Furcocercus Cercariae and other Parasitic Infections in Freshwater Snails of Jakara Dam, Kano State, Nigeria

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ABSTRACT

Freshwater Snails from different parts of Jakara dam, Kano state, Nigeria were examined for the presence of cercariae. The locations were Wasai, Bangare and Yadakunya in three local government areas. A total of 613 snails comprising of the genus Bulinus, Lymnea, Bithynia were collected out of which 104 (17%) were infected with different types of cercariae, nematode larva and annelids (Oligochaetes). There was no significant association between the locations sampled and the prevalence of infected snails. A prevalence of 17.24% of infected snails was observed in Bangare; this was not significantly different from the 19.20% observed in Wasai (PR: 0.89, χ2:0.11, P = 0.7370) and 16.14% observed in Yadakunya (PR:1.06, χ2:0.04, P = 0.8322). The prevalence observed in Wasai was also not significantly different from that of Yadakunya (PR:1.19, χ2:0.73, P = 0.3915). Lymnea and Bulinus species were the only snails infected with cercariae while Bithynia species were infected with nematodes larva. Five types of furcocercus cercariae were recovered from the Bulinus snails only during the cold harmattan season while Fasciola cercariae and other cercariae were recovered at the end of the harmattan season.

Keywords: *Cercaria, Furcocercus, Fasciola, Jakara dam, Snail intermediate hosts*

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INTRODUCTION

Freshwater snails play a very important role in the transmission of trematode infections. The larval forms of these trematodes known as cercariae gets into the body of the host either by ingestion with vegetables or penetration of the skin when the host comes in contact with the water body. Some Furcocercus cercariae are the infective forms of trematodes of the genus Schistosoma which causes Schistosomiasis. Schistosomiasis is a neglected tropical disease. In Africa alone, it is estimated that some 200 million people are infected with this blood fluke. Nigeria is one of most affected country with an estimated 101.28 million people at risk of infection while 28.53 million are already infected. 34 out of the 36 states and Abuja

are endemic (Steinman, 2006). Snail species serving as intermediate hosts of urinary and intestinal schistosomiasis were reported from Kura (Jibril, 2016), Wasai part of Jakara dam (Duwa and Oyeyi, 2009), Yadakunya, Danmadanho and Sankarawa part of Jakara dam (Duwa, 2016, 2017). The aim of this work is therefore to further investigate the different types of cercariae in this water body.

MATERIALS AND METHODS

Study area

This study was carried out in Wasai, Yadakunya and Bangare parts of Jakara dam between February and December 2018. Jakara dam was constructed in 1976 and this part of it is situated in Minjibir Local Government Area (LGA) in the North Eastern part of Kano metropolis about 41.5Km from the city centre. Bangare part of Jakara dam is the most polluted.

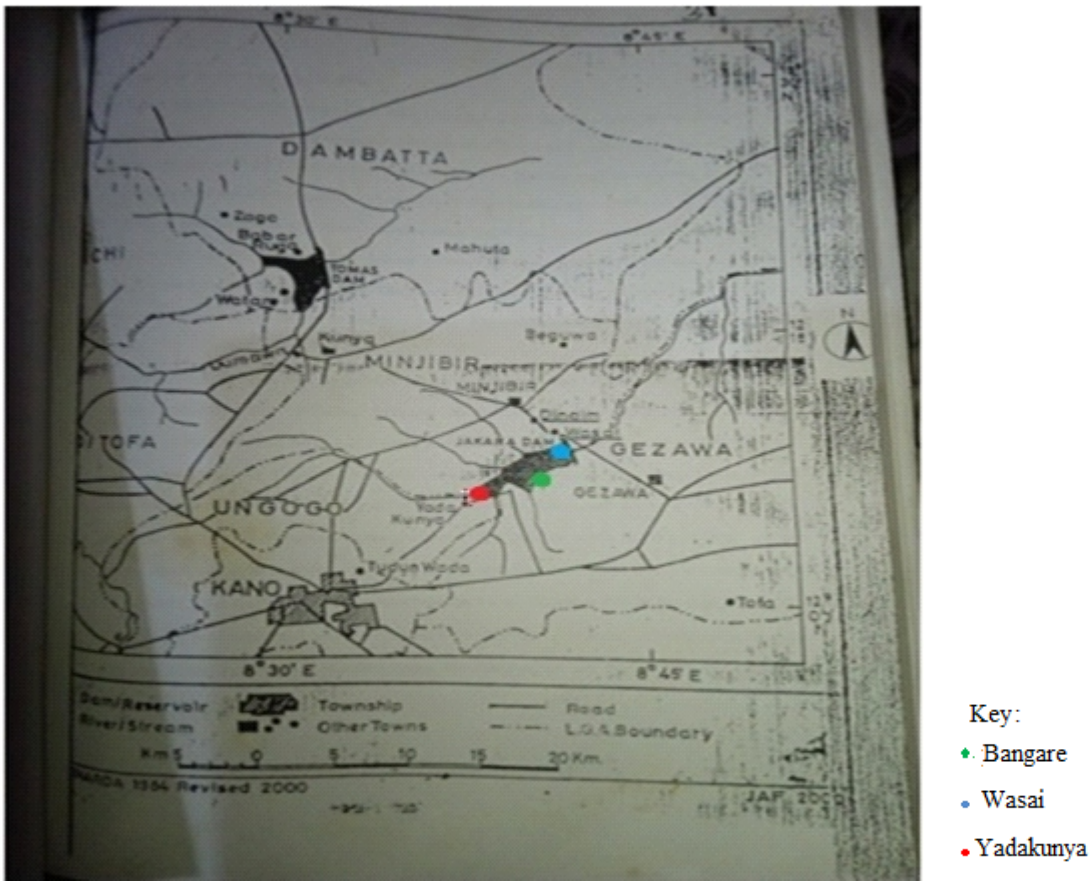

Fig.1: Map of Jakara dam showing the study area

Snail collection

Three parts of Jakara dam were investigated for the presence of freshwater snails. These parts are located in three local government areas of the state (Gezawa, Minjibir and Ungoggo). Snails were collected by hand picking only (due to accessibility) into a wide mouthed plastic container and brought to the laboratory. It was then sorted out into different genera and species for further investigation. The snails were fed with lettuce during the study.

Cercarial shedding

Snails were separately placed in compartmented petridishes and exposed to artificial light (rechargeable lamp) for 2-3 hours to stimulate cercarial shedding, they were also exposed to sunlight on a sunny day. Few drops of water were then taken from the petridish containing the snail and placed on a glass slide using a pipette and narcotized with neutral red to demobilize them before examination with a compound microscope for more detailed identification. Those snails that do not shed cercaria on the first day were re-exposed on the second day and those that shed cercariae were continuously exposed and observed under the microscope until the water in which they were placed was exhausted. Photomicrograph of the cercariae were taken using Toupview 3.1 digital camera fitted to the microscope through a USB and cercariae were identified using keys provided by Frandsen and Christensen (1984) and Key to cercarial identification.

Statistical analysis

The statistical analysis was performed using Stata version 12.1 for Windows (Stata Corp LP, United States). Chi-square test and classical test of hypothesis by *csi* (Tables for Epidemiologist: cohort study risk-ratio calculator) command in Stata were used to test for association and differences between prevalence of snail infection and sampled location. This program implements Pearson Chi square as it determines prevalence, prevalence (Risk) difference (PD), prevalence (Risk) ratio (PR), Odd Ratio and confidence intervals.

RESULTS

The prevalence of infection in *Lymnea* and *Bulinus* species in the different parts of Jakara dam was shown in Table 1 (16.96%). A total of 613 snails were collected out of which 104 were infected with different types of cercariae. The highest prevalence was found in Wasai (19.2%) (Minjibir LGA) part of the dam followed by Bangare (17.24%,Gezawa LGA) and the least in Yadakunya (Ungoggo LGA) 16.1% although sample sizes were not equal. The infection with furcocercus cercariae was only observed in *Bulinus* species in the month of December in Yadakunya. The *Fasciola* cercaria was observed in *Lymnea* species. The month with the highest infection rate is December. There was no snail in the rainy season during the months of July and September. One of the furcocercus cercaria named *Cercaria bulini yadakunya* I was the most abundant, the tail furca curved backwards at intervals during the swimming period until the body separates from the tail while still under the pressure of a cover slip. They have no eyespots.

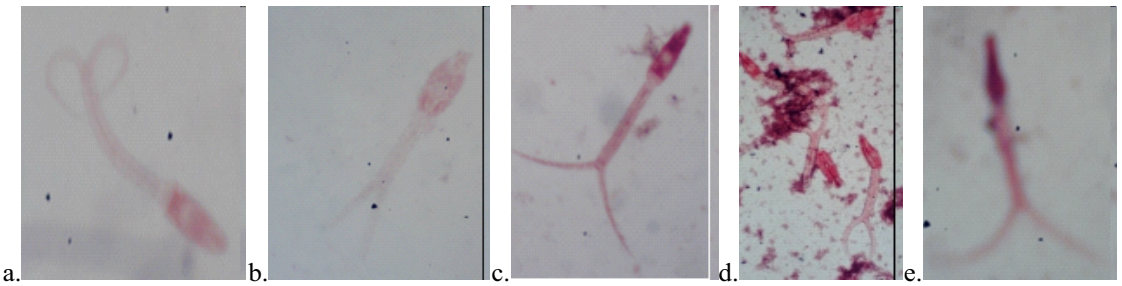

Fig.2a: Furcocercuscercariae (a-e) from Yadakunya part of Jakara dam they were named *Cercariae bulini yadakunya* I V

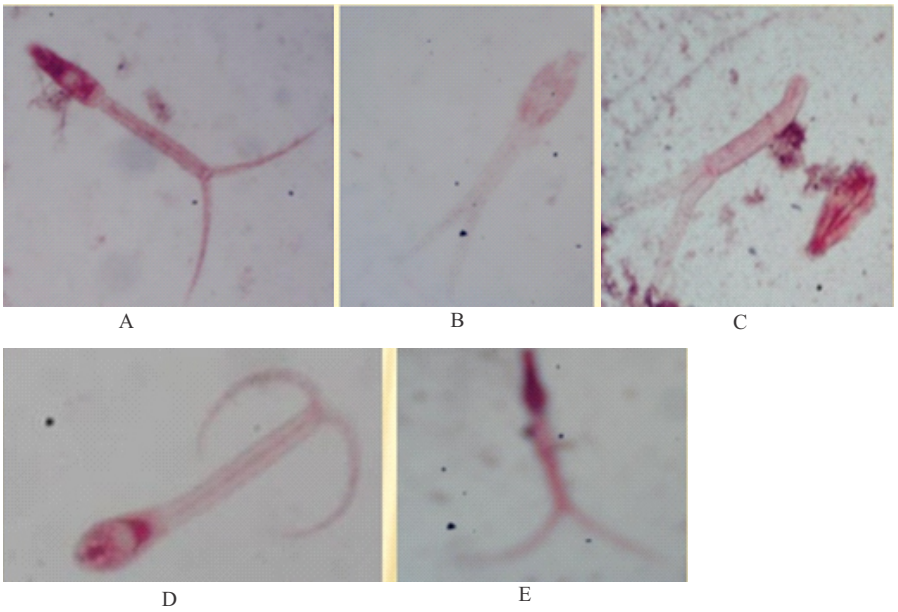

Fig.2b:Furcocercus cercariae (a-e) from Yadakunya part of Jakara dam they were named *Cercariae bulini yadakunya* I V.

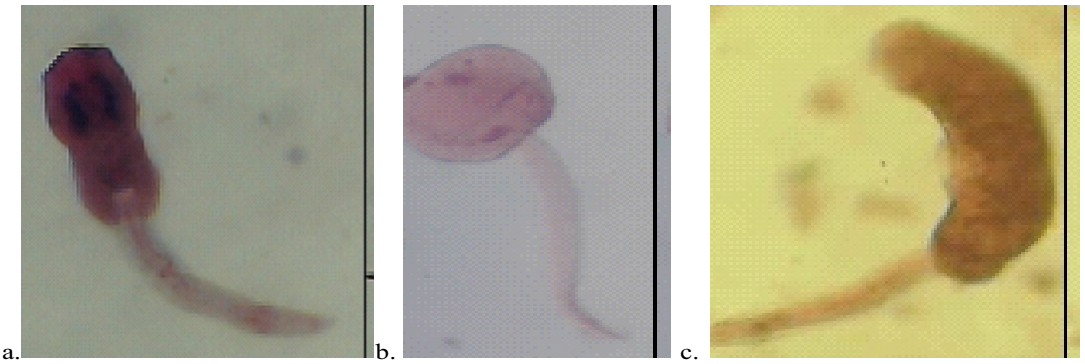

Fig.3: a. *Echinostome* cercaria b. *Fasciola* cercaria. c. *Gymnocephalus* cercariae

Fig.4: Other infections:a,b. larva of a Nematode from*Bithynia tentaculate* c. Annelid (Oligochaeta) from **a** *Lymnea* snail

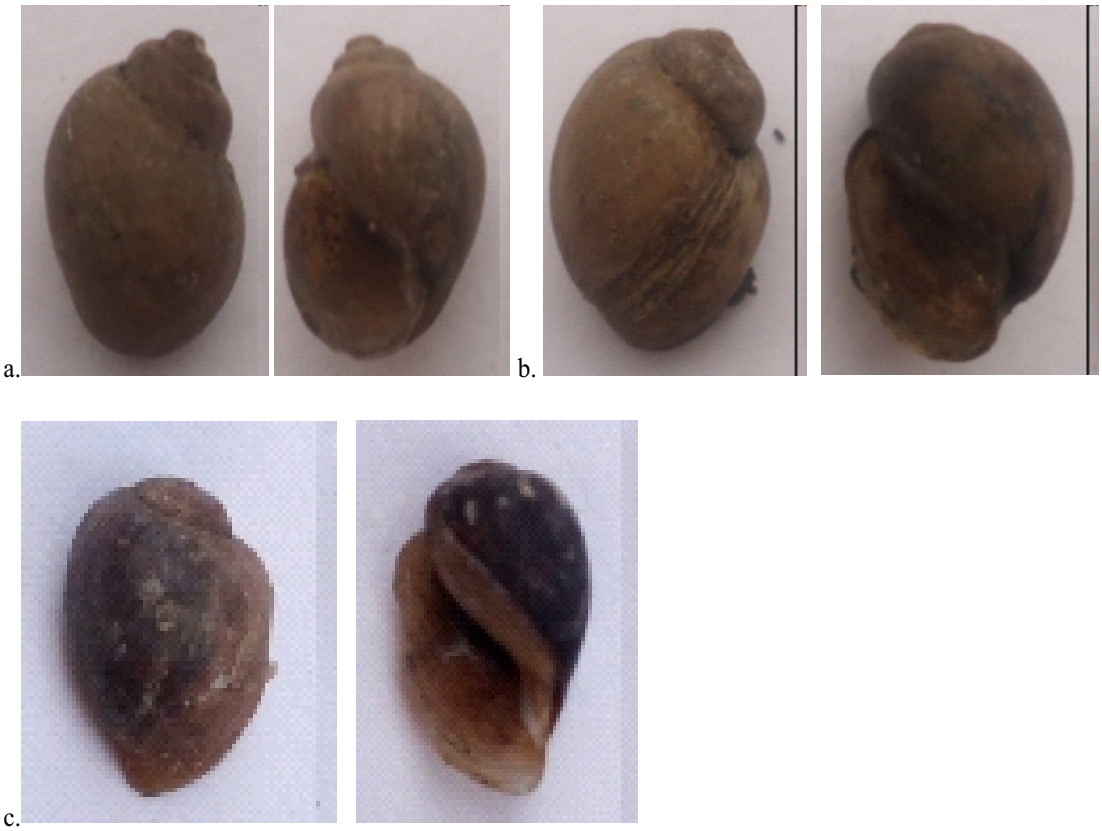

Fig.5: Bulinus species

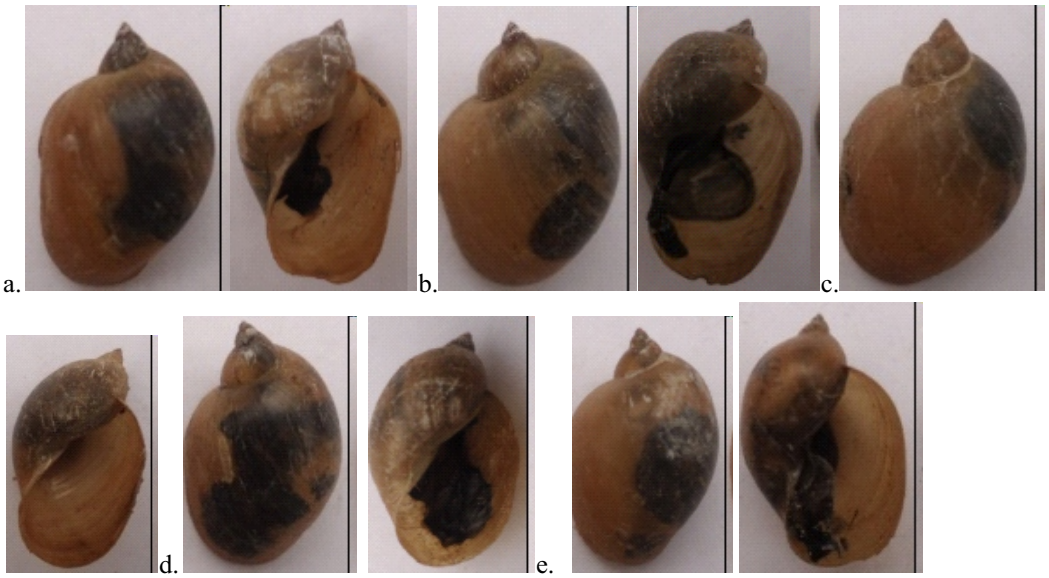

Fig. 6: Lymnea species

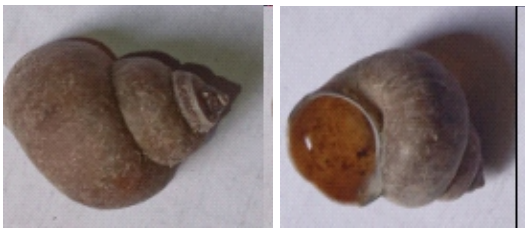

Fig.7: Bithynia specie

Table 1: Prevalence of infection in the three locations

Location	Snails examined	Snails infected	Prevalence (%)
Bangare	58	10	17.24
Wasai	140	27	19.2
Yadakunya	415	67	16.1
Total	613	104	16.96

Statistical analysis

There was no significant association between the locations sampled and the prevalence of infected snails. A prevalence of 17.24% of infected snails was observed in Bangare; this was not significantly different from the 19.20% observed in Wasai (PR: 0.89, χ2:0.11, P = 0.7370) and 16.14% observed in Yadakunya (PR:1.06, χ2:0.04, P = 0.8322). The prevalence observed in Wasai was also not significantly different from that of Yadakunya (PR:1.19, χ2:0.73, P = 0.3915).

DISCUSSION

The cercarial infections observed in snails in the different parts of this water body shows that there is likely to be different types of trematode infections taking place. Considering the fact that the water body is accessible to different animals,other animal schistosome cercaria can be harboured by the different snails. Okeke and Ubachukwu (2016) reported the infection of Biomphlaria snails with different morphotypes of cercaria in south-east Nigeria. Although many cercariae have been discovered in the different

parts of Jakara dam, this is the first time different types of Furcocercus cercariae are encountered despite continuous reports of Schistosomiasis in the area (Duwa *et al*, 2009; Abubakar, *et al*, 2015; Dawaki, *et al*, 2016). The Bulinus species were shedding only furcocercus cercaria.There was no Biomphlaria snail during this study but the predorminantcercariae in this study named *Cercaria bulini yadakunya* I (after the location where the snail intermediate host was collected) has the characteristics of a *Schistosoma mansoni* cercaria and has the tail furcae curved backwardly in the resting position when observed under pressure of the coverslip on the slide. According to Frandsen and Christensen (1984) the backward curvature of the tail furca is rarely seen in preserved cercariae or in living cercariae under pressure of the coverslip on the slide. Multiple infections were only observed in *Lymnea* snails. According to Webster *et al* (2013) there is the likelihood of novel zoonotic hybrid schistosomes evolving with subsequent changes in the parasites' life history traits, transmission potential and virulence when humans and their livestock start to frequent the same water bodies In view of this there is the need for the proper identification of snails and cercariae obtained to ascertain the particular infection being transmitted as there may be animal forms of schistosomiasis considering the morphology of the furcucercus cercariae emitted and for proper control strategy of snails, fascioliasis and schistosomiasis in the area.

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