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CERCARIAL INFECTIVITY OF FRESHWATER SNAILS

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ABSTRACT

Study was conducted on cercarial infectivity of freshwater snails. Snails were collected from Rima River of Usmanu Danfodio University Sokoto. They were transported to the laboratory in water containers and screened for infections. 410 snails of Bulinus truncatus, Lymnea natalensis and Melanoides tubaculata were screened, out of which 320

Introduction

Snails belong to a large and highly diverse group of invertebrate known as the phylum - *Mollusca*, class - *Gastropoda* and order - *Stylommatophpra*. Snails act as intermediate hosts of different trematode parasites, in which several developing larval stages such as sporocysts, rediae and cercariae are set up (Elsheikha and Elshazly 2008). The proportion of snails that release cercariae (prevalence of infection) and the number of cercariae released from each infected snail (intensity of infection) play important roles in the transmission of trematodes from the snail host. Only *Lymnaea* group of snails is involved in establishing of life cycle in at least 71 species of trematodes (Soldanova *et al*., 2010). Other species of snails also transmit various trematode parasites of livestock and birds. For example, *Bulinus* spp *Biomphalaria* spp *Onchomelania* spp *Melanoides* spp *Indoplanorbis exustus* is responsible for the transmission of *Schistosoma nasale*, *Schistosoma spindale* and *Schistosoma indicum* as well as other

trematodes such as *Echinostoma* spp. and some spirorchids (Liu *et al.,* 2010). 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), and Graham, (2002). Among various water snails, such as *Lymnaea, Bulinus and Melanoides* are the common snails found round Rima river.
Therefore the present work was undertaken to determine the cercariae of different tremaodes infectivity of fresh water snail around Rima river.

MATERIALS AND METHODS

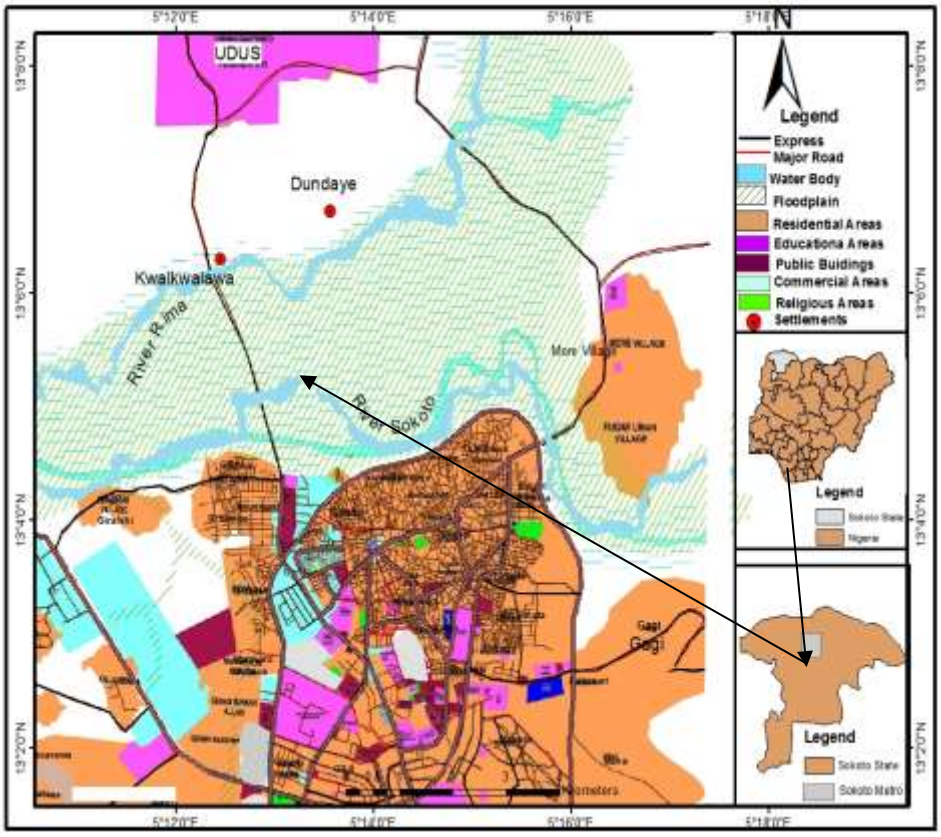
Study Area

The field work was conducted at Rima River (Figure 1) in Wamako Local Government Area of Sokoto State and the laboratory work was carried out at Parasitology Research Laboratory, Zoology Unit of the Department of Biological Science, Faculty of Science of Usmanu Danfodiyo University Sokoto.
Sokoto State is located in the extreme end of northwest of Nigeria, near to the confluence of the Sokoto River and the Rima River (Lat 13°N long 5°E and 350 meters above the sea level). Sokoto State is in the dry Sahel savannah surrounded by isolated sandy hills. With an annual average temperature of 28.3 °C Sokoto is, on the whole, a very hot area. However, maximum daytime temperatures are for most of the year generally under 40 °C and the dryness makes the heat bearable. The warmest months are between February to April when

(78.04%) were positive for trematode cercariae. The percentage of infection in Lymnea sp, Bulinus sp and Melanoides sp were 260(83.87%), 60(66.6%) and 0(0.00%) respectively. Prevalence was high in Lymnea sp followed by Bulinus sp, but Melanoides sp did not show any infection. Statistics shows significant different in snails infected with cercariae (P<0.001). The present study reveals that these snails harboure infective stages of trematodes cercariae

Keywords: *Snails, infective stage , Lymnea, Melanoides, Bulinus*

daytime temperatures can exceed 45 °C (Dangel, 2008). The rainy season is from June to October during which showers are a daily occurrence. The showers rarely last long and are a far cry from the regular torrential rain known in wet tropical regions. From late October to February, during the cold season, the climate is dominated by the Harmatta wind blowing Sahara dust over the land. The dust dims the sunlight thereby lowering temperatures significantly and also leading to the inconvenience of dust everywhere in houses (Dangel, 2008).



Study Area and Fresh Water Snail Collection Sites
(GIS Generated by GIS Lab. Department of Geography Usmanu Danfodio University Sokoto 2017)

Collection of Snails

Four hundred and ten freshwater snails were collected within the month of April between 9am to 11am around (Rima River) Kwalkwala River of Usmanu Danfodiyo University Sokoto, using a scoop net. They were washed in water and transferred into a clean glass bottle with holes on

the lid for aeration and taken to the Parasitology laboratory of Usmanu Danfodio University Sokoto. They were transferred into a clean plastic container (Plate 1) in the laboratory and allowed to stand for a period of 72hours for acclimatization

Snail Identifications

The snails used in this study were identified by Prof D.A Dakul a Malacologist of Department of Zoology University of Jos in Plateau State.

a. *Bulinus truncatus*
b. *Lymnea natalensis*
c. *Melanoidsee tuberculata*

Plate I: showing snails in plastic container

Plate 2: showing cercariae shedding set up

Plate 3: *Bulinus truncates*

Plate 4: *Lymnea natalensis*

Plate 5: *Melanoides tuberculata*

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Sample Examination

Four hundred and ten fresh water snails were collected and were placed individually in test-tubes half filled with tap water and arranged in a test -tube rack. The test-tubes were exposed to 100wattts bulb for 2 hour to observe for the emergence of phototropic *cercariae*. After 2hours, each test-tube was emptied in a clean Petri-dish and observed under dissection microscope for identification and count the number of cercariae present. A single cercarium was picked up using pippet and placed on a clean glass slide stained with iodine and mounted on a microscope for proper identification using objectives lens of ×40

The cercaria counting was done using an instrument called Neubeur counting chamber and cercariae found within each chamber was counted.

Statistical analysis

The prevalence of fresh water snail infected with cercariae was calculated. The Chi-squared test was used to determine the association between factors and prevalence. The snail infected was calculated and expressed as percentage

RESULTS

Out of 410 snails tested for Cercariae shedding 320 were positive with a prevalence of 78.04% as shown in (Table 1). Ninety (90) of the fresh water snails were *Bulinus truncatus,* 310 were *Lymnea natalensis* and 10 was *Melanoides tubaculata*. Out of the 90 *Bulinus truncatus* examined 60 were positive with a prevalence of 66.6% , 310 *Lymnea natalensis* were examined 260 were positive with a prevalence of 83.87% and 10 *Melanoides tubaculate* were tested with a prevalence of 0.00% (Table 2). Sixty (60) *Bulinus truncatus* shedded 366 Cercarea with a mean intensity of (6.1) while 260 *Lymnea natalensis shedded* 1581 Cercariae with a mean intensity of (6.0) and *Melanoides tubaculata* shedded non with a mean intensity of (0.0) (Table 3). Two types of Cercarea were observed. They are Schistosoma *haematobium* (plate 5 and 6) and *Fasciola gigantica* (plate 7 and 8). Statistic shows significant different between the species of snails infected with cercariae ($P<0.001$).

Table 1 Prevalence of Fresh Water Snail examined for *Cercariae* shedding

Number of Snail Examined	Snail infected with Cercariae	Prevalence (%)
410	320	78.04

Table 2 Prevalence Species of Fresh Water Snail Shedding Cercareiae

Snail species	Number examined	Prevalence (%)
Bulinus truncatus	90	60(66.6)
Lymnea natalensis	310	260(83.9)
Melanoides tubaculata	10	0(0.00)

Table 3 Prevalence and Mean Intensity of Snail Infected with cercariae

Snail Specie	Number positive	Number of Cercariea	Mean intensity
Bulinus truncatus	60	366	6.1
Lymnea natalensis	260	1581	6.0
Melaniodes tubaculata	Nil	Nil	0.00

Plate 6: Stained *S. haematobium* cercariae

Plate 7: Unstained *S. haematobium* Cercarea

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Plate 8: Stained *F. gigantica* Cercarea

Plate 9: Unstained *F. gigantica* Cercarea

DISCUSSION

The present study report cercariae of two species of digenetic trematodes in freshwater snails collected from Rima River. Out of the total snail collected 78.04% were found infected with cercariae. It could be said from the result that increase in snail population may result to an increase in infection of humans by schistosome cercariae with increase in human contact activities. Although mortality due to schistosomiasis may be low, the disease imposes a heavy burden upon the health and well being of individual (WHO, 1985). The mean intensity of infection was relatively low. The number of cercariae counted for each snail was low. It may be at the time of inducing the snail (using artificial light sources) , the cercariae within the sporocyst had not reached maturity (4-6wks) by which the cercariae begins to emerge from the birth pore near the anterior end of the mother sporocyst (Smyth 1967). Faust and Hoffman (1934) observed that a snail infected by a single miracidium can discharged an average of 3,500 cercariae a day for a long time. The prevalence of *Lymnaea natalensis* (83.87%) was higher than *Bulinus truncatus* (66.7%) but no cercariae was shedded by *Melanoides tubaculata* but they are known to be used in the biological control experiment

against the snails host of schistosomiasis (Dakul ,2001) . they also carry certain parasites that are dangerous to human (Pinto and Demelo 2011). These snails act as first intermediate host for parasities such as *Clonorchis senensis* *Paragonimus westermani* and *Angiostrongylus cantonensis* (Vogler *et al.*, 2012) . A similar result was gotten from the study conducted to check the Prevalence of snails and *schistosome cercariae* In punjab, concentration was on *Lymnea* and *Bulinus spp* only Pakistan Overall 10389 snails were collected from four study areas of Punjab from November 2005 to October 2006. The highest prevalence (38%) was found for *Indoplanorbis* followed by *Physa* (17%), *Bellamaya* (10.3%), *Gyraulus* (10%), *Lymnaea* (9.2%), *Oncomelania* (9%) and the lowest was found for *Bulinus* (6.7%). High prevalence during the period of this research has being attributed to the reduced water volume accompanied by increased density of snail host and the intensified use of habitat by definitive hostas attributed by .(Jordan *et al.*,1980). The population dynamic of the host snail in conjunction with climatic factor such as rain fall are known to influence prevalence (Sapp and Esch 1994)

Conclusion and Recommendation

It is evident from the result of this research that fresh water snails (*Bulinus truncatus*, *Lymnea natalensis and Melanoidies tubaculata*) are present around Rima river (kwalkwalawa river) and these snails most especially *Bulinus truncates* and *Lymnea natalensis* are harboring trematode cercariea namely *S. haematobium* and *F.gigantica* Cercariae of Public and Veterinary Health importance and the population of *Lymnea natalensis* (including the cercariae shedded) was higher than that of *Bulinus truncatus* which means the risk of animal contacting the infection is very high due to defecating, feeding on grass infested with Metacercariea (the infective stage of the parasite) and continued drinking of water from infested aquatic environment which can cause serious economic loss to farmers. *Bulinus truncatus* also shedded cercariea which means human contact with infested aquatic environment can cause serious health problem. How ever it would be

advisable based on this result that a combination of educating the population using water bodies for various activities on the dangers of contact with water bodies, prophylactic treatment by mollusciciding the water in the middle of dry season when the streams are still flowing but at low level and speed according to Madsen (1985) and chemotherapy will go a long way in curbing the disease

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