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Incidence of helminth infections in freshwater fish from different regions of the Telangana State

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Abstract

The fauna of trematodes, nematodes and cestodes, mainly caryophyllides are found both in marine and freshwater fishes of different parts of India. The present study deals with the survey of helminth parasites from Telangana region, India, during 2012 to 2014 and this report summarizes the data of incidence, intensity and infection of helminth parasites freshwater fishes. The freshwater fishes were collected from different three districts of Telangana state. Population dynamics of helminth parasites were determined. Out of 440 fresh water fishes 243 were infected with helminth parasites in which cestode, trematode and nematode were found in one annual cycle. During the present investigation the high rate of infection of cestode and trematode found as compare to nematode parasites. The study has established that the *Mastacembalus armatus* fish is one of the most heavily infected fish species as compare to *Clarius batrachus*, *Wallago attu* and *Channa punctatus*. This 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 Telangana region

Keywords: Helminth infections, freshwater fishes, Telangana State.

INTRODUCTION

Recent trends of helminthic infections in India are characterized by a remarkable decrease of soil-transmitted nematodiasis and moderate endemicity of foodborne trematode (FBT) infections. Among FBT infections prevailing in the different regions of India, clonorchiasis has been known as the most important endemic disease, and its endemicity has maintained at relatively high levels in riverside areas (Tripathi, 1954). Clonorchiasis is contracted by eating raw or undercooked fish intermediate hosts containing the metacercariae of *Clonorchis sinensis*. As the second intermediate hosts of *C. sinensis*, total 26 species of freshwater fishes have been reported in India.

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The physiological and biological features of the host affect the community of parasites even more seriously (Ahmed and Begum, 1978), and these factors determine the final composition of parasite fauna of the fish. Little is known about the distribution, pathogenic effects and control of most of the diseases in natural population of fresh water fish. The helminth parasite fauna of fresh water fishes, its frequency and distribution have been studied in many parts of the world (Kennedy and Hine 1969). The helminth parasites of fishes may harm their hosts in variety of ways e.g.

- by causing mechanical injury and atrophy of blood vessels or other ducts,
- by introducing toxic metabolic by products able to produce changes in the blood, enzyme, vitamin and hormone activity of the host,
- by depriving the fish from its nutrition,
- by acting as carrier or vectors of other pathogens and e) by providing a point of category for other pathogens through mechanical damage (Mehra 1991).

The helminth fauna of Indian subcontinent including Burma and Ceylon was first studied by Southwell (1913 & 1930) and then by Baylis (1923, 1936 & 1939). Later on, Srivastava (1936), Gupta (1951, 1953, 1959, 1961 & 1976) and Tripathi (1954, 1956 & 1957) published a series of papers on fish helminths. In India, Bashi Rullah (1973) was the first to make a brief survey on the helminth fauna of fishes. He concentrated his studies mainly on the trematodes and nematodes. Recently, Vinatha Naini and Raghu Ramulu, (2009, 2010) have worked on the distribution, incidence, infection pattern and pathology of fish helminths in addition to their systematic studies.

The fauna of trematodes, nematodes and cestodes, mainly caryophyllides are found both in marine and freshwater fishes of Srilanka, India and Bangladesh, as the temperature never falls below 4°C, which is a suitable temperature for excellent survival and distribution of these parasites. Bashirullah (1973), Ahmed (1981), Zaman et al. (1986), Khanum (1994), Khanum and Zaman (2000), Khanum and Farhana (2002), etc. worked on parasitic fauna of fresh water fishes in different parts of India, but such work is lacking on Telangana state. So, the present investigation was assigned on the objectives such as, parasitic community, prevalence, intensity and pattern of distribution of parasites in *freshwater fishes*. This paper presents an up-to-date checklist of the helminths so far isolated from different organs of freshwater fishes of Telangana State

of India with special attention to the parasitic incidence, infection intensity and distribution of cestodes, trematodes and nematodes.

MATERIALS AND METHODS

Surveyed Area

Telangana is a state in southern India. It has an area of 114,840 km² and is the twelfth largest state in India. Its major cities include Hyderabad, Warangal, Nizamabad, Karimnagar, and Khammam. Telangana is a semi-arid area and has a predominantly hot and dry climate. Summers start in March, and peak in May with average high temperatures in the 42 °C (108 °F) range. The monsoon arrives in June and lasts until September with about 755 mm (29.7 inches) of precipitation. A dry, mild winter starts in late November and lasts until early February with little humidity and average temperatures in the 22–23 °C (72–73 °F) range. The host fishes were collected at random from different fish ponds, ditches, rice fields, rivers and fish markets of Adilabad, Karimnagar and Warangal Districts of Telangana state in different seasons of the year, mainly during summer and rainy seasons of 2012 to 2014.

Examination of Freshwater fishes

After external examination, body cavity of the host fishes (both live and those preserved in 5 neutral formalin) was cut open and examined. Body cavity,

Figure-1. The Surveyed Area shows Adilabad, Karimnagar and Warangal districts of Telangana State.



mesenteries, musculature, alimentary canal, heart, liver, gall-bladder, spleen, kidney, swimbladder, gonads and urinary bladder were carefully removed to separate clean petri dishes containing 0.75 % physiological saline solution. The organs were slit open carefully and examined under a stereobinocular microscope. The nemas were fixed in hot glacial acetic acid and the trematodes and caryophyllid cestodes in FAA. To keep the head organs intact caryophyllids and acanthocephalans were removed with special care by scraping deeply beneath them. Live Acanthocephalans were kept in tap water until the osmotic pressure made them too weak to draw in the proboscis. They were then fixed in between the slides and preserved in 70 % ethyl alcohol.

The worms which were cleared in xylene, were cleared and temporarily mounted in lactophenol. Nematodes were stained in aniline blue, trematodes and cestodes in Semicohn's carmine, while the acanthocephalans in borax carmine and hematoxylin and mounted in Canada balsam.

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) Index of infection = $\frac{\text{No. of host infected} \times \text{No. of parasite collected}}{\text{Total hosts examined}}$

RESULTS & DISCUSSION

The survey was carried out with 440 freshwater fishes in which *Clarius batracus* (Linnaeus, 1758), *channa Punctatus* (Bloch), *Wallago attu* and *Labeo rohita* from various places of Telangana State. Out of 440 fresh water fishes 243 were infected with helminth parasites in which cestode, trematode and nematode were found in one annual cycle. A total 344 helminth parasites were found during the present investigation. They were belonging with three classes in which total seven genera are found, out of them four from cestode [Senga Dollfus, (1934), Circumoncobothrium Shinde,

(1968), Lytocestus Cohn, (1908), Gangesia Woodland, (1924)], two from trematode [Allocreadium Looss, (1900), Orientocreadium, Tubangui, (1931), and one from nematode [Procamallanus Baylis, (1923)]. During the present investigation the high rate of infection of cestode and trematode found as compare to nematode parasites. The values for the incidence, intensity, density of infection in and influence of season on parasitic infection of helminth parasites from freshwater fishes are shown in table-1.

The incidence of infection of cestode and trematode was highest in summer season (39.5%, 21.8%) respectively, while cestode low in winter season (25.4%) and trematode moderate in winter season (7.5%) and but in cestode moderate in rainy season (38.14%,) while trematode least in rainy season (5.6%) but nematode parasites incidence of infection was highest in winter season (11.7%) while moderate in summer season (6.51%) and least in rainy season (0.20%). Regarding the parasitic diversity and population study cestode and trematode indicates abundance population as compare to nematode parasites. This may be due to, development of parasites requires high temperature, low humidity and less rainfall which is the best environment for the growth of parasites except nematode parasites. The valuable information pertaining to the influence of seasons on the helminth parasites was contributed by several workers like Tornquist (1931) who described about the systematic method of occurrence of certain fish parasites Camallanus lacustus that the infective stages invade the host during summer, the growth and maturation takes place during autumn and winter release of their infective progeny occurs during summer.

Some of these parasites cause diseases to fish, affecting their health and reproduction, making them fall easy prey to predators and some infect man. In fish farming, parasites may lead to epidemics and mortalities, resulting in economic losses (Khalil & Polling, 1997). The purpose of this survey was to estimate the present status of parasite incidence in this region and to provide parasitologic and epidemiologic information.

The infections of *Lytocestus* sp. are observed in only *Clarius batracus* and *Senga*

Table-1 Influence of seasons on parasitic infection

	Seasons	Incidence %	Intensity %	Index of infection
Cestode	Rainy	38.2	0.9	9.9
	Winter	25.8	0.94	8.2
	Summer	39.6	1.5	18.7
Trematode	Rainy	5.6	0.71	0.2
	Winter	7.5	0.95	0.98
	Summer	21.9	0.98	3.45
Nematode	Rainy	0.2	0.3	0.005
	Winter	11.7	0.99	01.9
	Summer	6.7	1.19	0.98

sp., *Circumoncobothrium sp.* and *Allocreadium* are heavily found in *Mastacembelus armatus*. The infection of *Senga sp.*, *Orientocreadium sp.* In *Channa punctatus* and while *Gangesia sp.*, *Procamallanus sp.* is found in *Wallago attu*, because of the host specificity. Morphological, physiological and ecological factors play important role in the host specificity. *Senga sp.*, *Circumoncobothrium sp.*, *Gangesia sp.*, *Procamallanus sp.* were specifically recovered from intestine *M. armatus* and *W. attu* while *Allocreadium sp.* were recovered from lung only *M. armatus*. *Lytocestus* are recovered from stomach of *C. batrachus* and *Orientocreadium sp.* were recovered from stomach and intestine of *C. punctatus*. This suggests that the worms are site specific and probably derive certain nutrients from the organs. This needs further investigation to establish the reasons for organ specificity.

Conclusion

The one year survey has shown that fresh water fishes from the Marathwada region harbor a wide range of parasites especially the helminth parasites. The study has established that the *Mastacembelus armatus* fish is one of the most heavily infected fish species as compare to *Clarius batrachus*, *Wallago attu* and *Channa punctatus*. This 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 Telangana region. However, the above study can only be complete if it covers a whole season to investigate the following: Seasonal variation in incidence of infection, variation in intensity of infection, variation in parasite fauna with the diet of the host, variation in infection with the habitat type.

Competing interests

The authors have declared that no competing interests exist.

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