Original Article

Urinary schistosomiasis in the Danjarima community in Kano, Nigeria

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Abstract

Background: Studies in northern Nigeria have suggested a linear relationship between urinary schistosomiasis and individual water-related activities. Knowledge of the perceptions of the local populace about schistosomoasis and of gender and cultural restrictions could be beneficial to control programmes. We studied the prevalence of urinary schistosomoasis and the socio-demographic factors associated with the disease in Danjarima community of Kano, northern Nigeria.

Methodology: A cross-sectional survey involving 890 subjects was conducted in the community. Urine samples were collected and examined for ova of *Schistosoma haematobium* using sedimentation technique. A semi-structured questionnaire was administered to the subjects in order to determine their knowledge and perceptions about urinary schistosomiasis in relation to their cultures.

Results: Eggs of *S. haematobium* were demonstrated in 370 (41.6%) of the urine sampled examined. The highest prevalence rate of 54.4% infection with *S. haematobium* was recorded in Zaura sub-village while the lowest rate of 6.4% was observed in Sabon-Fegi. More males (55.9%) were infected than females (3.7%) and the difference between the infection rate in males and females was statistically significant ($P \leq 0.01$). The age group 10 to 14 years recorded the highest rate of infection ($P \leq 0.05$) in both males (80.9%) and females (10.3%).

Conclusion: The lack of adequate perception on the cause of urinary schistosomiasis and exposure to water bodies were responsible for the high prevalence of infection in Danjarima.

Key words: urinary schistosomasis, *S. haematobium*, epidemiology, Danjarima

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Introduction

Urinary schistosomiasis caused by *S. haematobium* is endemic in sub-Saharan regions including Nigeria [1,2]. Schistosomiasis occurs in about 250 million people worldwide, and along with malaria is considered one of the major parasitic diseases afflicting humans [3,4]. The disease is associated with considerable morbidity and mortality in the developing world [5]. The distribution of the disease is focal and often restricted to areas with peculiar ecology which favours its transmission [6].

Urinary schistosomiasis is a water-based disease transmitted through freshwater snails, Bulinus species, as intermediate hosts [7]. Individuals' perceptions on the etiology and impact of urinary schistosomiasis differed by their levels of education and gender. In previous studies, a very low proportion of affected populations were reported to be aware of the role of snails in the transmission of the disease [8].

Studies [9-14] on the epidemiology of urinary schistosomiasis in Nigeria and other countries mostly targeted the schoolchildren while only a limited number of studies have been conducted at the community levels [1]. A significant number of victims have therefore been excluded from the studies. Moreover, there is little information on the epidemiology of *S. haematobium* infection in northern Nigeria, and the prevalence and distribution of the disease remain unknown in most of the areas in this geographical zone. We studied the prevalence of urinary schistosomoasis and investigated the socio-demographic factors associated with the disease in Danjarima community of northern Nigeria.

Materials and Methods

Study Area

The study was conducted between July and September, 2001, in Danjarima village, comprising Zaura, Watari and Sabon-Fegi sub-villages. Danjarima is located in Kumbotso Local Government Area (LGA) of Kano State, in the northwestern region of Nigeria, with an estimated population of just under 3,000 people, the majority of whom are farmers. The village covers about 24.28 sq.km and

Table 1. Prevalence of S. *haematobium* Infection in the three sub-villages of Danjarima.

SUB-VILLAGE	NUMBER OF SAMPLES EXAMINED	NUMBER OF SAMPLES INFECTED (%)	OVERALL PREVALENCE RATE
Zaura	298	162 (54.4)	18.2
Watari	294	151 (51.4)	17.0
Sabon-Fegi	298	57 (19.1)	6.4
Total (%)	890	370 (41.6)	41.6

lies between Latitude 11^0 47' N-12'00N and Longitude 8^0 26' E-8'30'E of the Greenwich.

A large body of water, River Watari, flows across the length of Watari and part of Zaura sub-villages. the inhabitants utilize the river for irrigation and domestic purposes, and children and young adolescents swim regularly in the river, especially during the summer. Few ponds are also located in some parts of Watari and Sabon-Fegi.

Selection of Subjects

Subjects were selected in each sub-village using a systematic random sampling. This was done after de facto census of the entire households in the community was conducted in accordance with *de – jure* technique [15]. A stratified sample of 890 subjects comprised of children five years of age and older and adults were included in the study.

Data Collection

Ethical approval for conducting the study was sought from the authorities of Kumbotso LGA, followed by mobilization of the inhabitants through the village head and the respective heads of the sub-villages. An interviewer-administered structured questionnaire was used to obtain the following information from the participants: age, sex, occupation, and sources of drinking and bathing water. The survey also asked whether the participants had passed blood in their urine during the month previous to the study, as well as the participants' perceptions of the etiology and methods of control of schistosomiasis.

Parasitological Examination

From each subject, a 10 ml sample of mid-stream or terminally voided urine was collected in a properly labeled clean and sterile specimen container containing 0.1g of boric acid. The specimen containers were placed in black polyethylene bags to preserve and prevent the ova of *S. haematobium* from hatching during transportation to the laboratory. Microscopic examination of the urine samples was performed at the Parasitology unit, Pathology section, of the Aminu Kano Teaching Hospital (AKTH), Kano, using the sedimentation method described in Cheesbrough [16]. Urine deposits were examined under a light microscope using 10X and 40X objectives. Urine samples containing egg(s) of *S. haematobium* were recorded as positive, while those without eggs were recorded as negative. The data obtained were analyzed using Chi-Square statistics.

Results

Table 1 presents the prevalence rate of *S. haematobium* infection in the three sub-villages of Danjarima comprising 162 (54.4%) subjects in Zaura, 151 (51.4%) subjects in Watari, and 57 (19.1%) subjects in Sabon-Fegi respectively. The overall prevalence rate was 41.6%.

Table 2 shows the prevalence of *S. haematobium* infection according to gender of the subjects in the three sub-villages of Danjarima. The infection rate was significantly higher ($P < 0.01$) among males (55.9%) than among females (3.7%) (Table 3). Infection was higher (80.9%) among individuals in the 10 to 14 years age group than in other age groups ($P < 0.05$) and was lower in the higher age groups. However, the infection rate among individuals aged 40 years and above was higher than that of the subjects in age groups 20 to 39 years (Table 4).

Of the 890 questionnaires administered, only 520 responses on the knowledge of the etiology and the mode of transmission of schistosomiasis were obtained (Table 5). Only 134 (25.8) of the respondents have attributed urinary schistosomiasis to contact with water bodies. The remaining 386 (74.2) respondents attributed the etiology to other causes. Thus, 214 (41.2%) respondents believed that the disease was a common sickness "like malaria

Table 2. Prevalence of *S.haematobium* infection according to the gender in the three sub-villages of Danjarima.

	NUMBER OF SAMPLES EXAMINED			NUMBER OF SAMPLES INFECTED (%)			
Sub-Village	M	F	T	M	F	T	Overall % Infection
Zaura	216	82	298	156 (72.2)	6 (2.0)	162 (54.4)	18.2
Watari	220	74	294	148 (67.3)	3 (4.1)	151(51.4)	17.0
Sabon-Fegi	210	88	298	57 (27.1)	Nil	57(19.1)	6.4
Total (%)	646	244	890	361 (55.9)	9(3.7)	370 (41.6)	41.6

Table 3. Age and gender-related infection rates among subjects from the three sub-villages of Danjarima.

	MALE			FEMALE			
AGE GROUP	NE	NI	% INF.	NE	NI	% INF.	PR.
5 - 9	256	146	57.0	56	2	3.6	47.4
10 - 14	136	110	80.9	68	7	10.3	57.4
15 - 19	102	60	58.8	42	-	-	41.7
20 - 24	34	14	41.2	28	-	-	22.6
25 - 29	88	26	29.5	27	-	-	21.7
30 - 34	12	2	16.7	15	-	-	11.1
35 - 39	8	Nil	Nil	8	-	-	Nil
40 - above	10	3	30	-	-	-	30
TOTAL	646	361	55.9*	244	9	3.6*	41.6

NE = Number examined % INF. = Percentage Infected
NI = Number infected PR. = Prevalence Rate.
*** = P < 0.01**

Table 4: Prevalence rates of *S.haematobium* among different age groups from the three sub-villages of Danjarima

AGE GROUP	NUMBER OF SAMPLES EXAMINED	NUMBER OF SAMPLES INFECTED	PREVALENCE RATE
5 - 9	312	148	47.4
10 - 14	204	117	57.4
15 - 19	144	60	41.7
20 - 24	62	14	22.6
25 - 29	115	25	21.7
30 - 34	27	3	11.1
35 - 39	16	Nil	Nil
40 - above	10	3	30
TOTAL	890	370	41.6

Table 5. Knowledge and perception of respondents about urinary schistosomiasis in Danjarima.

s/no.	Attributed cause of Urinary Schistosomiasis	Number of respondents (%)
1.	Food/Blood Poisoning	105 (20.2)
2.	Evil Spirit	67 (12.9)
3.	Common disease like Malaria	214 (41.1)
4.	Water	134 (25.8)
	Total (%)	520 (100)

fever"; 67 (12.9) respondents attributed the cause to evil spirits; and 105 (20.2%) respondents believed it was caused by either food or blood poisoning.

Discussion

This study shows that urinary schistosomiasis had a high prevalence rate in Danjarima community. Previous studies show that urinary schistosomiasis is widely distributed in Nigeria [17-21] and suggest a linear relationship between infection and individuals' water contact activities in northern Nigeria [22].

The prevalence rate of 41.6% observed in Danjarima community was higher than a prevalence of 25.5% observed [2] in some rural villages and farm settlements in Southeastern Nigeria. The figure was, however, lower than a prevalence rate of 98% reported from an agricultural settlement near Yola, Northeastern Nigeria [23]. The difference in prevalence rates may be influenced by peculiar ecological characteristics and levels of contact of individuals with water bodies and the degree of exposure to infective schistosome cercariae in different locations.

The prevalence of *S. haematobium* infection by sub-village showed that Zaura had the highest infection rate of 54.4%, followed by Watari at 51.4%. Sabon-Fegi sub-village had the lowest infection rate of 19.1%. This could be associated with the proximity of Zaura and Watari sub-villages to River Watari in the village, which may have served as a main reservoir and breeding site for the snail intermediate hosts, *S. haematobium*. Eventually, people of the two sub-villages utilize River Watari water for irrigation, fishing, swimming and domestic purposes. Sabon-Fegi on the other hand, is the farthest from the river and this may result in lesser contact with the water source by the residents compared with those who live in the other two sub-villages, and may have accounted for low *S. haematobium* infection rate observed in the area.

Infection rate was highest among subjects in the group aged 10 to14 years (80.9%) with a gradual decrease in the infection rate among the older age groups. This result was similar to a previous finding [2] in the southern part of Nigeria; however, it was different from previous reports [7,24] from other locations which indicated highest prevalence in the 5 to 10 years age group. The variation in the prevalence rate in different age groups from various centers may be attributed to natural environment, water contact patterns, and physico-chemical characteristics of locally available water influencing snail breeding in different ecological areas [25].

We observed a gradual decrease in the prevalence rate among subjects with ages between 19 and 39 years. However, subjects of 40 and above presented with infection rate (30%) close to the infection rate among the age group 15 to 19 years (41.7%). The reason could be that subjects aged 40 years and older usually visit the river at sunset to bathe and such exposure may have contributed to the present rate of infection among the group.

Previous studies did not report a consistent pattern on the prevalence of *S. haematobium* infection according to sex in Nigeria [6]. In this study, we observed a significantly higher prevalence rate of infection with *S. haematobium* among males than among females ($P \geq 0.01$). This observation could be attributed to a cultural habit of the regular and longer contact with the breeding site of the disease vectors among the male folks through farming and swimming than their female counterparts who were restrained by socio-cultural factors from swimming in the locally available river and ponds. This finding differs from a previous report [26] of prevalence of *S. haematobium* infection in females, but was, however, similar to other published findings [27,28].

The majority of the residents of Danjarima were not aware of the actual cause, mode of transmission, and control of urinary schistosomiasis as only 25% of the subjects included in this study attributed the cause of urinary schistosomissis to water sources. This finding implies that a large proportion of the populace were not aware of the preventive measures against infection by *S. haematobium* as it relates to

their contact with the bodies of water in their environment.

The findings of this study suggest that urinary schistosomiasis is endemic in Danjarima, Nigeria, with a high prevalence rate of infection particularly among those in the second decade of life and affecting more males than females. The lack of proper knowledge of the cause of the disease and insufficient safe water supplies coupled with inadequate health care facilities may have influenced the infection rate and distribution of the disease in the area. Appropriate intervention and health education for the community are required for the control and prevention of urinary schistosomiasis and its attendant illnesses in Danjarima.

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