PREVALENCE AND INTENSITY OF URINARY SCHISTOSOMIASIS IN SELECTED VILLAGES OF FIKYU COMMUNITY, USSA LOCAL GOVERNMENT AREA, TARABA STATE, NIGERIA

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Abstract: Schistosomiasis remains a public health problem in several parts of the world particularly in Africa. In this study, 390 urine samples were collected and screened, using filtration technique, to determine the prevalence and intensity of urinary schistosomiasis in Fikyu community, Ussa Local Government Area, Taraba State. *Schistosoma haematobium* eggs were found in 125 (32.05%). Chi square analysis shows that occurrence of the infection was not significantly associated with village, although the highest prevalence of infection was recorded in Kabkinra (42.86%), followed by Acha-nyim (38.24%), Kpakya (30.43%), Gafa (28.57%), Kabgbabaen (26.32%), with the least in Kabnyangsum (25.40%)(P = 0.316). There was however significant difference in mean egg intensity between the villages with the highest mean egg output observed for Kabnyansum village (4.63 eggs/10ml of urine) while the least for Acha-nyim (1.73 eggs/10ml)(P = 0.031). The infection rate was significantly (P = 0.009) highest among males (34.40%) than the females (29.07%). Similarly, the males had higher mean egg intensity of 2.76 eggs/10*ml* of urine compared to the females with 2.12 eggs/10*ml* urine, although the difference was statistically insignificant (P = 0.430). Risk factors of the infection in the study area include age, occupation, source of water, swimming, fetching of water and fishing. The findings of this study reveals that urinary schistosomiasis is prevalent in the study area, hence the need for an urgent intervention.

Keywords: Intensity, prevalence, *Schistosoma haematobium*, Fikyu, Ussa, Taraba, Nigeria

Introduction

Schistosomiasis, also known as bilharzia, is a chronic and debilitating disease caused by digenetic trematode flatworms (flukes) of the genus *Schistosoma* (Senghor *et al.*, 2014). This water-dependent disease is endemic in rural areas where there is lack of potable drinking water (Gryseels *et al.*, 2006). It is one of the most common parasitic infections in the world, second, only to malaria in terms of socio-economic and public health importance, especially in rural areas of developing countries (Engels *et al.*, 2002; Senghor *et al*., 2014). Infection occurs through contact with water infested with the free swimming larval stages of parasitic worms (cercariae) that penetrate the skin and develop in the human body to maturity (Bala *et al.*, 2012).

Schistosomiasis remains a public health problem in several parts of the world particularly in Africa (Steinmann *et al.*, 2006; Bigwan *et al.*, 2012). According to the World Health Organization, an estimated 235 million cases of schistosomiasis have been reported worldwide with 120 million symptomatic, 20 million with severe disease while 732 million persons are believed to be at risks of infection in known endemic areas (WHO, 2010). In Africa alone, about 90% of the over 200 million infected cases have been reported while in Nigeria, up to 101 million persons are at risk of schistosomiasis with nearly 29 million infected as at 2008 (Chitsulo *et al.*, 2000; Mafuyai *et al.*, 2006; Hotez and Kamath, 2009). A lot of researches were carried out on the prevalence of schistosomiasis in Nigeria including Adamu *et al.* (2001) who reported the prevalence *S. haematobium* infection in Wurno districts of Sokoto State to be 41%; Daniel *et al.* (2001) who reported 60% in Zuru Emirate of Kebbi state; Bello *et al.* (2003) who reported an overall prevalence of 60%; Nale *et al*. (2003) have reported the prevalence of 11.5% of urinary schistosomiasis in five communities near river Kubanni in Zaria; Akeh *et al.* (2010) reported the prevalence of 37.9% in Sankala, Cross River state; and Ukpai and Ezeike (2002) who reported a prevalence of 2.8% in Agulata, Anambra. The *S. haematobium* infection endemicity in Nigeria appears to be on the increase, particularly in the rural areas, with school aged children at greatest risk (Bello and Edungbola 1992 and Okoli and Odaibo,1999).

Diagnosis is based on clinical symptoms, on the detection of morbidity markers (e.g. microhaematuria in *S. haematobium* infection), on specific pathological changes using ultrasonography, on measurement of specific cellular immune responses and on immune histo-chemical demonstration of specific schistosome antigens (immunodiagnosis) (Ogbe, 2002). A diagnosis based on the demonstration of eggs in urine of the host provides the most common technique to demonstrate the presence of infection, and remains the gold standard for all other diagnostic techniques (Ogbe, 2002).

Despite more than a century of highly effective antischistosomal drug, the eradication of the disease is still far from actualization (Bigwan *et al.*, 2012). Since data from infected areas are still needed for mounting effective control measures, it is therefore important to study the epidemiological nature of urinary schistosomiasis, especially in communities of Fikyu where the inhabitants are farmers and fisher men. It is, thus, hoped that findings from this study will provide data for developing the much needed Africa-wide risk map for urinary schistosomiasis prevalence and form basis for future research.

Materials and Methods

The study area

The research work was carried out in Fikyu Community, Ussa Local Government Area of Taraba State, located in North Eastern Nigeria. Ussa Local Government Area lies between (Latitude 7°11″ N and Longitude 10°02″ E), borders the Republic of Cameroon in the south; the Donga river form its Northern boundary, and it occupies an area of about 1,495 km per square, and has an estimated population of 105, 070 persons (TSLS, 2003). The major occupations of the people are farming and fishing, with a few civil servants. Four streams flow through the settlement to River Gamana, including Yangtxu, Usuun, Tgixtsi and Ukang (TSLS, 2003). Temperature is usually high throughout the year with no monthly average below 29ºC annually (Ojo *et al.*, 2013).

Ethical consideration

Prior to the commencement of the investigation, ethical clearance and approval was obtained from Health Department, Ussa Local Government Area. Informed consent was also

sought and obtained from the village head and subjects in the study area.

Sample collection

Purposive sampling technique was used to select six (6) villages within Fikyu community including, Kabkinra, Kpakya, Kabgbabaen, Kabnyangsuum, Gafa and Acha-nyim based on their proximity to water body, each being less than one kilometer (1 *km*) away from the water body. Systematic random sampling technique was used to select 65 participants from each of the six selected villages and this gives a total of 390 samples.

A questionnaire was administered to each person that provided urine in order to provide information on their sex, age, occupation, source of water and water contact activity.

Urine sample was collected in 25 *ml* capacity universal bottles by the inhabitants themselves who were carefully instructed on how to go about it. All collections were done between 10:00am and 2:00pm (10:00 hours and 14:00 hours) to coincide with the period when excretion of *Schistosoma haematobium* eggs is highest (Fleck and Mondy, 1988). Each urine sample was preserved by adding 5 drops of 1% Domestic bleach (Sodium hypochlorite) to prevent lyses of the eggs (Bala *et al.*, 2012), and were packaged in cold Box and taken to the Parasitology Laboratory, Department of Biological Sciences, Usmanu Danfodiyo University, Sokoto for analysis.

Sample analysis

The samples were analyzed using the standard filtration technique described by Pugh (1978). The method involves the use of vacuum-pump filtration machine (Millipore Corporation Bedford, Massachuse 01730 USA). Terminal spine eggs, characteristic of *Schistosoma haematobium*, were counted for each positive sample and the result was expressed as eggs/10ml of urine to represent the intensity.

Analysis of data

Chi-Square (χ^2) analysis was used to observe the association in prevalence of infection between villages, sex, age groups, source of water supply, water contact activities and occupation among the people. Intensity of infection was analyzed using One-Way Analysis of Variance (ANOVA) at 0.05% level of significance. In all cases data were analyzed using SPSS statistical package version 20.0.

Results and Discussion

The results show that out of the 390 samples of urine examined for *Schistosoma haematobium* eggs, 125 samples were infected, with a prevalence of 32.05% and mean egg intensity of 2.49 eggs/10ml of urine.

The village specific prevalence of urinary schistosomiasis showed that Kabkinra had the highest prevalence (42.86%), while Kabnyangsum had the least prevalence (25.40%), and there was no significant difference (P = 0.316) between infection and village. The highest mean egg intensity 4.63 eggs/10ml urine was recorded in subjects in Kabnyansum village, while subjects in Acha-nyim recorded the least mean egg intensity (1.73 eggs/10*ml* urine) (Table 1). There was a significant difference in mean egg intensity of infection between Kabkinra, Gafa and Achanyim village (p = 0.040, 0.037 and 0.017), respectively, as shown in Table 1.

The urine samples were collected from 218 males and 172 females. The sex specific prevalence shows that males had the highest prevalence of 34.40% while females had 29.07%, and a significant association of prevalence of infection with gender (P = 0.009) (Table 2). Males had a lower mean egg intensity (2.76 eggs/10*ml*) than the females (2.12 eggs/10*ml*) even though the difference was statistically insignificant (P = 0.430).

Table 1: Prevalence and intensity of urinary *Schistosomiasis* among the selected villages in Fikyu Community

Name of villages	Number examined	Number positive	%	No. of eggs	Mean ±S E Intensity
Kabnyansum	63	16	25.40	74	4.63 ±1.844a
Kpakya	69	21	30.43	59	2.81±0.977a
Kabgbabaen	57	15	26.32	36	2.40±0.989a
Kabkinra	63	27	42.86	58	2.15± 0.485b
Gafa	70	20	28.57	39	1.95±0.394b
Achanyim	68	26	38.24	45	1.73±0.275b
Total	**390**	**125**	**32.05**	**311**	**2.49±0.340**

X^2 = 4.680; df = 1; P = 0.316; a = Indicate no significant difference; b = Indicate significant difference

Table 2: Prevalence and intensity of urinary *Schistosomiasis* with respect to gender

Sex	Number Examined	Number positive	%	No. of eggs	Mean±S E Intensity
Male	218	77*	34.40	207	2.701±0.494a
Female	172	48	29.07	104	2.145±0.398a
Total	**390**	**125**	**32.05**	**311**	**2.49±0.340**

X^2 = 6.728; df = 1; P = 0.009; * Significant Association

Table 3: Prevalence and intensity of urinary *Schistosomiasis* with respect to age groups

Age	Number examined	Number positive	%	No. of eggs	Mean intensity
6 - 15	131	43*	32.82	99	2.30
16- 25	72	31*	43.05	120	3.75
26- 35	72	19	26.39	42	2.33
36-45	56	15	26.79	17	1.13
46-55	33	7	21.21	9	1.29
56-65	18	8	44.44	15	1.88
66 and above	8	2	25.00	9	4.50
Total	**390**	**125**	**32.05**	**311**	**2.49**

X^2 = 71.728; df = 6; P = 0.000; *Significant Association

The highest prevalence of 44.44% was found among those aged 56–65, while those in the 46–55 age grouphad the least prevalence (21.21%). The occurrence of the infection is significantly associated with the age (P = 0.000). The results of intensity of urinary schistosomiasis showed that the highest mean egg count (4.50 eggs/10*ml*), was seen in subjects aged 66 years and above, while age group 36–45 years recorded the least mean egg intensity (1.13 eggs/10*ml*), although this difference was not significant (P = 0.994) (Table 3).

The results of the study in relation to occupation showed that civil servants were observed to have the highest prevalence of 35.00%, while traders had the least prevalence of 17.65% (Table 4). Statistical analysis showed significant association in prevalence of infection with farming and students (P=0.000). The highest mean egg intensity was recorded among the tailors (4.00 eggs/10*ml* urine) while traders were observed to have the least mean egg intensity of 1.00 eggs/10*ml* of urine.

Table 4: Prevalence and intensity of urinary schistosomiasis with respect to occupation

Occupation	Number examined	Number Positive	%	No. of eggs	Mean ±S E intensity
Farming	168	51*	30.36	120	2.40±0.642a
Students	181	68*	34.81	168	2.67 ±0.426a
Civil servants	20	7	35.00	16	2.29 ±0.714a
Trading	17	3	17.65	3	1.00±0.000a
Tailoring	4	1	25.00	4	4.00 ±0.000a
Total	**390**	**125**	**32.05**	**311**	**2.49±0.340a**

X^2 = 140.160; df = 4; P = 0.000; *Significant Association

The prevalence of 32.05% obtained in this study seem to be higher than that reported from other parts of Taraba State by earlier reseachers including Agere *et al*. (2010) who reported

a prevalence of 28.8% in Jalingo and Ardokola Local Government Areas, Monday *et al.* (2014) who observed a prevalence of 15.5% in Bali town, Bali Local Government Area, Taraba State among others.Reports from other parts of Nigeria include Ejima and Odaibo (2010) who reported 18.7% in Kogi State; 10.0% (Bigwan *et al*., 2012) in Potiskum, Yobe State, 16.3% (Rine *et al*., 2013) in Nasarawa State, and 9.2% (Iwu *et al.*, 2015) in Ehime Mbano, Imo State. However, higher prevalence rates have been reported by other researchers including, 41.5% (Houmsou *et al.*,2012) in Benue State, 45.3% (Okon *et al*., 2008) from a community in South Eastern Nigeria, 48.2% (Babatunde *et al*., 2013) in two peri-urban communities in South western Nigeria, 65.0% (Nmorsi *et al*., 2005) in Edo State and 74% (Bala *et al*., 2012) in Gusua, Zamfara State. The presence of urinary schistosomiasis in this study may be due to the high level of exposure to, and the dependence of the inhabitants of Fikyucommunity on the infested streams and river for their recreational and domestic needs.

The significant association of urinary schistosomiasis in the study area with gender might be an indication that the males are more active, involving themselves in such activities as fishing and farming, among others, which bring them to constant contact with water contaminated with the schistosomes. This, however, is contrary to the findings of Bala *et al*. (2012) and Babatunde *et al*. (2013) who reported that infection was not associated with any gender, concluding that both sexes are equally at risk of infection. Other authours such as, Kabiru *et al.* (2013), Morgas *et al*. (2010), and Sam-wobo *et al*. (2011) seem to agree with the findings of this study andfound the infection to be sex dependent, stating that males are more exposed than females. However, the intensity of the disease as indicated by the number of eggs per 10 *ml* of urine, in this study, showed that intensity is not sex dependent, an indication that both sexes carry equal worm burden.

The significant association of prevalence and intensity of urinary schistosomiasis with the ages 6 – 15 and 16 – 25, agrees with the findings of Houmsou *et al.* (2012), Abdullahi *et al.* (2011), and Kanwai *et al*. (2011), who found children of school age and young adults to be associated with the disease. The association could be due to the fact that the children of school-age and young adults are often involved in more activities that bring them to contact with infested water bodies, such as swimming, irrigation, fectching of water, bathing and fishing.

Table 5: Prevalence and intensity of urinary schistosomiasis with respect to source of water

Source of water	Number examined	Number positive	%	No. of eggs	Mean ± SE Intensity
River	201	57*	28.36	167	2.93±0.679a
Stream	76	32*	42.11	87	2.72±0.469a
Well	105	32	30.48	53	1.66±0.252a
Borehole	8	4	50.00	4	1.00±0.000a
Total	**390**	**125**	**32.05**	**311**	**2.49±0.340**

X^2 = 45.016; df =3; *P* = 0.000; *Significant Association

Table 6: Prevalence and intensity of urinary schistosomiasis with respect to water contact activities

Contact Activity	Number examined	Number Positive	%	No. of eggs	Mean ±S E Intensity
Bathing	125	37	29.60	107	2.89±0.641a
Washing	27	10	37.04	20	2.00±0.471a
Swimming	48	22*	45.83	41	1.86±0.331a
Fishing	58	19*	32.75	64	3.37±1.530a
Irrigation	69	15	21.74	48	3.20±1.176a
Fetching water	63	22*	34.92	31	1.40±0.215a
Total	**390**	**125**	**32.05**	**311**	**2.49±0.340**

X^2 = 20.104; df = 5; *P* = 0.001

The prevalence of 32.05% obtained in this study seem to be higher than that reported from other parts of Taraba State by earlier reseachers including Agere *et al*. (2010) who reported a prevalence of 28.8% in Jalingo and Ardokola Local Government Areas, Monday *et al.* (2014) who observed a prevalence of 15.5% in Bali town, Bali Local Government Area, Taraba State among others.Reports from other parts of Nigeria include Ejima and Odaibo (2010) who reported 18.7% in Kogi State; 10.0% (Bigwan *et al*., 2012) in Potiskum, Yobe State, 16.3% (Rine *et al*., 2013) in Nasarawa State, and 9.2% (Iwu *et al.*, 2015) in Ehime Mbano, Imo State. However, higher prevalence rates have been reported by other researchers including, 41.5% (Houmsou *et al.*,2012) in Benue State, 45.3% (Okon *et al*., 2008) from a community in South Eastern Nigeria, 48.2% (Babatunde *et al*., 2013) in two peri-urban communities in South western Nigeria, 65.0% (Nmorsi *et al*., 2005) in Edo State and 74% (Bala *et al*., 2012) in Gusua, Zamfara State. The presence of urinary schistosomiasis in this study may be due to the high level of exposure to, and the dependence of the inhabitants of Fikyucommunity on the infested streams and river for their recreational and domestic needs.

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Conclusion

The prevalence of urinary schistosomiasis in Fikyu community of Ussa Local Government Area, Taraba State as established in the current study can be described as moderate. Village, sex and age appear to influence the prevalence and intensity of the disease in the study population. The disease also appears to be associated with occupation as farmers and students had the highest prevalence. The prevalence and intensity of urinary schistosomiasis in this study appears to be as a result of an interplay between many of the above factors. It is, thus, recommended that government should put strong intervention measures in place for the education, screening and treatment of the inhabitants of Fikyu community on urinary schistosomiasis and other related diseases of public health importance.

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Conflict of Interest
The authors declare that there is no conflict of interest related to this study.

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