PREVALENCE AND INTENSITY OF TREMATODE CERCARIAL INFECTIONS IN THE SNAIL HOST AT A SELECTED STUDY SITE IN THE OUSL PREMISES

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Introduction

Trematodes belonging to the Phylum Platyhelminthes live as endoparasites of many vertebrates and invertebrates. Trematodes require one definitive host and one or two intermediate hosts to complete their life cycle. In these hosts, the trematode passes through different development stages, including the adult, egg and various larval stages, such as the miracidium, sporocyst, redia, cercaria and metacercaria. One of the hosts of these trematodes is almost always a snail that acts as an intermediate host, in which the cercaria stage is developed. The cercaria leaves the snail host to water and swims around till it finds the next host in its life cycle. Thus, it is the cercaria stages that transmit the infection from the snail intermediate host to the second intermediate host or the definitive host depending on the species of trematode.

Because the cercariae have short life spans, most commonly less than 24 hours, optimising their emergence from the snail hosts to correlate with the availability of its next host will enhance the probability of successful transmission. The proportion of snails that releases cercariae (prevalence of infection) and the number of cercariae released from each infected snail (intensity of infection) also play important roles in the transmission of trematodes from the snail host. Age and size of snails, light conditions, temperature ranges, depth of water are some of the factors that appear to affect the prevalence and intensity of digenetic trematode infections in the snail intermediate hosts (Fingerut, *et. al*., 2003, Graham, 2003).

Aims and Objectives

Previous studies on trematode infections in snails are not widely reported from Sri Lanka. Thus, in this study our aim was to survey the snail intermediate host, *Melanoides turberculata* for cercarial infections. The specific objectives were to identify the trematode species infecting the snail, to determine the prevalence and intensity of cercarial infections in the snail host and to investigate the effect of light and size of host on the emergence of cercariae from infected snail.

Methods

Individuals of the snail species, *Melanoides turberculata* were collected from a selected field site next to a small tributary of the Diyawannawa canal located within the OUSL premises. Sampling was carried out every week for four months (October to January) and a total of 251 snails were collected. Light intensity and the soil moisture content of the site were also recorded at the time of sampling. The size of snails was recorded by measuring its length using a vernier caliper.

To determine the prevalence of infections and assess the impact of light on cercarial emergence, the snails were placed in separate beakers containing 5ml of 0.3 % saline water at room temperature. They were kept at one of three light conditions for 72 hours, that is natural light/dark condition, continuous light and continuous darkness. Each beaker was examined for cercariae after 24 hours. The parasite density in each breaker was estimated by counting the total number of cercariae present in four 25 μl samples of solution taken randomly from each beaker. All cercariae were observed using a light microscope at 10x4 magnification. Cercariae were identified using keys (Cheng, 1986, Daily, *et. al.*, 1996).

The prevalence of infection was assessed by determining the number of infected snails out of the total examined. The mean intensity of infection in the snails was determined for each condition of light. The average number of cercariae shed per 24 hour period by an infected snail was taken as an estimation of the intensity of cercarial infection in the snail.

Results and Discussion

i) Identification of trematodes infecting snails

Based on the morphology of the cercariae, three trematodes belonging to the following Super families / Order were found to infect the samples of *Melanoides* snails collected from the OUSL premises:

- Super family Opisthorchioidea which produced Pleurolophocercous type cercariae
- Super family Diplostomiodea which produced Furcocercous type cercariae and
- Order Plagiorchiida which produced Xiphidiocercariae type cercariae

The definitive host of these trematode parasites was not investigated in this study. However, several birds were frequently observed in this location. Thus, it is possible that the definitive host of these parasites is a bird, which defecate parasite eggs into

the site. It is also possible that the second intermediate host is a species of fish that lives in the canal as ingestion of these infected fish by birds would complete its life cycle. It would be also of interest to investigate if these trematode types are potentially infectious to humans and other mammals.

ii) Prevalence and intensity of cercarial infections in snails

Overall, 29 of the 251 snails (11.55%) examined produced cercariae stages. The majority of snails (93.1%) were infected with Opisthorchioidea cercariae whilst 6.9% and 3.4% snails were infected with cercariae of the Plagiorchiida and Diplostomiodea, respectively.

The prevalence of infection varied over the four months the study was carried out. The highest percentage prevalence of cercarial infections in snails was recorded during the month of December (25%) whilst it was lowest during October (3.45%). Such prevalence data could probably be correlated with the monthly variations in the light intensities observed at the study site. The average light intensity at the study site during the daytime was lowest in the month of December (414 Lux).and highest during the month of October (2367 Lux).

As expected in any natural population, intensity of cercarial infections varied greatly from snail to snail. The average number of cercariae shed per snail during 24 hours ranged between a minimum of 3 to a maximum of over 1700. These high numbers shed indicate the enormous reproduction capability of the parasite within its snail host, which ensures its transmission to the next host in its life cycle.

iii) Impact of light and size of snail on emergence of cercariae

The average number of cercariae released from each infected snail per 24 hour period did not vary significantly when exposed to different light conditions. Even though day light is reported to be required for cercarial emergence, in the laboratory conditions described in this study, the cercariae were emerging even in the dark.

A positive correlation was observed between the size of the snails and the number of cercariae shed per infected snail during the 24 hour period. This indicates larger snails are more likely to have higher intensities of infections. Several previous studies have also observed a positive correlation between size with prevalence and intensity of infection (Graham, 2003). This result is probably explained best by the fact that

larger snails provide more space and greater energy resources for production of cercariae.

Conclusions

- Three types of trematodes were found to infect the samples of *Melanoides turberculata* snails examined.
- The percentage prevalence of cercarial infections in snails was 11.55%. The majority of snails (93.1%) were infected with a trematode belonging to the Super family Opisthorchioidea.
- The intensity of cercarial infections varied from snail to snail. When experimentally exposed to different conditions of light, there was no significant difference in the average number of cercariae shed per 24 hour period by the infected snails.
- A positive correlation was observed between the size of the snail and the average number of cercariae shed per infected snail during the 24 hour period.

Further investigations are necessary to consolidate the findings in this study. For instance, additional research is required to assess the effects of light in the field conditions and to investigate the impact of other factors, such as temperature, on cercarial emergence from snails. It would also be of interest to investigate the cercarial infections in other snail species in the same study site and at other locations.

References

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