

Prevalence of fresh water snail (intermediate host) infected with different trematodes cercariae in and around Meerut district

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Abstract

Snails belong to a large and highly diverse group of invertebrate known as the Phylum - Mollusca, Class – Gastropoda. Snails act as intermediate hosts of different trematode parasites, in which several developing larval stages such as sporocysts, rediae and cercariae are set up. The objectives of this study was to determine the prevalence of snail(intermediate host) infected with larval stages of different trematodes. Snails were collected from various water bodies like ponds, tanks, ditches, canals and crop fields from in and around Meerut district. They were transported to the laboratory in water containers and maintained in small aquaria, supplemented with natural food stuff. Snails were then screened for infection of different trematodes by cercarial shedding method. A total of 1000 snails of different species mainly Indoplanorbis, Lymnaea sp. and Bellamya were screened from July 2014 – June 2015 by cercarial shedding method out of which 100 (10%) were found positive for different trematode cercariae. The percentage of infection in Indoplanorbis spp., Bellamya spp. Lymnaea and spp. were 6.28 %, 10 %, and 12.28%, respectively. Prevalence was highest in Lymnaea whereas Indoplanorbis showed lowest infection with trematodes cercariae. The present study reveals that Indoplanorbis spp., Lymnaea spp. and Bellamya spp. are common snails found in and around Meerut. These snails act as intermediate hosts having infective stages of parasites.

Keywords: intermediate host, snails, Lymnaea, Indoplanorbis, Bellamya.

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Introduction

The life cycle of digenetic trematodes is complicated. To most species, snails act as intermediate host, in which several developing larval stages such as sporocysts, rediae and cercariae are set up. Moreover, freshwater snails can have an important effect on trematodes. As they are extensively widespread in freshwater streams, the trematodes are able to produce high number of cercariae for their transmissions. The outbreaks of parasitic infection have been continually reported in Meerut. This area is covered by diverse ecosystems of fields, along with plenty of water resources, producing a high biodiversity to support the life cycle of trematodes for the infection of both humans and animals. Epidemiological surveys throughout 2014-2015 have also shown an increase of trematode infections in this area. In Meerut many species of freshwater snails were reported to be intermediate hosts. However, only a few studies have been concerned with the cercaria infectious potential in northern India and only a few snail species were investigated. Information on the species composition of cercariae is a pre-requisite for any study on the epidemiology of the veterinary or biomedical importance of trematodes. Hence, a study of the epidemiological situation of cercarial infection in freshwater snails in Meerut

was carried out, based on the original data from a large scale survey of cercaria infections. This is the first step for providing new information on the latest distribution of trematode infection and for the development of the effective control measures in Meerut district.

Materials And Methods

The snail specimens were collected by hand from different fresh water bodies of Meerut region during July 2014 to June 2015. After collection, the snails were identified using the methods of Brandt (1974), and then they were crushed to examine under light microscope to investigate cercarial infection. The alive cercariae were vitally stained with 0.5% neutral red and identified according to morphology described by Schell and Ito (1962). In addition, the cercarial specimens were stained with Delafield's haematoxylin or borax carmine, dehydrated in an alcohol series, cleared with xylene, and mounted in permount. With camera lucida, illustrations were made to record information for a morphological characteristic study. The cercariae were identified at the family level and in some cases; the identification of the genus was possible. A total of 9 groups of cercaria were found. They were identified based on morphologically distinguishable differences according to Schell(1970) (internal organ arrangement, place and number of sucker etc.).

Results & Discussion

A total of 1000 snails belonging to different species, comprising *Indoplanorbis*, *Lymnaea* and *Bellamya* were screened from July 2014 –June 2015. Out of which 73 were found infected with different trematodes cercariae. The percentage of infection

in *Indoplanorbis* spp., *Bellamya* spp. *Lymnaea* and spp. were 6.28 %, 10%, and 12.25%, respectively as shown in tables 1,2,3. Prevalence was highest in *Lymnaea* whereas *Indoplanorbis* showed lowest infection with trematodes cercariae (fig-1,2,3).

Table 1: Overall month-wise prevalence of cercaria larva in *Indoplanorbis* sp.

Month	Number of host screened	Number of host infected	Prevalence %
July	35	2	5.71
August	30	3	10
September	35	2	5.71
October	30	1	3.33
November	20	3	15
December	25	2	8
January	26	2	13
February	34	3	8.82
March	35	1	2.85
April	30	1	3.33
May	25	1	8
June	25	1	8
Total	350	22	6.28

Table 2: Overall month-wise prevalence of cercaria larva in *Bellamya* sp.

Month	Number of host screened	Number of host infected	Prevalence %
July	25	4	16
August	30	3	10
September	25	3	12
October	25	3	12
November	20	3	15
December	25	2	8
January	26	2	13
February	24	3	12.5
March	25	2	8
April	25	2	8
May	25	3	12
June	25	5	20
Total	300	35	10

Table 3: Overall month-wise prevalence of cercaria larva in *Lymnaea* sp.

Month	Number of host screened	Number of host infected	Prevalence %
July	35	5	14.28
August	30	3	10
September	35	2	5.71
October	30	2	6.66
November	20	3	15
December	25	2	8
January	26	2	13
February	34	3	8.82
March	35	4	11.42
April	30	3	10
May	25	3	12
June	25	3	12
Total	350	43	12.28

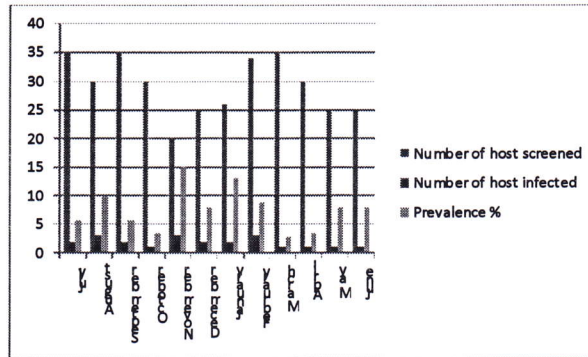


Fig1: Histogram showing month-wise prevalence of cercaria larva in *Indoplanorbis sp.*

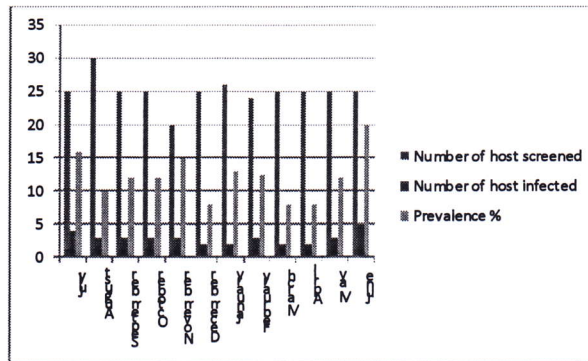


Fig2: Histogram showing month-wise prevalence of cercaria larva in *Bellamyia sp.*

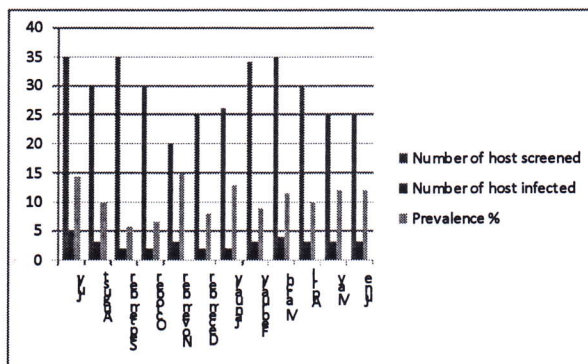


Fig3: Histogram showing month-wise prevalence of cercaria larva in *Lymnaea sp.*

Table 4. Freshwater snail species with the type of trematode cercariae infection in Meerut district

Snail Species	Number of positive cases infected with trematode cercariae										Infection %
	Total number of individuals	Transversotrema aceraria	Megaluro us cercaria	Monos tomecercaria	Haplorchi laceraria;	Pleurolophocerc ousercaria;	Strigea cercaria;	Xiphidocercari a;	Virgulatocercari a	Gymnocephalou scercaria	
<i>Indoplanorbis</i>	22	5	4	4	4	3	-	-	-	2	6.28
<i>Bellamya</i>	35	4	3	3	3	5	7	4	3	3	10
<i>Lymnaea</i>	43	9	5	3	3	4	7	6	3	3	12.28

Discussion

Lymnaeidae snails are of medical and veterinary importance since they are required, as intermediate hosts, to complete the life cycle of trematode species. They are distributed throughout the world and are known as the vectors of more than species belonging to trematode families. A considerable body of research has explored the potential role of lymnaeid snails in transmitting the infectious parasitic trematodes worldwide Faltýnková et al (2007). However, intra-molluscan trematode parasitism is frequently associated with the alteration of a host's growth, fecundity or survival, and its susceptibility to trematodes. In the present study, *L. luteola* was found to be a predominant pond snail in the region. This finding was in accordance with previous reports. Furthermore, in consistance with several earlier studies in this study the highest population density of *L. luteola* was recorded in summer.

Until present, only a few studies have been carried out on the diversity

and abundance of cercarial infection in the pond snails of Meerut. Seasonality that is mirrored by changes in environmental variables can intervene in snail's ecology and influence the larval development of a trematode inside its host snail. It may also affect cercarial shedding (the release of cercariae from the host snail in nature). However, the influence of environmental elements on cercarial shedding is trematode-specific. The highest cercarial infection rates in lymnaeid snails of the region were observed between June and September, while Sharif et al. (2010) recorded the maximum infection rates in late summer (August-September). Thus, it can be anticipated that both snail's propagation and their infection with trematodes are correlated with seasonal variations. Farahnak et al. (2006) noted that various ecological factors such as season and water temperature, pH and dissolved oxygen influence the emergence of cercariae from the snails and their release inside the water resources. Prevalence rate was high in August in our observation, and it may be due to the

snails being infectedd by the parasitic stage, i.e., cercarial stage during mid-rainy season when the eggs containing miracidium, are being carried by water to low-lying areas where snails breed. The snails get infected by the parasites in about 1-1½ months before and in the next 1-1½ months the natural cercariae emerge out from the snails.

The maximum emergence of cercariae from snails is noted in early winter months. The percentage of cercarial emergence during winter months have also been reported by Prasad(1973), Sahai (1984), Rajkhowa et al.(1991) and Kumar(2002) from different regions of the country

With regard to the importance of farm animal health in national economy, it is essential to study the diversity, distribution and abundance of the intermediate hosts of infectious trematodes, mainly freshwater snails. *L.luteola* is a common pond snail in Meerut region which has shown the capacity for vectoring diverse cercarial species. Results of this study and those of the related investigations can assist in collecting data on the ecological relevance of the snails distribution and the pattern of transmission of digenian trematodes by the snails and finally, in prevention and control of the disease outbreaks

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