Bayero Journal of Pure and Applied Sciences, 2(1): 58 - 63
Received: February, 2009
Accepted: April, 2009

THE ROLE OF JAKARA DAM IN THE TRANSMISSION OF SCHISTOSOMIASIS

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ABSTRACT
Fresh water bodies around the Jakara dam in Wasai town of Minjibir Local Government Area of Kano state were investigated for the presence of potential snail intermediate host. Five sites ,one stream, one burrow pit , one pond and two locations on the Jakara dam were investigated . Five species of snails, Bulinus globosus Morelet, the intermediate host of Schistosoma haematobium Bilharz, Biomphalaria pfeffeiri Krauss, the intermediate host of S. mansoni Sambon and Lymnea natalensis Krauss, the intermediate host of Fasiola gigantica Cobbold , P..conica and Bithynia tentaculata were encountered and investigated for trematode infections. B. globosus was the most frequently encountered in the two dam sites (Fako and Kwata) and was the only species shedding schistosome cercariae. Fishermen, children, female child hawkers were also found at the dam site. This clearly indicates Jakara dam is playing a role in the transmission of schistosomiasis.

Keywords : Schistosomiasis , snails, Jakara dam, Kano state

INTRODUCTION

It is well documented that the construction of man made lakes in areas endemic for schistosomiasis frequently leads to increased level of this disease in the human population.. Steinmann *et al.*, (2006) stated that the development of water resources and their management can increase schistosomiasis transmission . An analysis, based on African studies, showed that there is a risk ratio of 2.4 and 2.6 for urinary schistosomiasis (caused by *S. hematobium*) and intestinal schistosomiasis (caused by *S. mansoni*), respectively, among persons living adjacent to dam reservoirs. The analyses also showed that persons living near land that had been irrigated for agricultural use had an estimated risk ratio of 1.1 for urinary schistosomiasis and an estimated risk ratio of 4.7 for intestinal schistosomiasis (Steinmann *et al.*, 2006). Communities in Oyan dam (Ogun state) witnessed an outbreak of urinary schistosomiasis four years after its construction. In 1988 an overall prevalence of over 80% with high rates in all age and sex groups was recorded (Ofoezie, 2002). Adeoye and Akabogu (1996) also reported a prevalence rate of 6.5% and 45.3% in Ado-odo and Ago –Iwoye area of Ogun state respectively. Both *Schistosoma haematobium* (Bilharz) and *S.mansoni* (Sambon) are common in Nigeria (Cowper,1973).In the Northern state of Kano , there has been widespread development of earth dams. Many of such water bodies have been found to contain potential snail intermediate hosts (Betterton *et al.*, 1988). Rabiu (2007) reported the presence of *B.globosus* and *B. pfeffeiri* in Jakara dam (Kano state). The aim of this work is to investigate the distribution of potential snail intermediate host at Jakara dam and environs to determine if the dam plays any significant role in the transmission of schistosomiasis in the area.

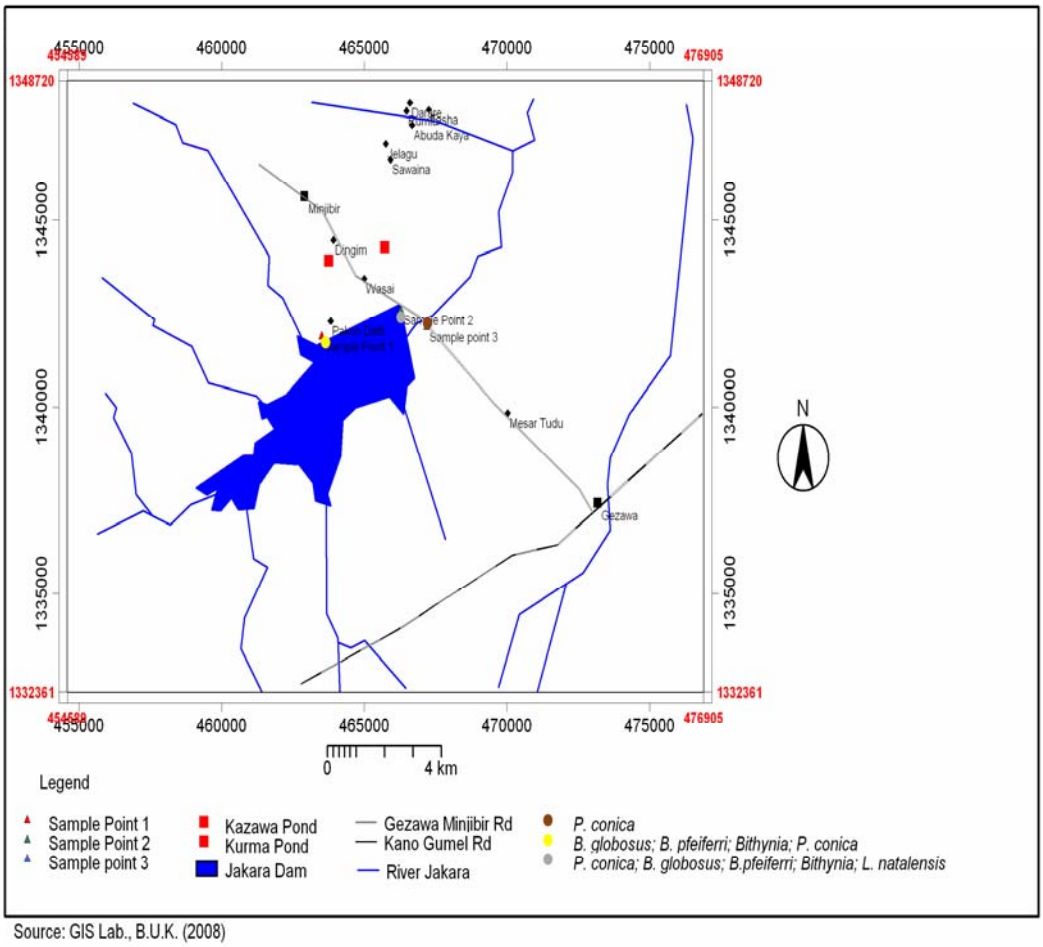
MATERIALS AND METHODS

The Study area

This study was conducted at Jakara Dam and its immediate environs between November 2008 and December 2008. Jakara dam was constructed in 1976 and is situated in Minjibir Local Government Area (LGA) in the North Eastern part of Kano metropolis about 41.5Km from the city centre. The area in terms of geology falls within the tip end of the Basement complex adjoining the Chad formation, which is characterized by disappearing type of streams. Jakara dam is one of the most grossly polluted dam in West Africa, because during the dry season all the streams that feed it dry up with the exception of the major Jakara stream which sustain it. The water bodies contain muddy substrata and gentle flowing, low turbidity water with rich growth of algae and macrophytes.

MATERIALS AND METHODS

Primary school pupils were interviewed for possible cases of schistosomiasis and water contact activities using a standardized self administered questionnaire, each pupil was interviewed for details of age, sex, water supply, whether they passed blood in urine and whether they had been given any antischistosomal drug or not. They were also questioned on whether they visit the dam to fish, swim or swam in stagnant pools. The subjects were chosen randomly. The pattern of human infection is reported elsewhere.



Source: GIS Lab., B.U.K. (2008)

Fig. 1: Jakara Dam in Relation to the Study Sites (Wasai and Dingim)

Survey of Snail Intermediate Host

All types of fresh water bodies in the immediate vicinity as well as the Jakara dam were investigated for the presence of potential snail intermediate hosts. Snails were searched for using long handled steel net, examination of submerged and emergent plants as well as polythene bags. Snails found were placed in wide mouth screw capped containers and brought alive to the laboratory at Bayero University Kano for identification and detection of trematode infection using the shedding method (Oyeyi, 1988)

A total of five sites comprising two locations on the Jakara dam (Kwata and Fako), one stream at Gada, one burrow pit at Urma and one surface pond at Kazawa were investigated (Figure 1).

For the screening process snails were washed in distilled water thoroughly and placed singly into alternate compartments of a transparent tissue culture plate together with some sieved pond water they were exposed to light supplied by a tungsten lamp for about two hours to stimulate cercarial emergence .Compartments containing shed cercariae were identified by preliminary examination with a dissecting microscope. For more detailed identification cercariae were transferred into glass slides and narcotized with neutral red before examining with a compound microscope. Snail and cercariae identification were based on descriptions given by Wallace and Gilles (1985) and Oyeyi (1988).

The snail species encountered in these water bodies include *B. globosus* Morelet the intermediate host of *S. haematobium* Bilharz, *B. pfeffeiri* Krauss, the intermediate host of *S. mansoni* Sambon and *Lymnea natalensis* Krauss, the intermediate host of *Fasiola gigantica* Cobbold, *P. conica* and *Bithynia* spp (Plate 1A-E). These snail species were variously encountered in three out of the five sites (Table 2) . Of the five snail species found, *B. globossus* was the most frequently encountered (44.8%) but was restricted to the two dam sites. The least commonly occurring were the *Biomphalaria pfeifferi* and *Lymnea natalensis*.(4%) each of which were also found at the two dam sites. However *P .conica* was the most widespread as it was found in all sites that harbored snails. Out of the 105 snail, specimens collected in the present investigation only 18 (17%), comprising two species (*B.globosis* and *L. natalensis*) were infected. (Table 3). *B.globosus* shed cercariae resembling those of human schistosomes (Plate 2). And none of the 4 samples of *B. pfeifferi* collected were infected. One of the specimen of *L.natalensis* was found shedding the *Fasciola* type of cercariae (*Gymnocephalus*) (Plate 4). Most (15) of the infected *B.globosus* were shedding both Amphistome and fasciola type of cercariae (*Gymnocephalus*) (Plate 3 and 4). Only two out of the 47 specimens of *B.globosus* (4.3%) collected were found shedding the schistosome type of cercariae.

Table 1: Some Features of The Study Population

Features	Wasai	Dingim	Total
Ethnic groups:			
Hausa	373	120	493
Others	-	-	-
Water Contact:			
Canal /Dam	90 (24.1)	30 (40.0)	120 (24.3)
Seasonal **ponds**	100 (26.81)	60 (50.0)	160 (32.5)
None at all	183 (49.06)	30 (40.0)	213 (43.0)
Knowledge of Schistosomiasis	200 (53.62)	12 (10.0)	212 (43.0)
Therapy (previous)	10 (2.68)	0 (0)	10 (2.0)
Haematuria (aware of presence)	29 (7.77)	2 (1.6)	31 (6.3)
Knowledge of Source of infection			
Salt Water	31 (8.31)	6 (5.0)	37 (7.5)
Canal/Dam	50 (13.4)	1 (0.83)	51 (10.34)
No idea	292 (78.28)	113 (94.17)	405 (82.15)

Values in parenthesis ( ) are percentages

Table 2: Frequency of occurrence of snail species in different types of water bodies in Wasai

Snail Spp	Sampling sites					
	Fako	kwata	gada	Urma	kazawa	Total
B.globossus	20	27	0	0	0	47(44.7)
L.natalensis	0	4	0	0	0	4(3.8)
B.pfeifferi	1	3	0	0	0	4(3.8)
Bithynia tentaculata	22	8	0	0	0	30(28.57)
P.conica	5	9	6	0	0	20(19.05)
Total	48	51	6	0	0	105

Table 3: Types of cercariae found after shedding

Snail species	Number collected	Number infected	Type of cercariae
B. pfeifferi	4	0	0
B. globossus	47	17	schistosome, faschiola type, amphistome
L. natalensis	4	1	gymnocephalus (fasciola type)
P. conica	20	0	-
Bithynia Tentaculata	30	0	-
Total	**105**	**18**	

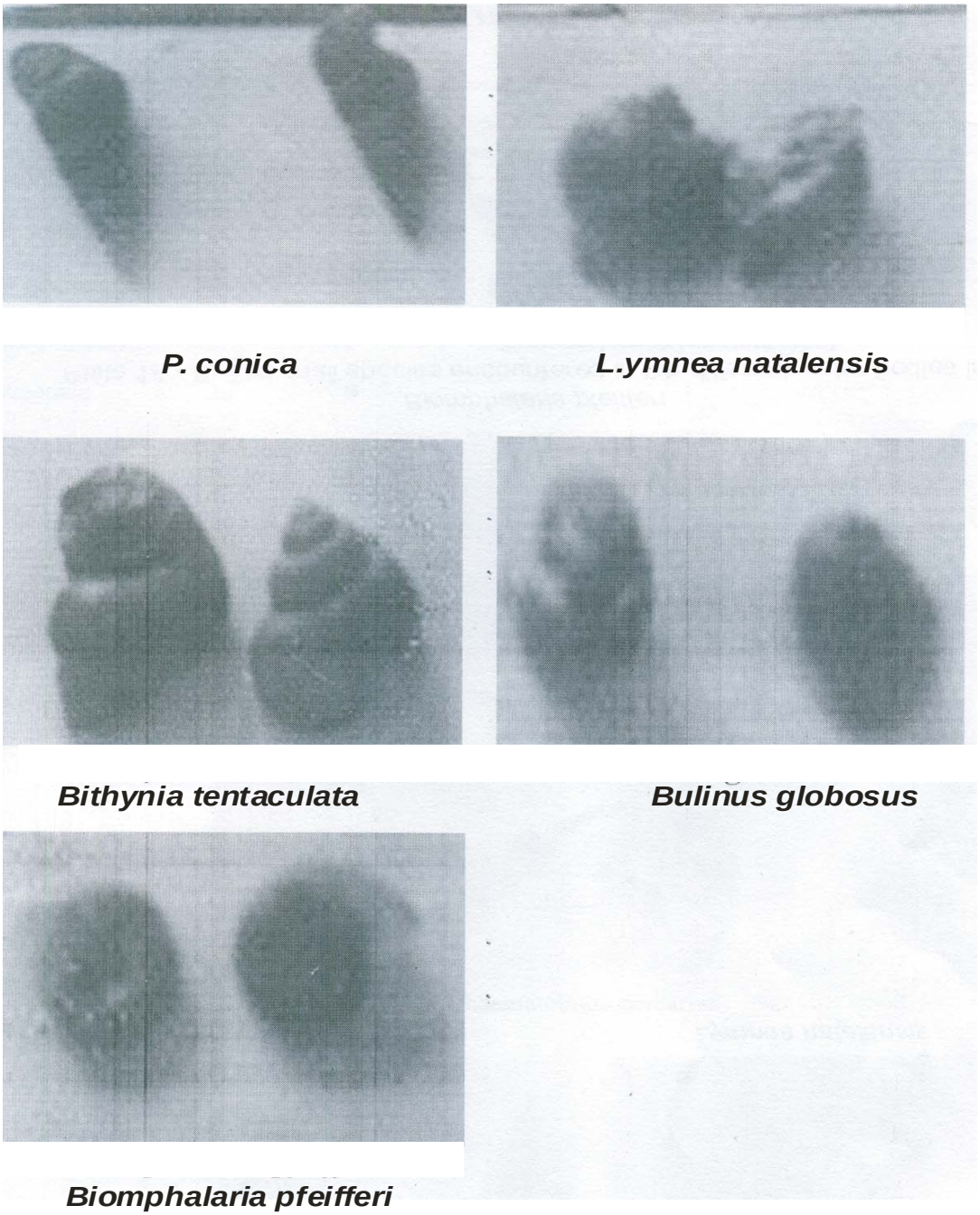


Plate 1A-E: The snail species encountered in the different water bodies in Wasai
Plates 2-4: The morphological types of cercariae found in this study

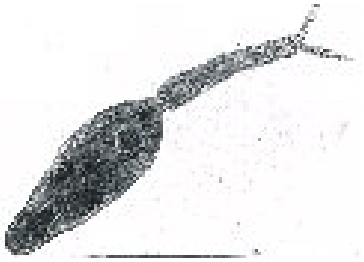


Plate 2: *Schistosoma haematobium* cercariae

Plate: 3 Amphistome cercariae

Plate 4: Gymnocephalus cercaria

DISCUSSION

Crucial to the nature of transmission of schistosomiasis is the pattern of water contact activities and the presence of snail intermediate hosts. Nnoruka, *et al.* (2002) also stated that the distribution of schistosomiasis is focal and restricted to areas with peculiar ecological characteristics which favor snail breeding, water contact, and intensive water use. As regards the role of Jakara dam in the transmission of the disease in surveyed population this study reveals the presence of a sparse population of *B.globosus,* very few (4.3%) of which were found shedding schistosome type of cercariae. Rabiu, 2007 also reported the presence *Bulinus globosus* the intermediate host of *S.haematobium* which were shedding the schiastosome type of cercariae in the same area (Wasai).

This scarcity of snails may be attributed to the fact that the survey was conducted during the dry and cold harmattan month of December 2007 when water level in the dam was low and temperatures (21.4^0C) not too favorable for snail multiplication.

It may also be as a result of regular removal and clearing of aquatic vegetation along with other wastes by fishermen as observed at some locations on the dam where human contact with the water often occurs, this constitutes an important snail control measure-that of environmental management and modification, Boele and Lamraani, 2004 also observed that repeated clearing and removal of vegetation from water sources has shown significant reduction in snail and egg mass densities.

The proportion of the surveyed school children who make contact with the dam water (24%) and the proportion of those who admitted to water contact in rain pools (32.5 %) makes it reasonable to state that the Jakara dam definitely plays some role in the transmission of schistosomiasis in the studied communities but may not be a major one.

Zakary, 1997 also observed that when the Akosombo dam in Ghana was constructed there was an increase in snail intermediate host of schistosomiasis and the incidence of urinary schistosomiasis was recorded as 69.9% among children who visited the Volta lake and 10.7% among children of the same village who never visited the lake. In Cote d'Ivoire an increase in prevalence was also observed in *S.haematobium* infection after the construction of Kosso and Taabo dams (WHO, Bull, 1997).Bassey (1988) reported 67.9%,73.7% and 55% prevalence in Kura, Kadawa and Garun babba, Kano state respectively. Prevalence rates of 6.5% and 45.3% was recorded in Ago-iwoye and Ado -odo, Ogun state respectively (Adeoye and Akabogun , 1996).

Conclusion and Recommendation

The Jakara dam clearly plays a role in the transmission of schistosomiasis in the area because the main factors involved in its transmission i.e water, human contact and host snails are brought into intimate play due to the presence of the dam.However, other transmission foci such as irrigation channels, temporary pools and surface water pools may be playing a more important role because a larger proportion of the school children in this study admitted water contact in such pools. It is recommended that communities should be educated on the mode of transmission of schistosomiasis.

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