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Trends in Fisheries Research
An International Peer-Reviewed Journal
UGC Approved Journal No: 63495
www.sciencejournal.in

STUDIES ON POPULATION DYNAMICS OF HELMINTH PARASITE *CIRCUMONCOBOTHRIUM SP.* IN FRESHWATER FISH *MASTACEMBELUS ARMATUS* FROM LATUR DISTRICT (MS) INDIA

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ABSTRACT
The present study deals with the Population dynamics of helminth Parasite *Circumoncobothrium* sp. in freshwater fish *Mastacembelus armatus* from Latur District (MS) India. The survey was conducted during, annual cycles 2011 to 2013 from different sampling station to estimate the **Population dynamics**. For this study 368 freshwater fish *Mastacembelus armatus* selected. Fish samples were collected from different localities of Latur District, Maharashtra State, namely Ausa, Nilanga, Ahemadpur, Deoni, Jalkot, Renapur, Latur, Shirur-Anantpal, Chakur and Udgir. The population dynamics shows the prevalence, mean intensity, abundance and dominance of the collected cestode *Circumoncobothrium sp.*

KEYWORDS: *Circumoncobothrium* sp., Freshwater fish, *Mastacembelus armatus*, Population dynamics.

INTRODUCTION

India is the mega biodiversity country in the world. Fish are the most important inhabitants of the aquatic ecosystem mainly marine and fresh water and provides the human population cheap and easily digestible proteins. In India it is estimated that about 10 million tons of fishes are required to meet the annual demand of fish proteins as compared to an actual annual production of only 3.5 million tons (Shukla and Upadhyay, 1998). The major component of fish is protein. Fish proteins have a high biological value. It also contains variable quantities of calcium, phosphate, fat and other nutrient important for human health and growth. Fish provides the world's prime source of high quality protein, 14-16% of the animal protein consumed worldwide; over one billion people consume fish as their primary source of animal protein.

Recent studies indicate that of 750 species of freshwater fish species found in India, a large number of them are familiar only to the local population. Intestinal parasitic helminths have a serious impact on fish health, productivity, quality and quantity of meat. Fish parasitic populations are known to differ due to variation in the environment and host population (Dogial, 1961). Helminth parasites of fishes are commonly divided into three main groups; cestodes, nematodes and trematodes. Kennedy, (1975) stated that population investigation can provide date for the predication of integrated methods to achieve the regulation of numbers of harmful parasites, because it has been stated that a single method of control have little value, whereas co-ordinated activities ameliorate the infection.

MATERIAL AND METHOD

Examination of fish for collection of parasites:

Examination of intestinal parasites was carried out by using the method described by Hassan *et al.*, (2010). After the separating and counting the population of different helminth parasites from different freshwater fishes the parasites were preserved in separate bottles. Some of these were used for the taxonomic study.

Statistical analysis employed for the population dynamics studies of helminth Parasites:

The definitions and formulae of prevalence, mean intensity and relative density given by Margolis *et al.*, (1982) and Index of infection given by Tenoza and Zejda (1974)

RESULT AND DISCUSSION

Infection of *Circumoncobothrium* sp. in *Mastacembelus armatus* during 2011-12:

Average month wise variations in the Prevalence, Mean Intensity and Relative Density of *Circumoncobothrium sp.* in *Mastacembelus armatus* were as follows:
During observation of population dynamics of *Circumoncobothrium sp.* a total 182 fishes of *Mastacembelus armatus*, out of which 90 males and 92 females were examined. Among them 19 males and 18 females found infected, resulting

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in maximum 57.14 % prevalence of infection in males and 37.50 prevalence of infection in females for year 2011-12 (Table-1 and Graph-1).

Incidence of Infection:
The maximum prevalence (57.14) in male was recorded in the months of March, and May. Whereas minimum (0) in June, July, August and September, in rest of months between (12.50) to (28.57). The maximum prevalence (37.50) in female was recorded in the months of, March and May. Whereas minimum (0) in July, in rest of months between (12.50) to (28.57) (Table 1 and Graph-1).

Intensity of infection
The maximum mean intensity (3.00) in male was recorded in the months of April, October, and December. Whereas minimum (0) in June, July, August, September, in rest of months between (1.25) to (2.00); (Table 20). The maximum mean intensity (5.0) in female was recorded in the months of November. Whereas minimum (0) in July. In rest of months between (1.00) to (3.00) (Table 1 and Graph-1).

Density of infection
The maximum relative density (0.86) in male was recorded in the months of March. Whereas minimum (0) in June, July, August, September, in rest of months between (0.38) to (0.75) (Table 20 and Figure 28). The maximum relative density (0.75, 0.71) in female was recorded in the months of May, April and November respectively. Whereas minimum (0) in July, in rest of months between (0.13) to (0.57); (Table 1 and Graph-1).

Table 1: Monthly and gender wise prevalence, mean intensity and relative density of helminth parasites (February 2011 to January 2012)
Host: ***Mastacembelus armatus*** **Genus:** ***Circumoncobothrium sp.***

Month and Year	No. of fish Examined		No. of fish Infected		No. of Parasites collected		Prevalence		Mean Intensity		Relative Density		Locality
	M	F	M	F	M	F	M	F	M	F	M	F	
Feb. 11	7	8	2	2	4	4	28.5	25	2	2	0.57	0.5	Ausa
Mar. 11	7	8	4	3	6	4	57.1	37.5	1.5	1.3	0.86	0.5	Nilanga
Apr. 11	8	7	2	2	6	5	25	28.5	3	2.5	0.75	0.71	Chakur
May. 11	7	8	4	3	5	6	57.1	37.5	1.2	2	0.71	0.75	Deoni
Jun. 11	8	8	0	1	0	1	0	12.5	0	1	0	0.13	Jalkot
Jul. 11	7	8	0	0	0	0	0	0	0	0	0	0	Ausa
Aug. 11	7	8	0	1	0	2	0	12.5	0	2	0	0.25	Latur
Sep. 11	8	7	0	1	0	2	0	14.2	0	2	0	0.29	Udgir
Oct. 11	8	8	1	1	3	3	12.5	12.5	3	3	0.38	0.38	Chakur
Nov. 11	8	7	2	1	4	5	25	14.2	2	5	0.5	0.71	Udgir
Dec. 11	7	8	1	1	3	3	14.2	12.5	3	3	0.43	0.38	Ausa
Jan. 12	8	7	3	2	5	4	37.5	28.5	1.67	2	0.63	0.57	Latur
Total	90	92	19	18	36	39	257	235.7	17.4	25.8	4.82	5.16	

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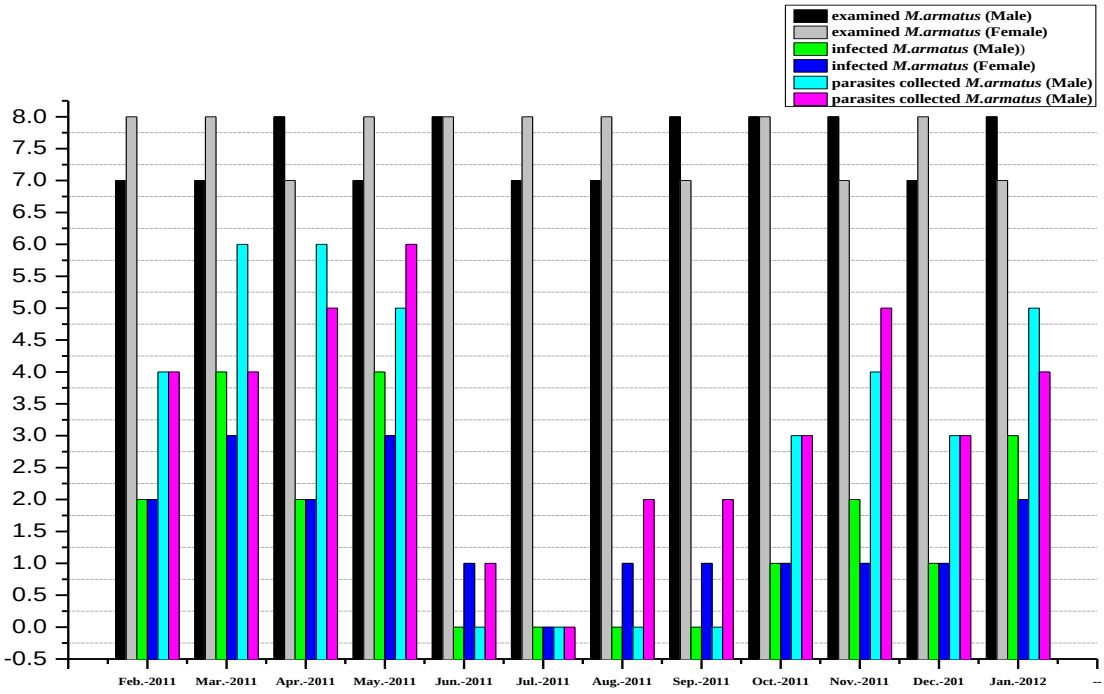
Table 2: Monthly and gender wise prevalence, mean intensity and relative density of helminth parasites (February 2012 to January 2013)

1. Host : *Mastacembelus armatus* **Genus: *Circumoncobothrium sp.***

Month and Year	No. of fish Examined		No. of fish Infected		No. of Parasites collected		Prevalence		Mean Intensity		Relative Density		Locality
	M	F	M	F	M	F	M	F	M	F	M	F	
Feb. 12	8	8	4	4	8	8	50	50	2.00	2.0	1.00	1.00	Ausa
Mar. 12	7	8	3	3	11	9	42.8	37.5	3.67	3.0	1.57	1.13	Nilanga
Apr. 12	8	8	3	4	10	8	37.5	50	3.33	2.0	1.25	1.00	Udgir
May. 12	8	8	4	4	8	8	50	50	2.00	2.0	1.00	1.00	Deoni
Jun. 12	8	8	1	1	1	2	12.5	12.5	1.00	2.0	0.13	0.25	Jalkot
Jul. 12	7	8	0	1	0	4	0	12.5	0.00	4.0	0.00	0.50	Renapur
Aug. 12	7	8	1	1	4	3	14.2	12.5	0.00	3.0	0.57	0.38	Latur
Sep. 12	8	7	1	2	2	3	12.5	28.5	0.00	1.5	0.25	0.43	Udgir
Oct. 12	8	8	1	2	3	6	12.5	25	3.00	3	0.38	0.75	Chakur
Nov. 12	8	7	2	2	6	4	25	28.5	3.00	2	0.75	0.57	Udgir
Dec. 12	7	8	2	1	7	6	28.5	12.5	3.50	6	1.00	0.75	Ausa
Jan. 13	8	8	4	2	5	6	50	25	1.25	3	0.63	0.75	Latur
Total	92	94	26	27	65	67	335.7	344.6	22.7	33.5	8.52	8.50	



Graph-1: Showing month wise and gender wise fluctuation of *Circumoncobothrium sp*. in *Mastacembelus armatus* (February 2011 to January 2012).

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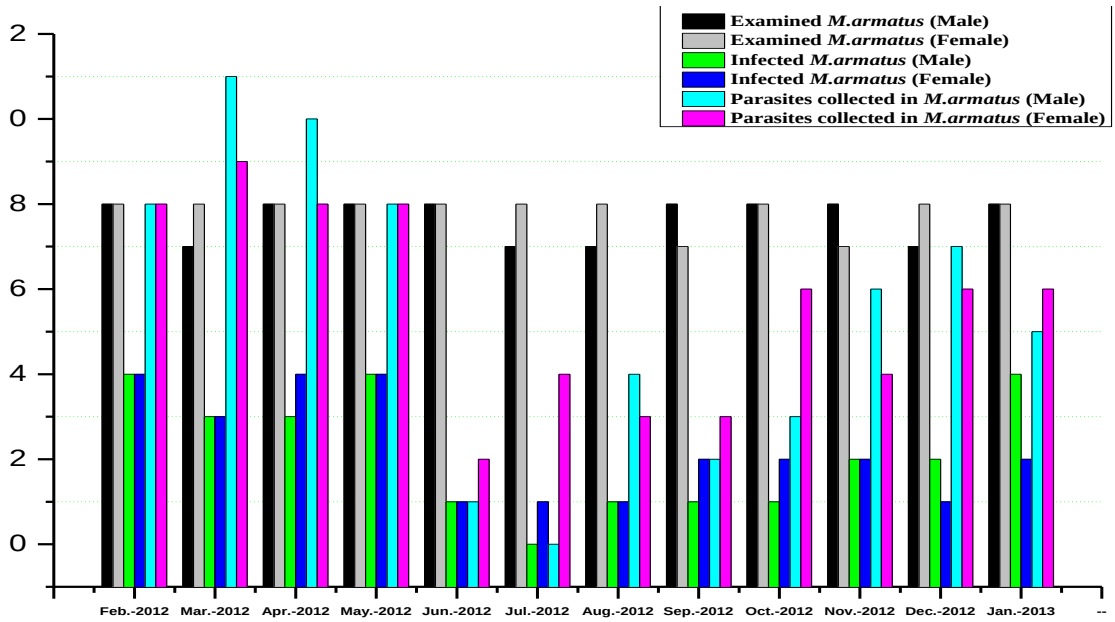

Graph-2: Monthly gender wise fluctuation of *Circumoncobothrium sp.* in *Mastacembelus armatus* (February 2012 to January 2013).

Infection of *Circumoncobothrium sp.* in *Mastacembelus armatus* during 2012-13:

Average month wise variations in the Prevalence, Mean Intensity and Relative Density of *Circumoncobothrium* sp. in *Mastacembelus armatus* were as follows:

During observation of population dynamics of *Circumoncobothrium sp.* a total 186 fishes of *Mastacembelus armatus*, out of which 92 males and 94 females were examined. Among them 26 males and 27 females found infected, resulting in maximum 50.00 % prevalence of infection in males and 50.00 % prevalence of infection in females for year 2012-13(Table-2 and Graph-2).

Incidence of Infection:

The maximum prevalence (50.00) in male was recorded in the months of February, May and January. Whereas minimum (0) in July. In rest of the months between (12.50) to (42.86). The maximum prevalence (50) in female was recorded in the months of, February, April and May. Whereas minimum (12.50) in June, July, August and December. In rest of the months between (28.57) to (37.50) (Table-2 and Graph-2).

Intensity of infection

The maximum mean intensity (3.67) in male was recorded in the months of March. Whereas minimum (0) in July, August, September, in rest of months between (1.00) to (3.50); (Table 21 Graph 11a). The maximum mean intensity (6.0) in female was recorded in the months of December. Whereas minimum (1.50) in September. In rest of months between (2.00) to (4.00) (Table-2 and Graph-2).

Density of infection

The maximum relative density (1.57, 1.25, and 1.0) in male was recorded in the months of March, April and May respectively. Whereas minimum (0) in July. In rest of the months between (0.13) to (0.75); The maximum relative density (1.13 and 1.0) in female was recorded in the months of March and February, April, May respectively. Whereas minimum (0.25) in June, in rest of months between (0.38) to (0.75). (Table-2 and Graph-2).

DISCUSSION

During the course of taxonomical investigations on helminth parasites of economically important fish hosts available throughout the year were periodically observed made to evaluate population dynamics of these fish helminth parasites. A complete record of the basic data comprising the number of host specimens examined, number of host specimens

infected and the number of parasites found was maintained for two annual cycles and is included in this work from February 2011 to January 2013.

The parasite prevalence, intensity and density depend on many factors like parasite and its life cycle, host and its feeding habits and the physical factors of water body where the fish inhabit. It also depends upon the presence of intermediate host such as piscivorous birds for the spread of cestodes infection (Zaidi and Khan, 1976).

Variation in parasite fauna with the diet of the host

Feeding activity of the host also is one of the reasons for the seasonal fluctuations of infections; the fishes were infected with large number of parasites in late winter to end of summer months, because the environmental conditions are favourable in such months. The waters are warm at that time the zooplankton fauna may be rich, this probably corresponds to the peak in the feeding activity of the fish together with the richness in the intermediate host fauna may be the crustaceans, smaller mollusks and fish resulting in high infections. The variation in prevalence and intensity may be due to host migration, change of feeding habits, availability of infective stages of parasites, and intermediate hosts (Bashirullah and Hafizuddin, 2007).

Effect of seasons on monthly fluctuation of helminth parasites

During present study more prevalence is found during summer season followed by winter and low in rainy season. Jadhav and Shinde (1976) explained the development of parasites should be needed high temperature, low rainfall and sufficient moisture. Hence, the high prevalence occurs in summer followed by other season.

CONCLUSION

The two year survey (2011 to 2013) has shown that fresh water fishes from the Latur district shows wide range of freshwater fishes. After the analysis of data the present study can be concluded that the high infection of helminth parasites (incidence, intensity, density and index of infection) were occurred in summer seasons followed by winter and low in monsoon season. This type of results indicated that environmental factors and feeding habitant are influencing the seasonally of parasitic infection either directly or indirectly. Observing the prevalence of *Circumoncobothrium sp*. sp. in the target host fish (*Mastacembelus armatus*) in this study, shows that the intermediate in this case, copepods, are present in the habitat. This is due to the abundant vegetation which gives rise to a more extensive habitat for the copepods therefore; fish are more exposed to greater concentrations of *Circumoncobothrium sp*.

The helminth fauna of fish may depend on various environmental factors such as geographical location of the habitat, season of the year, physico-chemical characters of the water. The infection of helminth parasites may also be related to the availability of their intermediate host, life cycles of the parasites and feeding habits of the fish host. Individual parasite species may have widely differing effects on different host species.

It is indeed important to acquire knowledge on different fish pathogens, their biology and life cycle in order to recognize fish diseases and for their control. The results obtained from current research will give preliminary knowledge of population dynamics of parasitic fauna of fishes from Latur District, Maharashtra, India which was till date less explored. At the same time it will help the scientific community and also pisci- culturists to know about the parasite species found to be infected in different fish hosts.

ACKNOWLEDGMENTS

The author thankful to Principal, D.B.F. Dayanand College of Arts and Science, Solapur (M.S) India for providing laboratory advances and library Facilities.

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