



Knowledgeable Research

ISSN 2583-6633

Vol.02, No.02, September, 2023

<http://knowledgeableresearch.com/>

Study of demographic pattern and prevalence of trematode parasite of digenia in *Channa punctatus* (Fresh Water Fish) of the Rohilkhand Region

ATUL KUMAR & RAMESH CHANDRA

Dept. of Zoology

Bareilly College Bareilly (U.P.)

Swami Shukdevanand College, Shahjahanpur

Email: emailtoatulpatel@gmail.com

Abstract: Fish is an important article of food. It serves as a host to a number of pathogens. Most of the fishes produce commercially most important by products. Fishes have ectoparasitic & endoparasitic diseases. Parasite produces an important role in growth of fishes and other animals. No systematic work has been done on trematodes and fish diversity of Rohilkhand region. So there is no record on impact evaluation of demographic parameter of parasite of fish community.

Keywords: *Channa punctatus*, *Isoparorchis hypselobangri*, Trematode parasite, demographic pattern and prevalence.

Introduction: The most diverse form of vertebrates on earth are fishes. Fishery is of great importance to human beings. Fishing industries yield a number of byproducts of commercial importance. The aquatic environment is of paramount importance of fish growth. The fishes are aquatic and cold blooded and suffers from various ectoparasite and endoparasite.

These parasitic diseases broadly can be classified as pathogenic and non pathogenic origin of disease. But pathogens are always present on fish body in aquatic environment.

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 parasite.

Taking into consideration that no systematic work has been carried out on the trematode fish diversity of this region and 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 chopra et al (1983), Srivastava & Jauhar (1983) and Tripathi (1990). The work on 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.

Topographical factors of study area

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. Annual temperature ranges from 5°C to 44°C and average rainfall is 800 mm. Generally the climate is moderate humid and cloudy.

Rivers of study area

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. Aril river originates in Moradabad and enters through Aonla in district Bareilly and merges with Ramganga.

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

Sl. no.	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	Rajkiya Matasya Pond
5.	Baheri	48 km	River Bhargura

**Table : II General characters of fish collection sites in different of Bareilly region
during Jan. 2005 to Dec. 2005.**

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 General characters of fish collection sites in different of Bareilly region
during Jan. 2006 to Dec. 2006.**

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	7.0-8.7	7.3-8.0	7.9-9.9	7.6-8.8	7.9-8.7	6.0-7.0	6.2-7.3
7	Temperature("C)	12.0-27.0	12.5-28.3	13.5-28.2	12.6-27.5	12.8-27.9	12.0-26.0	12.6-27.0
8	DO ₂ (mg/l)	5.5-6.0	5.3-6.9	6.3-7.8	6.8-7.9	6.3-7.5	4.4-5.0	4.32-5.31
9	Hardness (mg/l)	290-350	320-400	280-310	275-365	250-380	210-300	200-295

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 : IV Showing climatological data of bareilly distict between January 2005 to December 2005.

Month	Temperature(°C)		Humidity (%)		Rainfall (mm)	No. of Rainy Days
	Minimum	Maximum	Minimu m	Maximu m		
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
Septembe r	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 colloboration with Meterological centre, Amosy Airport, Lucknow.

Table : V Showing climatological data of bareilly distict between January 2006 to December 2006.

Month	Temperature(°C)		Humidity (%)		Rainfall (mm)	No. of Rainy Days
	Minimum	Maximum	Minimum	Maximum		
					Trace (less than 0.1 mm)	
April	21.87	37.48	25.8	49.2		4
May	25.09	37.99	41.41	63.93	92.1	8
June	26.65	34.43	68.46	80.06	223.4	16
July	25.82	32.84	76.63	95.18	492.5	15
August	26.45	35.13	64.92	90.00	94.8	12
September	24.63	35.73	50.28	82.96	11.5	4
October	19.57	32.10	43.6	88.00	26.2	4
November	14.16	28.91	50.25	87.35	7	1
December	10.61	25.87	62.14	85.09	0.2	1
January	7.23	19.20	71.03	89.50	8.7	3
February	11.2	25.9	50.20	80.35	20.3	4
March	15.40	31.50	35.20	67.00	3.5	2

In colloboration with Meterological centre, Amosy Airport, Lucknow.

MATERIAL & METHOD

The fishes were obtained either from local fish market of the study area or were collected from the spots at Rivers Ramganga, Nakatia, Begul and Chaudhari ponds and Rajkiya Matasya pond. The fishes were also obtained from local ponds in and around the vicinity of Bareilly district.

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.

The organs were open slightly with the help of scissors and forceps. So as to allow the flukes to loosen the contact with the host's tissue and the come out and settled down on the bottom of the petridish. Then the worms were picked up with the help of a micro-dropper and transferred to a slide to flattened them. For detailed study the worms were transferred to a mixture of 70% alcohol and 5% glycerine, sometimes also with a few drops of lactic acid and then examined under the microscope. For permanent preparations the worms fixed under slight pressure of cover slip in 70% alcohol or Bouin's fluid, stain with aceto alum carmine or chrlich's hematoxylin, cleared in clove oil and mounted in canada balsam.

The live worms were also examined under a microscope particularly for the excretory system and contents of cirrus sac. All the measurements were taken from the fixed specimens by using as acculometer 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.

Parasite Host List :

Digenetic Parasite	Host	Location
<i>Isoparorchis hypselobangri</i> Billet, 1898; Odhner, 1911	<i>Channa punctatus</i> (BI)	Body intestine

Observation :-

Study of Parasite

1. *Isoparorchis hypselobangri* (Billet, 1898; Odhner, 1911)

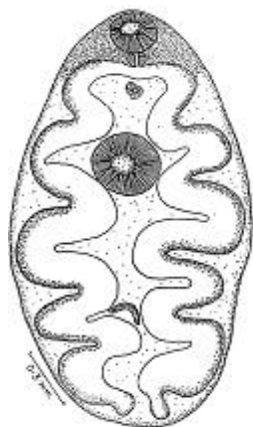
Family : Isoparochiidae poche

Genus : *Isoparochis* Southwell

Description :-

Body large, cylindrical, unspired with thick cuticle, flesh coloured translucent when expended, foliate with blunty projected anterior and broadly rounded posterior extremity and measures 1.02-4.05x0.62-1.07. Oral sucker is subterminal, oval, 0.16-0.39x0.17-0.49. Prepharynx absent, pharynx well developed. Oesophagus indistinguishable. Intestinal caeca long, serpentine, extending to near posterior end of the body. Acetabulum is large than oral sucker, rounded, situated in the anterior half of the body and measures 0.27-1.02. Gonads indistinguishable. Genital half of the body and measures 0.27-1.02. Gonads indistinguishable. Genital pore situated between the two suckers at a distance of 0.31-0.16.

Excretory vesicle Y-shaped, excretory pore terminal.



Photograph of collection site

120 specimens of *Channa punctatus* were collected from Deorania river, River Ramganga and Rajkiya Matasya Pond, Bareilly. Out of these 44 fishes were found infected with this species. The number of specimens collected from above localities were 120. Out of this maximum number of worms collected from a single host were 7.

Result and Discussion

Isoparorchis hypselobagri (Billet, 1898) has been described as the type species of the genus *Isoparorchis southwell*, 1913. The metacercaria of this species has been recorded from a number of fresh water fishes like Wallago attu and Barbus tor as has been listed by Pandey (1970) and Srivastava (1972). Srivastava (1977) discussed its host, distribution and relationships.

This is the first host and locality record of the larva from District Bareilly (U.P.).

Host: *Channa punctatus* (Bl.)

Location: Body cavity

Locality: Deorania River, River Ram Ganga and Rajkiya Matasya Pond, Bareilly

Table 6A : Showing details month-wise incidence of *Isoparorchis hypsilobagri* infection in fish. *Channa punctatus* collected from Deorania river, River Ram Ganga and Rajkiya Matasya Farm in Bareilly region during January 2005 to December 2005

Months	No. of fishes examined	No. of fishes infected		Percentage incidence of infection on the basis of body weight of fishes		Percentage incidence of infection on the basis of length of fishes		No. of flukes recovered	No. of flukes per host	Mean intensity	Index invasion
		Male	Female	Below 90 gm	Above 90-120 gm	Below 10 cm	Above 10 cm				
January	5	-	-	-	-	-	-	-	-	-	-
February	5	2	-	-	20	20	20	2	0.40	1.00	0.16
March	5	1	-	-	-	-	20	2	0.40	2.00	0.08
April	5	2	2	-	40	40	40	6	1.20	1.50	0.96
May	5	3	1	-	20	40	40	4	0.80	1.00	0.64
June	5	2	1	-	-	40	40	2	0.40	0.66	0.24
July	5	1	1	-	20	-	40	3	0.60	1.50	0.24
August	5	1	-	-	20	20	-	2	0.40	2.00	0.08
September	5	2	-	-	-	20	20	2	0.40	2.00	0.08
October	5	1	1	-	20	20	20	3	0.60	1.50	0.24
November	5	1	-	-	20	20	-	2	0.40	2.00	0.08
December	5	1	-	-	20	20	-	1	0.20	1.00	0.04
Total	60	17	6	-	9.0	8.0	13.0	29	-	-	-

Table 6B : Showing details month-wise incidence of *Isoparorchis hypsilobagri* infection in fish. *Channa punctatus* collected from Deorania river, River Ram Ganga and Rajkiya Matasya Farm in Bareilly region during January 2006 to December 2006

Months	No. of fishes examined	No. of fishes infected		Percentage incidence of infection on the basis of body weight of fishes		Percentage incidence of infection on the basis of length of fishes		No. of flukes recovered	No. of flukes per host	Mean intensity	Index invasion
		Male	Female	Below 90 gm	Above 90-120 gm	Below 10 cm	Above 10 cm				
January	5	2	-	-	20	-	40	4	0.80	2.00	0.32
February	5	1	-	-	-	-	20	2	0.40	2.00	0.08
March	5	3	-	20	20	40	20	6	1.20	2.00	1.72
April	5	3	1	-	20	20	40	7	1.40	1.75	0.18
May	5	1	-	20	-	-	20	2	0.40	2.00	0.08
June	5	1	-	-	20	20	-	1	0.20	1.00	0.04
July	5	1	1	-	20	20	20	5	1.00	2.50	0.40
August	5	1	1	20	-	20	20	6	1.70	3.00	0.48
September	5	1	-	-	20	-	20	3	0.60	3.00	0.48
October	4	1	-	-	-	20	20	2	0.40	2.00	0.08
November	5	2	-	-	20	20	20	5	1.00	2.50	0.08
December	5	2	-	-	20	20	20	5	1.00	2.50	0.40
Total	60	18	3	4.0	7.0	8.0	12.0	45	-	-	-

Overall Incidence of Trematode Parasite

Table : VII Incidence of Trematodes (Jan, 2005 to Dec., 2006)

Parasite	No. of individual infected	Parasitization percentage rate	Mean no. of parasite per host
<i>Isoparorchis hypselobagri</i>	44	36.67	0.62

Chi. Square Analysis (Overall)

Table VIII Overall Chi. Square Analysis of incidence of Trematods Parasite (Jan. 2005 to Dec. 2006)

Parasite	X ² Value
<i>Isoparorchis hypselobagri</i>	8.00

Table : IX overall chi-square analysis of seasonal incidence of trematode parasites (january 2005 to december 2006)

Parasite	X ² Value
<i>Isoparorchis hypselobagri</i>	3.05

CONCLUSION

OVERALL CHI-SQUARE ANALYSIS OF INCIDENCE OF TREMATODES (JANUARY, 2005 TO DECEMBER, 2006)

Table revealed that the Chi-square value of parasites *lupururchis hypselobagri* were found to be 8.00, This value indicated that their parasite distributed normally over the months of selected time period.

OVERALL CHI-SQUARE ANALYSIS OF SEASONAL INCIDENCE OF TREMATODE PARASITES (JANUARY 2005 TO DECEMBER 2006)

A perusal of table ix shows that the Chi-square value of parasite *Isoparorchis kypselobagri*, were found to be 3.05 for occurrence on their respective host. These value shows non-significant effect of season on the occurrence of parasites on their respective hosts.

Bibliography

- Chauhan, B.S. (1953). Studies on the trematode fauna of India IV. Sub-class Digenea (Prostomata). A revision of Hemiuroidea from the Indian region. *Rec Indian Mus.*, 51: 289-293.
- Chauhan, B.S. (1954), Studies on the trematode fauna of India, Part II, Sub class Aspidogastrea. *Rec. Ind. Mus.*, 51: 209-230.
- Chopra, A.K. Kumar, A. & Singh, H.R. (1983). *Diplostomum tetrai* a new metacercariae from a cold water fish, *Schizothorax richardsoni* from Garhwal Himalayas. *Indian J. Parasitol.*, 7: 89-91.
- Gupta, S.P. (1950). On a new trematode *Allocreadium thapari* n.sp. of the subfamily Allocreadiinae Looss. 1899, from the intestine of a fresh water fish, *Rita rita* (Ham.) *Indian J. Helminth.*, 2(1): 17-22.
- Hargis, W.J. Jr. (1953). Chloretona as a trematode relaxer and its use in mass collection techniques. *J. Parasitol.*, 39(3): 224-225.
- Jauhari, R.K. & Tripathi, L.K. (1990). On a new digenetic trematode *Gangatrema hanumanthal* n.sp. from the intestine of a fish, *Schizothorax richardson* from Garhwali Himalayas. *IndianJ. Parasitol.*, 7: 89-91.
- Mizelle, J.D. (1936). New species of trematodes from the gill of Illinois fishes. *Amer. Midl. Nat.*, 17: 785-806.