

# Diversity of Helminth parasites in freshwater fishes from Parbhani region (MS) India

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## ABSTRACT

The current study deals with the study of helminthes parasites from Parbhani region (M.S.) India, during July 2018 to June 2019 this report summarizes the data of incidence, density and intensity of infection of helminthes parasites in freshwater fishes in relation to ecological factors. Fish samples were collected from two main localities i.e. Yeldari dam, Masoli dam, in Parbhani District region examined helminthes parasites included three classes i.e. Cestode, Nematode and Trematode. During the present investigation 879 fishes were examined, in which 487 fishes were infected with 07 genera of helminthes parasites among these 04 were cestodes, one was nematode and 02 trematode. The current studies are useful for the status of diversity of helminthes parasites from Parbhani region.

## 1. Introduction

India is the third rank production of fish in the world and second rank in inland Fish production. Fisheries are significant role for the Indian economy it provides employment opportunities, is a source of foreign exchange earnings and nutritional food. The entirely fish production is 6.4 Million Metric Tonnes (mmt) of which 3.4 mmt is inland and 3.0 mmt is sea production but fish farming remains a high risk investment, mostly due to the disease problems caused by parasitic infections. The study of helminthes parasites in freshwater fishes was undertaken to examine the internal helminth parasitic environment of the host and the environmental factor such as season, temperature, humidity, age of the host. The general parasites of fishes causing the profitable losses like the helminth parasites such as Diphylobothrium (1758), Senga Dollfus (1964), Spinitectus Fourment, (1883), Lytocestus Cohn, (1908). However, very little is known about the parasitic diversity of fishes of the India in comparison with the information available from other country regions of the continent. Fishes are host to many adult and larval forms helminth parasites, the adult of which occur in amphibians, reptiles, mammals and birds as well as predatory fish. The strict dependence of the parasite on its host and the utilization of the latter by the former provide a helpful research model in the field of evolutionary biology and ecology. A number of investigations have studied helminthes parasites of freshwater fishes. But the work of these study in relation to the, host specificity, population dynamics, organ specificity. Therefore one objective of this investigation was to determine monthly incidence of infection; difference in intensity of infection and the second was to conclude variation in parasite biodiversity with the diet of the host, difference in infection with the habitat type.

## 2. Material and Method

The freshwater fishes were collected from different places of Parbhani region during the period of July 2018 to June 2019. Fishes were open up dorso-ventrally and the interior organs examined. The complete digestive system was removed and placed in a Petri dish with physiological saline. Infection of every group of parasites was treated as follows: collected trematode and cestodes were first relaxed and then fixed in

hot 04% formalin and stained using Harris haematoxyline. Stained parasites were cleaned with distilled water, dehydrated in ascending grades of alcohol, cleared in xylene, mounted in D.P.X. solution Nematodes were fixed in hot 10% Glycerol and cleared in lacto phenol. Drawings were made using a camera lucida. (Weesner Francis 1964). The recognition is made with the help of "Systema Helminthum" by the scientist Yamaguti (1961). Population dynamics of helminth parasites were determined by following formulae,

- 1) Incidence of infection =  $\frac{\text{Infected host} \times 100}{\text{Total hosts examined}}$
- 2) Intensity of infection =  $\frac{\text{No. of parasites collected in a sample}}{\text{No. of infected host}}$
- 3) Density of infection =  $\frac{\text{No. of parasites collected in a sample}}{\text{Total host examined}}$
- 4) Index of infection =  $\frac{\text{no. of host infected} \times \text{No. of parasite collected}}{\text{Total hosts examined}}$

## 3. Result and Discussion

The study was carried out among 879 freshwater fishes in which *Clarius batrachus* (Linnaeus 1758), *Mastacembalus armatus* (Lecepede, 1800), *Channa punctatus* (Bloch) and *Wallago attu* (Bleaker, 1857) from various places of Parbhani region. Out of 879 fresh water fishes 487 were contaminated with helminth parasites in which cestode, nematode and trematode were found in one annual cycle. A entire 689 helminth parasites were occurs during the present study. They were belonging with 03 classes in which total 07 genera are occurred, out of them 04 from cestode [Dollfus Senga, (1934), Circumoncobothrium Shinde, (1968), Lytocestus Cohn, (1908), Gangesia Woodland, (1924)], 02 from trematode [Allocreadium Looss, (1900), Tubangui, (1931), Orientocreadium and 01 from nematode [Procamallanus Baylis, (1923)]. During the present study the high rate of infection of trematodes and cestodes occurs as compare to nematodes parasites. The values for the intensity, incidence, density of infection in Table no.1 whereas the Table no. 2 shows effects of season on parasitic infection of helminthes parasites from freshwater fishes. The incidence of infection of trematodes and cestodes was maximum in summer season

(41.55%, 23.91%) correspondingly, while cestode low in winter season (27.95%) and trematode modest in winter season (9.44%) and but in cestode reasonable in rainy season (40.14%), while trematode least in rainy season (07.06%) but nematode parasites incidence of infection was maximum in winter season (13.66%) though moderate in summer season (08.64%) and least in rainy season (0.40%). Regarding the parasitic biodiversity and population research trematode and cestode indicates abundance population as compare to nematode parasites. This may be due to, growth of parasites requires high low humidity, temperature and less rainfall which is the favorable for the growth of parasites except nematode parasites. The valuable data pertaining to the effects of seasons on the helminth parasites was contributed by many workers such as Tornquist (1931) who put forth description about the efficient method of occurrence of few fish parasites *Camallanus lacustus* that the infective phase invade the host all through summer, the growth and maturation takes place through autumn and winter release of their infective progeny occurs in summer. Study of seasonal infection of fish infected with Caryophyllids has been done in other countries by various workers Anderson, Hanley (1976), Progestrom and Haluorson (1968) in *B.rutilius*, Karnaev (1960) in carps They observed high infection in summer. Homes and Kennedy (1976) observed the factors such as distribution mode of feeding and environment of the host the diet, often play important role to limit a parasite to a specific host species, as well as high prevalence occur in specific season. During summer season the symptom of cestode parasite was highest because of temperature which helps to hatching eggs of parasites and increases the rate of parasites while as rainy comparatively shows very low infection of the parasites. The L. Szidat (1956) he confirmed that "parasites are influenced by the same situation of specific variation and phylogenetic development as free living organism. The only difference is that they are affected by the wide exterior environment surrounding the host, but just by the host itself acting as the environment. The latter produces stimuli which help further development" (Szidat 1956). This report is radical contradiction to the following statement by Dogel V.A. (1947), "parasites are connected by a lot of strong links to the external environment surrounding the host itself". The second theory of Soviet parasitology is the study of the entire parasites inhabiting the host organism, in which they form a definite aggregation, the parasite fauna. Dogel V.A. (1934, 1935, 1947, and 1948) defines the problem confronting ecological parasitology as the study of the dependence of the parasitofauna as a entire on the changes in the external situation near the host and on changes in the physiological state of the host itself i.e. the environment of the order. This line of study has proved to be extremely help ful. The infections of *Lytocestus* species, are observed in only *Clarius batrachus* and *Senga* species, *Circumon cobothrium* sp. and *Allocreadium* are heavily occurs in *Mastacembelus armatus*. The infection of *Senga* sp, *Orientocreadium* sp. in

*Channa punctatus* and while *Procamallanus* sp, *Gangesia* sp, is occurs in *Wallago attu*, due to of the host specificity. Physiological, Morphological and ecological factors play very important role in the host specificity. *Circumon cobothrium* sp, *Procamallanus* sp., *Senga* sp., *Gangesia* sp. were specially recovered from intestine *W. attu* and *M. armatus* whereas *Allocreadium* sp. were recovered from lung *M. armatus*. *Lytocestus* are recovered from stomach of *Orientocreadium* sp. and *C. batrachus* were recovered from intestine and stomach of *C. punctatus* This suggests that the worms are site specific and possibly derive certain nutrients from the organs. This needs further research to establish the reasons for organ specificity. The subject of organ specificity among fish parasites has been noted by different researches for example, Jones and William (1994) reported that host and organ specificity is determined by environmental requirements of the hosts and the parasites. Hosts when they share the same surroundings and have, for example, similar feeding requirements are likely to harbor parasites which are closely associated taxonomically. One more interesting observation during current study was differentiation in parasitic infection with sampling stations. Even though *Mastacembelus armatus* was more infected than the other fish hosts, the intensity of infection of this fish with various parasites varied from one station to another station. At Yeldari and siddeswar dam the fish was heavily infected with the nematode and cestode while the other parasites occurred little in numbers or absent. At Yeldari dam, same the fish was heavily infected by the cestode parasites. Noteworthy is the fact that the entire *Channa punctatus* and *Clarius batrachus* from Masoli dam did not harbor any nematodes. The above variations can be attributed to changes in physico-chemical parameters or difference in food habits of the host. Among the *Wallago attu* those from Masoli dam were observed to be more heavily infected by the nematode. Anders and Moller (1986) state that fish from more polluted water tend to harbour more helminth parasites than those from not as much of polluted waters. Polanski (1961a) confirmed that the major factors determining the diversity of parasite fauna as well as the incidence and intensity of infection can be described as follows: Lifespan of the host, The diet of the host, the mobility of the host all over its life including the variety of habitats it encounters, its size attained and population density, large hosts provide supplementary habitats suitable for parasites than do small ones. During present study, *Mastacembelus armatus* which was the most greatly infected was observed to feed mostly on a special type of zooplankton and other small fishes. A few of these parasites cause diseases to fish, affecting their reproduction and health making them fall easy prey to predators and a little infect man. In fish farming, parasites may lead to epidemics and mortalities, resulting in financial losses (Polling and Khalil, 1997). The purpose of present study was to estimate the current status of parasite incidence in this region Parbhani and to provide parasitologic and epidemiologic data.

Month	Name of Parasite	No. of host examined	Total host infected	No. of host infected	Total no parasite collected	Density %	Incidence %	Intensity %	Index of infection	Habitat	Locality
Jul. 2018	Cestode	47	32	28	29	0.61	59.57	1.03	17.27	Intestine	yeldari
	Trematode			05	06	0.12	10.63	1.2	0.63	Liver	
	Nematode			00	00	00	00	00	00	----	

Aug. 2018	Cestode	46	17	14	15	0.32	30.43	1.07	4.56	Intestine	Siddeswar
	Trematode			03	04	0.08	06.52	1.33	0.26	Liver	
	Nematode			00	00	00	00	00	00	----	
Sep. 2018	Cestode	61	11	10	14	0.22	16.39	1.4	2.29	Intestine	yeldari
	Trematode			00	00	00	00	00	00	----	
	Nematode			01	02	0.03	01.63	02	0.03	Intestine	
Oct. 2018	Cestode	72	07	01	01	0.01	01.38	01	0.01	Intestine	Siddeswar
	Trematode			00	00	00	00	00	00	-----	
	Nematode			06	07	0.09	08.33	1.16	0.58	Stomach	
Nov. 2008	Cestode	78	34	22	25	0.32	28.20	1.13	7.05	Intestine	yeldari
	Trematode			08	09	0.11	10.25	1.12	0.92	Intestine	
	Nematode			06	14	0.17	07.69	2.33	1.07	Intestine	
Dec. 2018	Cestode	76	58	34	39	0.51	44.73	1.14	17.44	Intestine	Siddeswar
	Trematode			14	17	0.22	18.42	1.21	3.13	Liver	
	Nematode			19	31	0.40	25	1.63	7.75	Intestine	
Jan. 2019	Cestode	88	46	33	42	0.47	37.5	1.27	15.75	Intestine	yeldari
	Trematode			08	14	0.15	09.09	1.75	1.27	Liver	
	Nematode			12	26	0.29	13.63	2.16	3.54	Intestine	
Feb. 2019	Cestode	84	52	24	39	0.46	28.57	1.65	0.01	Stomach	Siddeswar
	Trematode			14	17	0.20	16.66	1.21	2.83	Intestine	
	Nematode			19	22	0.26	22.61	1.15	4.97	Intestine	
Mar. 2019	Cestode	82	59	34	49	0.59	41.46	1.44	20.31	Intestine	yeldari
	Trematode			22	24	0.29	26.82	1.09	6.43	Liver	
	Nematode			07	10	0.12	08.53	1.42	0.85	Intestine	
Apr. 2019	Cestode	88	56	36	52	0.59	40.90	1.44	21.27	Stomach	Siddeswar
	Trematode			19	22	0.25	21.59	1.15	4.75	Liver	
	Nematode			02	04	0.04	02.27	02	0.09	Intestine	
May 2019	Cestode	85	69	47	72	0.84	55.29	1..53	39.81	Intestine	yeldari
	Trematode			26	29	0.34	30.58	1.11	8.87	Liver	
	Nematode			01	01	0.01	01.17	01	0.01	Intestine	
Jun. 2019	Cestode	72	46	39	44	0.61	54.16	1.12	23.83	Intestine	Siddeswar
	Trematode			08	09	0.12	11.11	1.12	01	Liver	
	Nematode			00	00	00	00	00	00	----	
Total		879	487	522	689	0.78	55.40	1.41	381.73		

Note: Above table content 02 column show **infected host** because one column shows whole helminthes parasites infected host whiles other column infected host shows specific class wise

**Table 02) Influence of seasons on parasitic infection**

Genera	Seasons	Incidence %	Intensity %	Density %	Index of infection
<b>Cestode</b>	Rainy	40.14	01.15	0.44	11.99
	Winter	27.95	01.13		10.06
	Summer	41.55	01.51	0.62	20.35
<b>Nematode</b>	Rainy	0.40	0.5	0.007	0.007
	Winter	13.66	01.82	0.23	03.23
	Summer	08.64	01..39	0.10	01.48
<b>Trematode</b>	Rainy	07.06	0.91	0.26	0.47
	Winter	09.44	01.13	0.12	01.36
	Summer	23.91	01.34	0.27	05.72

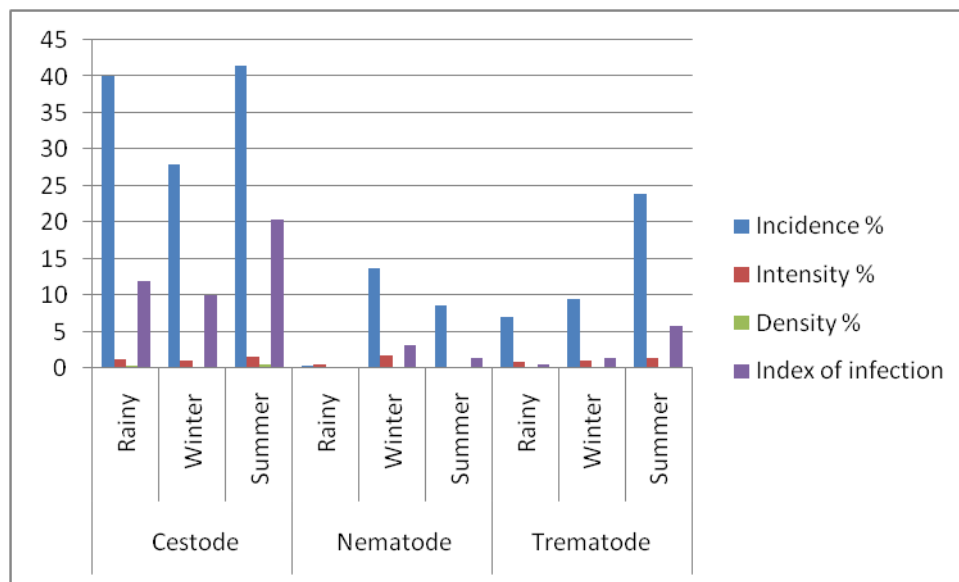


Figure 3) Influence of seasons on parasitic infection

#### 4. Conclusion

The one year study has shown that fresh water fishes from Parbhani District region harbor a broad range of parasites specially the helminthes parasites. The study has recognized that the *Mastacembalus armatus* fish is one of the most heavily infected fish species as compare to *Wallago attu*, *Clarius batrachus* and *Channa punctatus*. Present study thus highlights on the details of therefore is, the only one that has given some details on the endoparasitic organisms infecting

freshwater fish species along the Parbhani region. However, the above study can only be complete if it covers a entire season to investigate the following:

Seasonal difference in incidence of infection, variation in parasite fauna with the diet of the host, variation in intensity of infection, difference in infection with the habitat type.

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