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Seasonal study of parasitic infection in fresh water fishes from Solapur and Osmanabad District (M.S), India

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Abstract
Parasites show a high degree of specialization and reproduce at a faster rate than their hosts. The parasitic worms form the major portion of biodiversity on earth. Fish harbor a variety of parasites viz. protozoan's, cestode, trematode and nematode. In the present study, we collected freshwater fishes of species, *Mastacembels armatus, Channa marulius, Channa punctatus, Clarius batrachus* from different reservoirs of Solapur and Osmanabad District during summer, monsoon and winter season respectively. During the August 2016 to July 2017 we observed high helminthes parasitic infection i.e *Senga, Circumoncobothrium, Procamellenus* in the fishes during summer season as compared to the winter and monsoon season.

Keywords: Seasonal study, Freshwater fish, Helminth parasites, Solapur and Osmanabad

1. Introduction
India is one of the mega biodiversity countries in the world and occupying ninth position items of freshwater biodiversity [13]. For the last few decades, fishes have been extensively used as food for human consumption in the Indian subcontinent and thus contribute substantially to its economy. In India it is estimated that about 10 million tons of fish are required to meet the annual demand of fish proteins as compared to as an actual annual production of only 3.5 million tons [18]. These edible fishes are known to harbour a number of helminth parasites which cause deterioration in their health, hence their market and nutritive value is affected. Parasite can have wide range of impact on the ecology of their hosts in terms of health (Atme and Owen, 1967) behavior (Milinski 1984, Moore 1984) sexual selection (Howard and Minchella, 1990 Watve and Sukmar, 1977) and regulation of the host population (Freeland, 1983).

Parasites are of great importance to human health; therefore there is a great need to study of helminthes whose prevalence is high in our country. Helminth infections are common among the major parasitic disease in India and other tropical countries. In tropical countries like India, there is increasing protein demand and fishes acts as a cheap sources of animal protein. It is known for its protein value, high content of essential minerals and for being low in saturated fats. Hence to obtain healthy and quality fish meat, it is necessary that the fish should be free from all types of pathogens like bacteria, algae, protozoans, helminths, annelids, arthropods and molluscs. Parasites of fish constitutes one of the major problems to fish health. Besides the direct losses caused by mortality, parasites have considerable impact on growth, resistances to other stressing factors, susceptibility to predation, marketability and pave way for secondary infection. Many authors have carried out studies on the helminth parasites and population dynamics of those occurring in piscian hosts and work on different aspects of parasites. The study of population dynamics can be used as the biological basis of method to regulate population of parasite.

Fishes are important components of ecosystem from ecological, medicinal, nutritional and economical point of view. Keeping in view, importance of helminth parasitic infection to freshwater fishes, present study was designed to evaluate seasonal prevalence of helminths parasitizing freshwater fishes for three different seasons i,e. monsoon, winter and summer from Solapur and Osmanabad Dist.

Materials and Methods

Fresh water fishes *Mastacembelus armatus, Channa marulius, Channa punctatus, Clarius batrachus* were collected from different reservoirs from Solapur and Osmanabad Dist. during the early hours of morning, August 2016 to July 2017. They were brought in to the laboratory and dissected out. The helminth parasites were collected and then they were preserved in 4%formaline. Then they were stained with borax carmine for the permanent slide preparation. These slides were observed and identified under microscope. Their drawings were made with the aid of camera lucida. Their identification was done with the help of "systema Helminthum" Vol II "Helminths of vertebrates" [22]

Population dynamics of helminth parasites were determined by following formula

$$\text{Incidence of Infection} = \frac{\text{Infected hosts}}{\text{Total hosts examined}} \times 100$$

$$\text{Intensity of Infection} = \frac{\text{Number of parasites collected in a sample}}{\text{Number of infected hosts}}$$

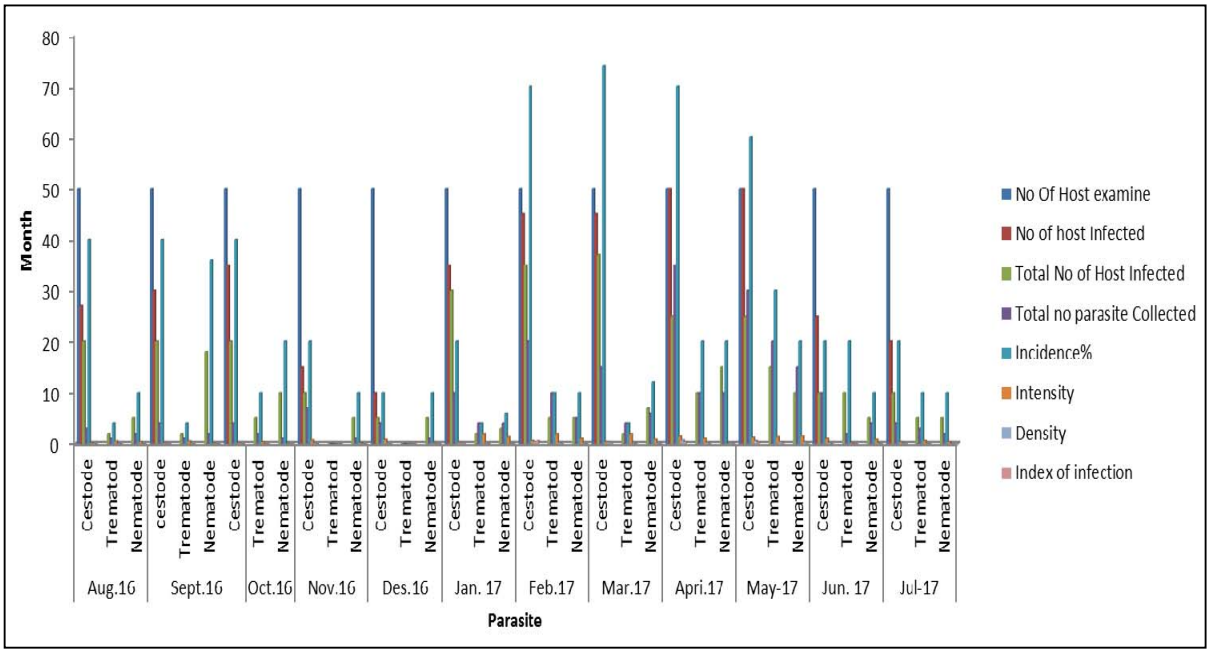
$$\text{Density of Infection} = \frac{\text{Number of parasites collected in a sample}}{\text{Total hosts examined}}$$

$$\text{Index of Infection} = \frac{\text{No. of hosts infected} \times \text{No. of parasite collected}}{(\text{Total hosts examined})^2}$$

Results

Table 1: Seasonal study of parasitic infection in freshwater fishes from Solapur and Osmanabad District (M.S), India, during the year August 2016 to July 2017

Month	Name of Parasite	No. of Host examine	No. of host Infected	Total No. of Host Infected	Total No. of parasite Collected	Incidence%	Intensity	Density	Index of infection	Habitat /locality
Aug.16	Cestode	50	27	20	03	40	0.15	0.06	0.024	Ujani
	Trematod			02	01	04	0.5	0.02	0.0008	
	Nematode			05	02	10	0.4	0.04	0.004	
Sept.16	cestode	50	30	20	04	40	0.2	0.08	0.04	Hingani
	Trematode			02	01	04	0.5	0.02	0.0008	
	Nematode			18	02	36	0.11	0.04	0.014	
Oct.16	Cestode	50	35	20	04	40	0.2	0.08	0.04	Hipparga
	Trematod			05	02	10	0.4	0.04	0.004	
	Nematode			10	01	20	0.1	0.02	0.004	
Nov.16	Cestode	50	15	10	07	20	0.7	0.14	0.028	Yermala
	Trematod			00	00	00	00	00	00	
	Nematode			05	01	10	0.2	0.02	0.002	
Des.16	Cestode	50	10	05	04	10	0.8	0.08	0.008	Jawalgaon
	Trematod			00	00	00	00	00	00	
	Nematode			05	01	10	0.2	0.02	0.008	
Jan. 17	Cestode	50	35	30	10	20	0.33	0.2	0.12	Hipparga
	Trematod			02	04	04	02	0.08	0.0032	
	Nematode			03	04	06	1.33	0.08	0.0048	
Feb.17	Cestode	50	45	35	20	70	0.57	0.4	0.56	Bhima
	Trematod			05	10	10	02	0.2	0.04	
	Nematode			05	05	10	01	0.1	0.004	
Mar.17	Cestode	50	45	37	15	74	0.40	0.3	0.222	Ujani
	Trematod			02	04	04	02	0.08	0.0032	
	Nematode			07	06	12	0.85	0.12	0.0168	
Apri.17	Cestode	50	50	25	35	70	1.4	0.7	0.35	Sina kolegaon
	Trematod			10	10	20	01	0.2	0.04	
	Nematode			15	10	20	.066	0.20	0.06	
May 17	Cestode	50	50	25	30	60	1.2	0.6	0.3	Chadani
	Trematod			15	20	30	1.33	0.4	0.12	
	Nematode			10	15	20	1.5	0.3	0.06	
Jun. 17	Cestode	50	25	10	10	20	01	0.2	0.04	Pathari
	Trematode			10	02	20	0.2	0.04	0.008	
	Nematode			05	04	10	0.8	0.08	0.008	
July 17	Cestode	50	20	10	04	20	0.4	0.08	0.016	Vairag
	Trematod			05	03	10	0.6	0.06	0.006	
	Nematode			05	02	10	0.4	0.04	0.004	



Graph 1: Seasonal study of parasitic infection in freshwater fishes from Solapur and Osmanabad District (M.S), India, during the year August 2016 to July 2017.

Result

Table no. 1 and graph no. 1 shows that incidence, intensity, density and index of infection of helminth parasites during August 2016 and July 2017. The maximum parasitic infection was observed in summer season (April 2017 – May 2017). During summer season maximum number of parasites (Cestode, Trematode and nematode) were collected from freshwater fishes.

From the above results it is clear that a considerable difference was found in the prevalence of helminth infections among different season. The highest cestode prevalence (74%), trematode prevalence (30%) and nematode prevalence (20%) recorded during summer season where as lowest cestode prevalence (20%), trematode prevalence (10%) and nematode prevalence (10%) in monsoon season. These finding of high prevalence during summer season was due to variations in temperature and other weather condition that influences the occurrences of parasitic infection in fishes.

Discussion

The analysis of data shows that the occurrence of helminth parasites vary according to seasons.

The incidences, intensity, density and index of infection of all the helminth parasites were found to be high in summer, medium in winter whereas lower in rainy season. Helminth parasite and host species, host size and feeding habitats, seasons and locality were also influence the intensity. Similar type of results were also observed in case of *Senga* sp, *Gangesia* sp., *Proteocephalus* sp. infected to *Channa* sp. in summer, winter and monsoon [4]. The simillar trend was also observed for incidence, density and index of infection in Piscean nematode of genus *Camallanus* sp. and *Spinitectus* sp [4]. The seasonal variation study of *Caryophyllidean* tapeworms show infection trend as, rainy < winter < summer season [19]. Seasonal environmental changes of water such as temperature, pH and conductivity affect on the occurrences of parasites from aquatic host [12]. High temperature, low rainfall and sufficient moisture were necessary for development of parasite [11]. Increase in parasitic infestation occurs due to elevated temperature, organic enrichment of the water bodies caused by pollution, agriculture runoff, indiscriminate use of antibiotics and this also causes increase in density of intermediate hosts. Low meatoblic acticity along with suppression of natural immune system makes them more susceptible to a wide range of parasites and diseases. Thus aquatic organisms respond directly to environmental changes due to influence of temperature, pH and dissolved O_2 levels on the metabolic processes.

Conclusion

After the analysis of data, present study can be concluded that the high infections of helminth parasite (incidence, intensity, density and index of infection) were occurred in summer season. Then it was followed by winter where as very low in monsoon season. This type of results indicated that environmental factors and feeding habitat are influencing the seasonality of parasitic infection either directly or indirectly.

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