Urinary Schistosomiasis: A Study Among Primary School Pupils In A Rural Community In Nigeria

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Abstract

U rinary schistosomiasis is endemic in Nigeria and represents a significant public health challenge especially among inhabitants of rural areas. Against this background, this study aimed at determining the prevalence and associated risk factors of urinary schistosomiasis among children in a rural community in Nigeria. A total of 214 primary school pupils consisting of 98 females and 116 males were recruited for this study. Participant`s age ranged from 5 years to 15 years. Urine samples were collected during the school hours from all participants and examined for the presence of ova of *Schistosoma heamatobium* using light microscopy. A detailed questionnaire was used to obtain socio-demographic data from study participants. The prevalence of urinary schistosomiasis among the participants was 5.6%. Females were observed to have a higher prevalence of urinary schistosomiais than males although the difference was not statistically significant (P = 0.149). Urinary schistosomiasis was significantly affected by participants source of getting drinking water (P = 0.149) and father`s occupation (P = 0.012). Although participants with a history of bathing in rivers were observed to be more infected (6.7%) than those without such history (2.9%), the difference was not statistically significant (P = 0.348). Participant`s age, religion, and father`s educational status did not significantly affect the prevalence of urinary schistosomiasis (P = 0.708). The study concluded that the prevalence of urinary schistosomiasis was significantly affected by participant`s source of drinking water and father`s occupation. Increased enlightenment campaign and provision of social amenities for rural Nigerian communities is advocated

Key words: *Schistosoma heamatobium*, pupils, okada community, Nigeria

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Introduction

Urinary shistosomiais is a major public health problem in developing countries of the world. It is reported to be endemic in Africa, especially among residence of rural communities[1]. Urinary schistosomiasis is endemic in Nigeria[1, 2, 3]. Urogenital schistosomiasis results when adult female *Schistosoma haematobium* worm pairs living in the veins draining key pelvic organs, including the bladder, uterus, and cervix, release terminal-spine eggs that penetrate the tissues and are excreted in the urine to allow propagation of the parasite life cycle[4].

Shistosoma haematobium infection has been linked to chronic inflammation and pain, as well as growth stunting and cognitive deficits among tens of millions of children[5]. Reports indicate that about 75 % of girls and women with chronic *Schistosoma haematobium* infection experience deposition of eggs with granulomas and sandy patches on their uterus, cervix, and lower genital tract[4]. This has been associated with contact bleeding, discharge, and secondary infections and diminished fertility among them[4]. *Schistosoma haematobium* infection produces bladder wall pathology in approximately 18 million people in sub-Saharan African and 10 million people suffer from hydronephrosis and renal failure[6]. *Schistosoma haematobium* eggs have now been further identified as a Group 1 carcinogen responsible for a unique squamous cell carcinoma, which is widespread in *Schistosoma haematobium* – endemic areas[7, 8]. It has also been reported to increase the risk of HIV infection among women in some African studies[9, 10, 11]. However, despite its overwhelming public health importance and its well-established links to HIV/AIDS and cancer, *Schistosoma haematobium* has been labeled among the neglected tropical diseases (NTD) [12, 13].

Schistosomiasis remains a burden in Nigeria and a major health problem in many rural communities of the country[1]. Urinary schistosomiasis has been reported to be associated with low-socio-economic and educational status in previous studies[14, 15]. These factors are common in rural communities of Nigeria[16, 17]. While there are few studies presently exist on the prevalence of urinary Schistososmiasis in Nigeria, none have specifically focused on inhabitants of Okada community, which is the headquarters of Ovia-North East Local Government Area of Edo State, Nigeria. Monitoring of disease in any community is critical for

the proper articulation and implementation of intervention programs. Against this background, this study aimed at determining the prevalence of urinary schistosomiasis among children in rural community of Okada, Edo State, Nigeria.

Materials And Methods

Study Area

Okada, a rural community, is the headquarters of Ovia North East Local Government Area of Edo-state and Igbinedion University and Teaching Hospitals are located there. The Local Government has an estimated population of 155, 344 persons[18]. Majority of the residents of Okada are farmers with few civil servants, lecturers and students making less than 5% of the community.

Study population

The study was carried out among pupils attending Ikaledaran primary school Okada, Edo State, Nigeria, from April 2014 to May 2014.

A total of 214 pupils attending Ikaledaran primary school Okada, Edo State, Nigeria were recruited for this study. Participant`s age ranged from 5 years to 15 years and consisted of 98 females and 116 males. The purpose of research was explained to all the participants. In addition a letter was sent to all parents/guardians explaining same to them and seeking for their permission to include their children/ward in the study. A detailed questionnaire was also attached to letter from which some data of parents and pupils were gathered. On receipt of parents/guardians approval and filled questionnaire, pupils were given a sterile universal bottle with container and educated on how to collect the samples. The study was approved by the ethical committee of the Ikaledaran Primary School Okada, Edo State, Nigeria.

Collection and processing of urine samples

Urine samples were collected from school children in well sterilized and well labeled universal containers with covers during school hours between 10:00h and 14:00h. The samples were immediately taken to the laboratory of Igbinedion University Teaching Hospital Okada, for analysis. The urine samples were processed as previously described[1]. In brief, 10 mls of urine was placed in a test-tube and centrifuged at 5000rpm for 5 minutes. The supernatant was discarded and resulting sediment placed on a grease free slide and subsequently covered with a cover slip. The preparation was examined under light microscope for the presence of ova of *schistosma heamatobium.* The slides were also examined for the presence of red blood cells cast. The presence of protein in urine was determined using reagent-strips (Medi-test Combi-9, manufactured by Machery-Hagel, Duren, Germany).

Results

The prevalence of urinary schistosomiasis among children was 5.6%. Although female were observed to have a higher prevalence of urinary schistosoniaisis (10.2%) than their male counterparts (1.7%) the difference was not statistically significant (P = 0.091) (Table 1).

No visible blood was observed from macroscopic examination of urine samples. Mico-heamaturia was however, observed in 11(5.1%) of samples collected. A total of 25 (11.7%) samples had the presence of protein. Neither micro-heamaturia (P = 0.478) nor proteinuria (P =0.152) were pathognomonic of urinary schsitosmaisis in this study (Table 1).

With respect to age and religion, children aged 14 years and above and those of the Christian faith were observed to have the highest prevalence of urinary schistisomiaisis respectively. However age and religion were not identified as risk factors for acquiring urinary schistosmiasis in this study (Table 2). History of bathing in flowing or stagnant river was associated with urinary schistosomiasis among children (OR =

Table 1: Prevalence of urinary schistosomiasis among children

Characteristics	N	No infected (%)	OR	95% CI	P value
Gender					
Female	98	8 (8.2)	2.489	0.726, 8.554	0.149
Male	116	4 (3.4)	0.402	0.117, 1.378	
Mico-heamaturia					
Yes	11	1 (9.1)	1.745	0.205, 14.896	0.478
No	203	11 (5.4)	0. 573	0.067, 4.889	
Proteinuria					
Yes	25	3 (12.0)	2.727	0.186, 10.840	0.152
No	189	9 (4.8)	0.367	0.092, 1.407	

N – Number of children examined; **OR** – odd ratio; **CI** – confidence interval

Table 2: Risk factors for acquisition of urinary schistosomiasis among children

Characteristics	N	No infected (%)	OR	95%CI	P value
Age (Yrs)					
5-7	45	2(4.4)			0.708
8-10	52	4 (7.7)			
11-13	70	2 (2.9)			
= 14	47	4 (8.5)			
Religion					
Christianity	189	11 (5.8)			0.592
Islam	23	1 (4.3)			
Paganism	4	0 (0.0)			
Do you bath in River					
Yes	147	10 (6.7)	2.372	0.505, 11.143	0.348
No	67	2 (2.9)	0.422	0.089, 1.980	
Source of drinking water					
Tap water	151	6 (3.9)			0.014
Well water	44	2 (4.5)			
River water	7	3 (42.8)			
Rain water	12	1(8.3)			
Characteristics	**N**	**No infected (%)**	**OR**	**95% CI**	**P value**
Father`s occupation					
Farming	56	2 (3.8)			0.012
Fishing	25	5 (16.0)			
Trading	110	4 (4.5)			
Civil Servants	21	1 (4.8)			
Clergy	2	0 (0.0)			
Educational status of father					
Tertiary	8	0 (0.0)			0.187
Secondary	74	2 (2.7)			
Primary	101	6 (5.9)			
No formal education	31	2 (12.9)			

N – Number of children examined

2.372, 95% CI =0.505, 11.143). Although children that bath in river water had a higher prevalence of urinary schistosomiasis (6.2%) than those without such history (2.9%), the difference between both groups was not statistically significant (P = 0.348) (Table 2).

However children whose source of drinking water was the river were observed to have a significantly higher prevalence of urinary schistosomiasis than children with other sources of drinking water (P < 0.014) (Table 2).

Occupation of parents was identified as a risk factor for acquisition of urinary schistosomiasis in this study (P = 0.012). Children born to parents whose occupation was fishing had the highest prevalence of 16.0% (Table 2).

The prevalence of urinary schistosomiasis was observed to be highest among children born to parents with no formal education (12.9%) although educational status of parents did not significantly affect the prevalence of urinary schistosomiasis among children studied (Table 2)

Discussion

Urinary schistosomiasis is endemic in Nigeria, but sadly one of the neglected common parasitic diseases of childhood in the country[2, 3]. It is a significant cause of clinical morbidity and mortality in endemic countries of Africa and Middle East[3]. Data on prevalence of urinary schistosomiasis in rural Okada community of Edo state Nigeria is missing. Against this background this study aimed at determining the prevalence of urinary schistosomiasis among primary school children

The prevalence of urinary schistosomiasis among school children was 5.6%. This is lower than 57.7%, 24.3%, 19.8% and 18.7% reported in other Nigerian studies[19, 20, 21, 22]. It is however higher than 4.6% reported in a recent Nigerian study[23]. The prevalence of

urinary schistosomiasis differs from place to place. It is worth mentioning that the difference could also be related to geographical location as documented in earlier conducted studies in south western Nigeria, north –eastern Nigeria, south- eastern Nigeria, north central Nigeria and south eastern Nigeria respectively in contrast to our study which was conducted in Mid Western Nigeria[19, 20, 21, 22, 23]. The variation could also be due to differences in water contact pattern among participants of these studies. The prevalence of urinary schistosomiasis was observed to be higher among female children (82%) as compared to their male counterparts who recorded a prevalence of 3.4%. Similar findings have been documented in an earlier study[21], with contrasting results obtained in others[23, 24]. The higher prevalence of urinary schistosomiasis observed among females may not be unrelated to the fact that females are more likely to engage in domestic chores like fetching of water from the streams and washing of clothings in same. However gender did not significantly affect the prevalence of urinary schistosomiasis in this study. This is consistent with an earlier report[23].

Proteinuria and haematuria are indirect disease markers that are commonly used to identify individuals or communities at risk of *Schistosoma haematobium* infection in endemic rural African settings[25]. Micro-heamaturia and proteinuria were observed in 11(5.1%) and 25 (11. 7%) of total samples examined in this study. Unlike in an earlier study Ugbomoiko *et al.,* (2009) where proteinuria and haematuria were positively correlated with urinary schistosomiasis, neither micro-heamaturia (P = 0.478) nor proteinuria (P =0.152) were pathognomonic of urinary schsitosmaisis in this study. Other covert or overt factors could result in the presence of blood and protein in urine. The presence of urinary tract infection can precipitate kidney damage and lead to protein leakage[25]. This may well account for the observed trend in this study.

Children aged 14 years and above were observed to have the highest prevalence of urinary schistosomiasis. Children in same age group have been reported to have the highest prevalence in other studies[21, 24, 26]. High water contact is a risk factor for acquiring urinary schistosomiasis[27]. Younger children are much more likely to be in custody of their parents and may not enjoy as much freedom in engaging on self voyage to streams for bathing and swimming sessions as older children. This may explain the observed higher prevalence among older children in this study. The prevalence of urinary schistosomiasis was however not significantly affected by age of children. This agrees with findings in another Nigerian study[23], but disagrees with findings elsewhere[24, 28]. Although children of the Christian faith were observed to have the highest prevalence of urinary schistosomiasis, religion was not identified as a risk factor for acquisition of USI. This is consistent with an earlier report[15].

The prevalence of USI was higher among children with history of bathing in the river. High water contact is a risk factor for acquiring urinary schistosomiasis[2, 27]. In this study however, a history of river bathing was not identified as a risk factor for acquisition of urinary schistosomiasis. This is in contrast to report elsewhere[24]. Other factors such as poor hygiene and proximity to water bodies have been reported to affect the prevalence of USI in an earlier study[29]. The existing stream in Okada is located at some distance from human settlement. Perhaps the distance children may have to cover to get to the stream may discourage frequent visits which may have translated to the observed trend in this study. The prevalence of urinary schistosomiasis was significantly affected by participant`s source of drinking water. Children with access to tap water had significantly lower prevalence than others who did not. Indeed the prevalence of urinary schistosomiasis was highest among the group of children whose source of drinking water was the river. This has been reported by another Nigerian study[29]. In this study, source of drinking water was identified as a risk factor for acquisition of urinary schistosomiasis. This is in line with findings from other Nigerian studies[24, 29]

Children whose father`s occupation was fishing recorded the highest prevalence of USI. This has been documented in previous Nigerian studies[29, 30]. It is a common practice in Nigeria for children to assist their parents in carrying out their trade during or after school hours. Children of workers in river related occupation may frequently visit rivers leading to increased contact with ova, a factor that have been reported to be associated with acquisition of urinary schistosomiasis[27].. Of all children examined, those whose father had no formal education were observed to have the highest prevalence of urinary shistosomiasis. This has been previously documented in an earlier study[3]. Poverty and lack of education breeds ignorance. Parents with no education may be completely oblivious of risk factors of acquiring urinary schistosomiasis and thus be unable to pass vital preventive health information to their children. However educational status of parents of children was not identified as a risk factor for urinary schistosomiasis. This agrees with findings from a previous study[3], but differs from others[15, 29].

Conclusively the prevalence of urinary schistosomiasis in this study was 5.6%. Participants source of drinking water, occupation of father, and type of toilet system used significantly affected the prevalence of urinary schistosomiasis among children. Findings from this study underscore the need for provision of basic social amenities for residents of

Okada community to curb the spread of schistosomiaisis. There is also need for public enlightenment on mode of transmission and prevention of urinary schistosomiasis in rural communities of Edo State, Nigeria.

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Conflict Of Interest:
Authors have no conflict of interest to declare

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