i>Channa punctatus</i> (BI)	Body cavity, stomach,

Observation: -

Study of Parasite

1. *Genarchopsissingularis* Srivastava, 1933

Family: Hemiuridae Luhe

Genus: *Genarchopsis* Ozaki (Syn. *Progonus* Loss, 3)

4. Description

Body small, oval, 0.98 - 3.32x0.49 - 0.86 with maximum breadth at acetabular zone. Oral sucker oval, subterminal, 0.13 - 0.33x0.19 - 0.37. Pharynx oval, 0.08 - 0.2x0.07 - 0.10. Oesophagus small. Testes symmetrical, postacetabular, oval, overlapping intestinal caeca, measuring 0.11 - 0.21x0.09 - 0.13 and 0.11 - 0.20x0.08 - 0.17, respectively. Cirrus sac absent. Ovary small, spherical, median, post - testicular, lying in the hind part of body, anterior to vitelline follicles,

0.067 - 0.22x0.087 - 0.16. Shell gland complex post - ovarian. Uterus with transverse coils extending posteriorly upto vitelline zone which continues anteriorly, as metraterm and opens into parsprostatica. Eggs yellowish, oval, 0.021 - 0.037x0.011 - 0.015 with the filament on one side. Vitellaria two, compact, oval glands, one on either side in posterior most part of the body. Excretory bladder Y - shaped with arms anastomosing dorsal to oral sucker.

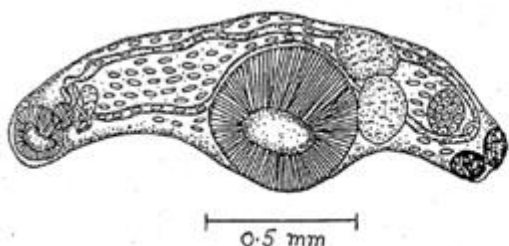


Figure 2: [Genarchopsissingularis] Figure: 3 [Photograph of collection site]

120 specimens of *Channapunctatus* were collected from Deorania river. River Ramganga and RajkiyaMatasya Pond, Bareilly. Out of these 34 fishes were found infected with this species. Out of these maximum number of worm collected from a single host were 6.

Locality: RajkiyaMatasya Pond, Faridpur, Bareilly

Overall Incidence of Trematode Parasite

Table VII: Incidence of Trematodes (Jan, 2015 to Dec., 2015)

Parasite	No. of individual infected	Parasitization% rate	Mean no. of parasite per host
<i>Genarchopsissingularis</i>	34	28.33	0.50

Chi. Square Analysis (Overall)

Table VIII: Overall Chi. Square Analysis of incidence of Trematods Parasite (Jan, 2015 to Dec., 2015)

Parasite	X ² Value
<i>Genarchopsissingularis</i>	9.29

Table VI: Showing details month - wise incidence of *Genarchopsissingularis* infection in fish. *Channa punctatus* collected from RajkiyaMatasya Pond, Faridpur, Bareilly region during January 2015 to December 2015

Months	No. of fishes invasion	No. of fishes infected		Percentage incidence of infection on the basis of body weight of fishes			Percentage incidence of infection on the basis of body length of fishes		No of flukes recovered	No of flukes per host	Mean intensity	Index Invasion
		Male	Female	Below 90 gm	90 - 120 gm	Above 120 gm	Below 10 cm	Above 10 cm				
January	5	-	-	-	-	-	-	-	-	-	-	-
February	5	2	-	-	20	20	20	20	4	0.8	2	0.32
March	5	2	2	20	40	40	40	40	6	1.2	-	-
April	5	3	-	20	20	20	40	20	6	1.2	2	0.72
May	5	2	-	-	20	20	20	20	3	0.6	1.5	0.24
June	5	1	-	-	20	-	20	-	1	0.2	1	0.04
July	5	-	1	-	20	-	-	20	3	0.6	3	0.48
August	5	1	1	-	20	20	20	20	6	1.2	3	0.48
September	5	1	-	20	-	-	20	-	2	0.4	2	0.48
October	5	1	-	-	-	20	20	-	1	0.2	1	0.04
November	5	-	-	-	-	-	-	-	-	-	-	-
December	5	-	-	-	-	-	-	-	-	-	-	-
Total	60	13	4	3	8	7	10	7	32	-	-	-

Chauhan (1953) in the comprehensive work on the family Hemiuridae maintained the genera Progonous and Ophiocorchis synonyms of the genus Genarches and transferred these species under it. Yamaguti (1958, 1971) synonymised the genus Ophiocorchis Srivastava, 1933 (Progonus Looss, 1899, Preoccupied; Genarches Looss, 1902 Preoccupied) with Genarchopsis Ozaki, 1925. Srivastava (1933) described Ophiocorchis singularis from the intestine of Channa marulius of Allahabad. Gupta (1951) collected some specimens from Channa punctatus at Lucknow and Saharanpur, U. P. and referred them to as new species Ophiocorchis indicum. Chauhan (1954) remarked that the differences enumerated by Gupta do not merit the establishment of a new species and the two species should be considered identical. The present specimen have been collected from Channa punctatus. Thus, it is evident that O. indicum is conspecific with O. singularis as suspected by Chauhan (1954). The present collection, however, forms a new locality record. Host: Channa punctatus (Bl.) Location: Body cavity, stomach and intestine.

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