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RESEARCH ARTICLE

CERCARIAL DIVERSITY FROM VECTOR SNAIL *LYMNAEA ACUMINATA* FROM AURANGABAD REGION, MAHARASHTRA, INDIA

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ABSTRACT

The freshwater snail species of *L. acuminata* were procured from different water bodies in and around the city Aurangabad during 2 years of study (from Jan. 2009 to Dec. 2010). Different larval trematodes emerged during patency were collected separately and got centrifuged. After mounting observations were made under compound microscope for their identification. In all some 6 types of cercaria have been identified during study period. Of the total parasitized snails 43.25 % snails were found invaded by, cercaria of *Fasciola hepatica* and least number of infected snails 2.33 % were found invaded by the cercaria of *Diplostomum hepatica*.

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INTRODUCTION

Trematode parasites are essentially a component of the fauna associated with aquatic environment and are generally overlooked until epidemic disease makes the association inescapable (Erasmus, 1972). Cort (1914) wrote his preliminary report "Larval trematodes from North American Fresh Water Snails." During his survey he described 14 new species of cercaria. Cort *et al*. (1937) carried out an extensive survey, by determining the incidence of 17 species trematodes in over 7000 specimens of *Lymnaea emarginata angulata* (Sow) from two lakes in North America. Later on Faust (1919) presented his finding in "The American Naturalist", which deals with a biological survey of cecariae. He states that "The molluscs most heavily infected are the ubiquitous species. *Planorbistrivolvis*and *Physa gyrina* and the western species *Lymnaea proxima*. The snail counts per unit of time method measures the density of the snail population (Oliver and Scheidermans 1956) in the marked area only, not the total population. These authors investigated infection rate of parasites by shedding and crushing method. A detailed description of the various types can be found in Cheng's report (1973). Some are classified according to the position and number of body suckers. Some are categorized according to the shape and relative size of their tails, while some cercariae are categorized morphologically by specialized body structure like the Xiphidiocercarie, the stylet bearing cercariae. Molluscs provide an environment that the parasite exploits to achieve considerable growth and reproduction. Joosse and Van Elk (1986); while working on experimentally parasitized trematode *Lymnaea stagnalis* by the miracidia of *Trichobilharzia ocellata*, determined the period of prepatency and patency. In recent year's wealth of information gathered on larval stages of digenetic trematodes from freshwater snails, described throughout the world. As note by Robert and Janovy (2000), the global prevalence of several animal parasites has not changed in 50 years. Of particular interest is Schistosomiasis where although the worldwide distribution of people infected may have changed due to eradication programs, as in Japan (200 million) and dying (20,000/year) from Schistosome infection have not diminished (Oliveria *et al*., 2004). Parasitic Platyhelminthes are important economically and socially and deserve the attention they receive. According to Kerney (1999), the pond snail, *L. stagnalis* is a Holaretic freshwater snail and a common host for many trematode parasite species (Loy and Haas 2001). One or more species of cercariae, sometimes more than ten, may be found in freshwater and terrestrial gastropod (Ito, 1980). Very recently a faunistic survey has been made by Sharif *et al*., (2010) to isolate cercariae from Lymnaeid snails in Central areas of Mazandaran, Iran. Sami and Ghaleb (2011) investigated larval stages of digenetic trematodes in the prosobranch gastropod snails from freshwater bodies in Palestine. The present

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freshwater pulmonate snail *L. acuminata* is inhabitant of varieties of aquatic habitats like freshwater ponds, pools, ditches and rivers is proned to get exposed varieties of natural and artificial stress conditions. Through rain water runoff, the water at their habitat gets contaminated by varieties of contaminants and there can be chances of trematode infection in the water due to human and other animal's excreta entering through rain water runoff. In the present investigation an attempt has been made to study the diversity of cercarial released from the freshwater snail *L. acuminata* naturally infected by digenean trematode larval pathogens.

MATERIALS AND METHODS

The freshwater snail species of *L. acuminata* were procured from different water bodies in and around the city Aurangabad during two years of study (from Jan. 2009 to Dec. 2010). Immediately snails were cleaned with tap water in the laboratory. Normal sized intact healthy snails (22 ± 1mm shell length) were sorted out and maintained in 100 ml dechlorinated tap water. Next day visual observations were made for parasitic infection. After every 24 hrs.snails were separated and transferred in new beaker with freshwater. The cercariae in infected snail water were killed with addition of formalin (2-3 drops). 1ml cercarial water taken in cavity block. With the help of capillary tube dropper, cercariae were sorted and counted. The same procedure was continued for total period of patency. An average with standard deviation of cercariae released during every day was calculated for patency period. Different larval trematodes were collected separately and got centrifuged. The larvae settled at the bottom of the tube were transferred to cavity block. First of all the larvae got preserved in 4% formalin. These preserved larvae then got processed for morphological study. After getting washed with distilled water, got stained with either heamatoxylin or neutral red and passed through increasing grades of alcohol for dehydration. After that parasites mounted over the micro slide under DPX medium. Observations were made under compound microscope for their identification. The trematode cercarial larval characters such as position and number of suckers, shape and size of the tail and morphologically by specialized body structures were taken into account for their identification. While identifying the cercaria a systematic key reference by Frandsen and Christensen (1984) was followed. After identification of particular type of cercaria, percentage of trematode larvae was calculated.

RESULTS

The frequency of trematode larval infection observed in present study is depicted in table 1. No infection was observed during summer months i.e. from February to May during both the years of study. Snails start getting invaded by trematode larval pathogens from June onwards. Heavily infection was observed in the month of September and October, 2009 and 2010. Maximum infection 50 to 60 % was found in the month of September respectively in 2009 and 2010. Various type of larval trematode pathogens got invaded in the naturally infected *L. acuminata* is shown in the form of observation table 2. In all some six types of cercaria have been identified during study period. Of the total parasitized snails 43.25 % snails were found invaded by, cercaria of *Fasciola hepatica* and least number of infected snails 2.33 % were found invaded by the cercaria of *Diplostomum hepaticum.*

Table 1. Frequency of larval trematode infection from January 2009 to December 2010

Month and year	Frequency of infection in %	Month and year	Frequency of infection in %
Jan 2009	05	Jan 2010	07
Feb	02	Feb	Nil
Mar	Nil	Mar	Nil
Apr	Nil	Apr	Nil
May	Nil	May	Nil
Jun	09	Jun	11
Jul	30	Jul	15
Aug	35	Aug	25
Sept	50	Sept	60
Oct	49	Oct	45
Nov	20	Nov	39
Dec2009	10	Dec2010	13

Table 2. Incidence of different trematode larval infection during infection period

S.No.	Cercaria of following trematode	Infected snails in %
1	*Fasciola hepatica*	43.25
2	*Plagiorchis vespectilionis*	20.84
3	*Echinostome* sp.	15.62
4	*Pseudoechinoparyphium* sp.	10.41
5	*Trichobilharzi aocellata*	07.55
6	*Diplostomum hepaticum*	02.33
Total		100.00

DISCUSSION

Many aquatic snails act as an intermediate host for larvae of trematode parasites. In Japan the numbers of people at risk (600 million), infected (200 million) and dying (20,000 per year) from Schistosome infections (Oliveira *et al*., 2004). From economical point of view worldwide losses due to Fasciolasis are conservatively estimated as some US $ 3.2 billion per annum (Piedrafita *et al*., 2004). One of the most characteristic features of trematode-mollusc interactions is their specificity. In the present investigation the intermediate snail host *L. acuminata* most of the time got invaded by only one type of cercaria. During two years of study from the point of incidences of cercarial infestation in naturally infected snail *L. acuminata*, found heavily invaded by larval trematodes during post monsoon period i.e. during Sept. and Oct. 2009 and 2010. Choubisa (2008) while screening freshwater gastropod snail from the point of larval trematode infection in the tribal region of Southern Rajasthan, reported that the most favourable season for cercarial infection was found during late rainy or prewinter season. During this season more than 95 % matured snail species found release of different kinds of cercaria like the present intermediate snail host *Lymnaea* from Aurangabad. *L. acuminata* is found distributed both lentic and lotic type of water body and is having a surface dwelling habit. May be because of this fact it is found invaded by diversified species of trematode cercarial larvae has been reported by Choubisa (2008) in various genera of the family Lymnaeidae. He also found that the larval digenean infection in surface dwelling snails from the lentic environment especially in the perennial ponds or reservoirs was higher than those of bottom dweller species in the same habitat. The present snail *L. acuminata* may be due to surface dwelling habit shows maximum diversity of trematode cercarial larvae. The digenean trematode *Diplostomum spathaceum* is well known parasite in fishes where it occurs as metecercercaria in the eye lenses of the host and often causes parasitic cataract (Sheriff *et al*., 1980). While screening the present freshwater snail *L. acuminata* from the point of larval trematode infections, it has been observed that

the cercarial stage of *Diplostomum* were found invaded in the body of snails collected from Salim Ali Lake Aurangabad. Fish host may be the definitive host of this trematode larval pathogen because many fishes are the inhabitants of this lake as associate animals. Lake water inhabitants of snail *L. acuminata* in the present study found heavily infected with cercarial larval trematodes compared with snail species collected from lotic water dwellers.

Wealth of information is available on morphology and various types of larval trematode stages such as furcocercous cercaria were described by Azim (1935), Xiphidiocercaria by Azim (1936) EL- Gindy and Hanna (1963) and Sakla and Khalifa (1981) and Pleurolophocercous cercariae were described by Khalifa *et al*. (1977) and Fahmy *et al*. (1986) in Egypt. Recently Yousif and his co-workers (2010) described morphology of new eleven types of cercariae from prosobranch snail, *Melanoides tuberculata* in Egypt. Of these cercariae they have describe two new types of cercariae which were released from *M. tuberculatus*. Based on variations in superficial morphological characteristic features some ten different types of cercarial forms have been noticed in the naturally infected present intermediate host snail *L. acuminata*. Similar type of observations were made by Cort (1914), while working on larval trematodes, some 14 new species of cercaria have been collected from freshwater snails from different localities throughout the United States and from various ecological situations. The emergence of two types of cercariae from single snail host is referred as a case of double infection. Such type of incidence occurred rarely in present study. Two types of furcocercariae have been found infested in *L. acuminata* at one or two occasions of naturally infected snails may be due to identical host- specificity of two different digenetic trematode parasites. Two types of furcocercariae namely *Trichobilharzia* and *Diplostoma* have been found infesting different snail specimens of *L. acuminata*, collected from same locality the city Aurangabad (M.S.). These two furcocercous cercaria never found infesting together in the same animal during two years of study period. Similar type of infection have been also observed by Pande and Agrawal (1978) and Choubisa (1986b). The present study provides to estimate larval trematode parasites among lymnaeids snails and their zonotic importance in animal or human health.

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