RESEARCH ARTICLE

Prevalence of urinary schistosomiasis and water contact activities as risk factor in Wowyen community

Abbas Abel Anzaku MSc[1], Onah Daniel Oche PhD[1], Akyala, Ishaku PhD[2], Akyala Ishaku PhD[3]

Anzaku AA, Oche OD, Ishaku A, et al. Prevalence of urinary schistosomiasis and water contact activities as risk factor in Wowyen community J Anal Toxicol Appl. 2017;1(1):7-10.

This study assessed the prevalence of urinary schistosomiasis and water contact activities as associated risk factor in Wowyen community. A total of 620 subjects comprising of 300 male and 320 female subjects were analyzed. The prevalence was achieved by standard urine filtration technique. One way analysis of variance (ANOVA) and paired t-test was carried out using software SPSS Statistical version 20. The result confirmed an overall (37.91%) prevalence of infection. On the trait of ages, distribution rate was higher between the age brackets 5-10 years (11.94%) while the lowest (1.62%) was recorded among the ages of 36 years and above whereas female subjects were significantly high (20.97%) than the male (16.74%) subjects on gender basis. Water contact activity was higher among children (25.01%) than the adult subjects (12.91%) as regards to maturity. Statistical analysis indicated that there is no significant difference among the age groups as well as gender at $\rho>0.05$ indicating vulnerability of the infection with no respect to ages or sexes. This study shows that children are more susceptible to urinary schistosomiasis and as such proper care by parents towards the children should be made to avoid water contact activity that will induce the infection. Provision of adequate pipe-born water is suggested while emphasis on further research in this community is strong recommended.

Key Words: *Urinary schistosomiasis; Water contact activity; Wowyen community*

Urinary schistosomiasis is a waterborne parasitic infection caused by several species of trematodes (Platyhelminthes infection, or flukes), a parasitic worm of the genus Schistosoma Central Intelligence Agency (1). According to World Health Organization, Schistosomiasis remains an important public health problem globally with an estimated 249 million infected cases reported each year occurring in 779 million people worldwide with the vast population occurring in sub-Saharan Africa where with about estimated 224 million suffer the malignant effects of the disease with an estimated 280,000 death toll every year mostly among the rural inhabitants.

In sub-Saharan Africa, Nigeria conveys the heaviest burden with an estimated 29 million cases of the infection (2). Both urinary and intestinal schistosomiasis exists in Nigeria but urinary schistosomiasis is more widespread than intestinal schistosomiasis with varying prevalence across the country (3). The disease is transmitted by the group of planorbid fresh water snails of the genus Bulinus found around sources of water such as streams, slow flowing rivers, ponds, and irrigation canals where rural inhabitants rely on for their recreational, occupational, domestic, and agricultural activities or where water contact activities such as drinking, bathing, washing, swimming or domestication is exhibited by the definitive host. Amaechi (4) reported that during the 65th World Health Assembly, it was advocated that Member of States should intensify control intervention and initiation of elimination programmes for schistosomiasis. These still remain a dream for several countries in sub-Saharan Africa particularly Nigeria where the coverage for the preventive chemotherapy for schistosomiasis is 4.0%. The non-implementation of the policies is impeded by the lack of political commitment, lack of public health infrastructures, and the necessary resources to initiate and sustain control programmes across the country. Mbata et al. (5) added that Nigeria has the greatest number of schistosomiasis worldwide with about 29 million infected and about101 million people are at risk of infection but unfortunately there is a scarcity of research about the infection and its associated risk factors.

In Wowyen there is inadequate water supply and like in all human settlement people in Wowyen depends on water for their domestic, economic and agricultural need. Fishing, bathing, swimming and fetching of water for domestic purpose, swamp farming which most households engage in and the mixing of the locally tapped palm wine are some of the purposes which water is used in this community. In this community, fishing and farming is the basic occupation being practiced by the villagers and farming involved the farmer crossing streams and rivers to get to their various farmlands. Children are also involved in water contact activity which can trigger ingestions of the parasite.

Some of the reports indicated that the disease is found mostly among school children and transmission is usually focal. Mbata et al. (5) that is to say that the geographical distribution of the infection and of severe morbidity is restricted to a particular place. Still on the same trail, Stothard et al. (6) added that primary schoolchildren are particularly vulnerable to schistomiasis because of their habit of playing in water, where they may contract the infection. As such, they are the ideal target group to investigate the prevalence of schistosomiasis and the data collected from this age group can be used to assess not only whether schistosomiasis threatens the health of schoolchildren, but can also be used as reference for evaluating the need for community intervention.

Many studies also point out that a lot of work will still had to be done to discover new endemic areas and to harness the predictive potential of schistosomiasis indicators to arrive at a cheaper community diagnosis and preventive protocols. With the documented reports, this study therefore determined the prevalence of urinary schistosomiasis and treatment seeking profile in this community.

MATERIALS AND METHODS

Study area

This study was conducted in Wowyen community, Nassarawa Eggon Local Government of Nasarawa State, Nigeria. Nassarawa Eggon Local government is one of the three local governments under Nasarawa north senatorial zone of Nasarawa state, along with it is Akwanga and Wamba Local Government. It has an area of 1,208 km2 and a population of 149, 129 at the 2006 census. There are two distinct seasons, the rain and dry seasons. The former takes place between April and October, while the later occurs from November to March.

Selection of subjects

School children were selected from L.G.E. A primary school Wowyen whereas

[1]*Department of Microbiology, Federal University Lafia, Nigeria;* [2]*Department of Medical Laboratory Science, School of Health Technology, Agasha, Nigeria;* [3]*Department of Biological Sciences, Microbiology Unit, Nasarawa State University Keffi, Nigeria*

Correspondence: Abbas Abel Anzaku, Department of Microbiology, Federal University Lafia, Nigeria. Telephone +2348038141859, e-mail humbleabel2016@yahoo.com

Received: September 05, 2017, Accepted: October 29, 2017, Published: November 10, 2017

other subjects were randomly sampled within the entire community using a systematic random sampling. A stratified sample of 620 subjects comprised 300 males and 320 females within the age range of five (5) years and above.

Sample collection and transportation

Both children and adults volunteers were screened. Pupils from primary schools and students from secondary schools were systematically queued up according to their height in both primary and secondary school and were given universal containers for urine collection. The adults were also given universal containers for urine collection as their ages and sexes were recorded.

Collection of urine specimens

Urine samples were collected into clean universal containers between 10 AM and 2 PM local time for maximum egg output (6). After vigorous shaking, 10 ml of urine was removed into another universal container containing 5 ml of 1% aqueous solution of carbol fucshin using a disposable syringe. The specimen was preserved in this form and transported to the laboratory for examination within five hours of collection.

Biochemical examination

Urine samples were examined biochemically immediately following collection of samples. Combi-9 reagent test strip (Yeondong Pharm. Corp. Seoul Korea) was used to test the samples for the presence of blood aematuria (7). this test was carried out by dipping the reagent strip into urine samples and comparing the colour chart according to concentration showing a range of valves from Negative (less than 10 erythrocytes/ul of urine) to increasing values of (10,25,50 and 250 erythrocytes/ul urine) for haematuria (8-10).

Macroscopic examination

Microscopic examination of the urine samples was performed using the sedimentation method described by Cheesbrough et al. (11). Urine deposits were examined under a light microscope using 10x and 40x objectives. Samples containing eggs of *S. haematobium* and without eggs were recorded. The data obtained were analyzed using Chi-Square statistics.

RESULTS AND DISCUSSION

The prevalence of urinary schistosomiasis infection was examined with the total occurrence of 235 (37.91%) out of the six hundred and twenty (620) samples analyzed. With respect to age groups, Table 1 below shows the age distribution of Urinary Schistosomiasis infection with the highest 74 (11.94%) occurrence in age bracket 5-10 years, 11-15 years as 50 (8.06%), 16-20 as 14 (2.26), 21-25 years as 53 (8.55%) 26-30 years as 19 (3.06%), 31-35 years as 15 (2.42%) and the lowest occurrence among the age bracket of 36 years and above as 10 (1.62%), respectively.

Table 2 below shows the occurrence of urinary schistosomiasis with respect to gender. Out of the total (300) male subjects examined, 105 were infected with 16.94% occurrence whereas out of the total (320) female subjects examined, 130 were infected with total occurrence of (20.87%).

Table 3 below shows the various water contact activity in the community with respect to age (adult or children). Based on water contact activities, adult subjects washing shows 18 (2.90%) for adult and 45 (7.26%) for children; drinking shows 20 (3.23%) for adult and 23 (3.71%) for children; bathing shows 12 (1.94%) for adult and 35 (5.65%) for children; swimming shows 7 (1.71%) for adult subjects and 52 (8.39%) for children while domestication shows 23 (3.71%) for adult as it is not application for children subjects.

Figure 1 below present the pictorial distribution of urinary schistosomiasis with respect to age range. From the chart below, subjects between the ages of 5-10 years had the highest (11.94%) prevalence of the infection while 36 years and above had the lowest (1.62%).

Figure 2 below shows the pictorial presentation of the infection urinary schistosomiasis with respect to gender. Male subjects had (16.94%) while female subjects had (20.97%) as the highest prevalence.

Figure 3 below present the pictorial display of the total percentage occurrence of the various water contact activities by the infected subjects in Wowyen community.

TABLE 1

Age distribution of urinary schistosomiasis in Wowyen community

Age (years)	No of examined	No of infected	Occurrence of infection (%)
5-10	33	74	11.94
11-15	134	50	8.06
16-20	21	14	2.26
21-25	115	53	8.55
26-30	54	19	3.06
31-35	43	15	2.42
36 & above	29	10	1.62
Total	620	235	37.91

TABLE 2

Occurrence of urinary schistosomiasis according to gender

Gender	No of subjects examined	No of infected subjects	% Occurrence of infection
Male	300	105 (525)	105 (16.94)
Female	320	130 (650)	130 (20.97)
Total	620	235 (1175)	235 (37.91)

TABLE 3

Water contact activities of the subjects with respect to maturity in Wowyen community

Activity	Adult %	Children%	% Occurrence of infection
Washing	18 (2.90)	45 (7.26)	70 (10.16)
Drinking	20 (3.23)	23 (3.71)	43 (6.94)
Bathing	12 (1.94)	35 (5.65)	47 (7.58)
Swimming	7 (1.13)	52 (8.39)	52 (9.52)
Domestication	23 (3.71)	0 (0.00)	23 (3.71)
Total	80 (12.91)	155 (25.01)	235 (37.91)

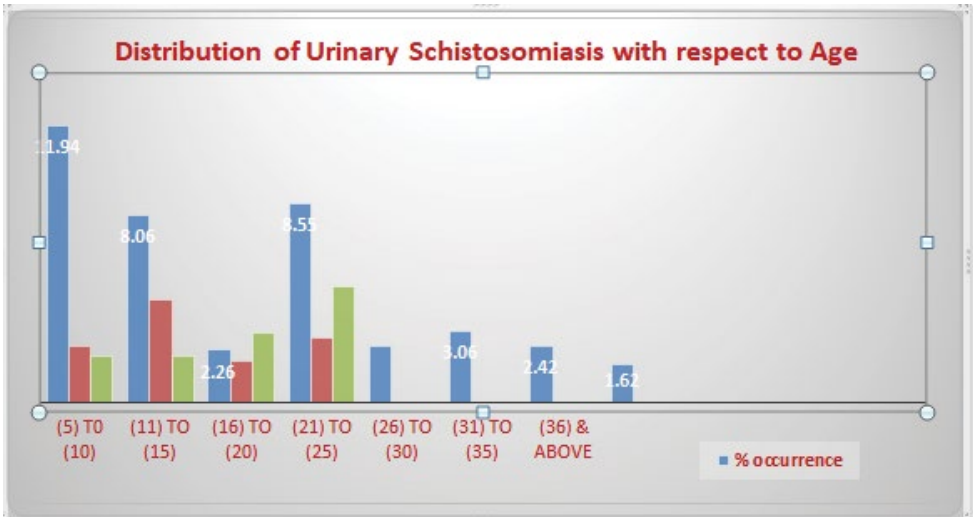

Figure 1) *Showing occurrence of urinary schistosomiasis according to age range*

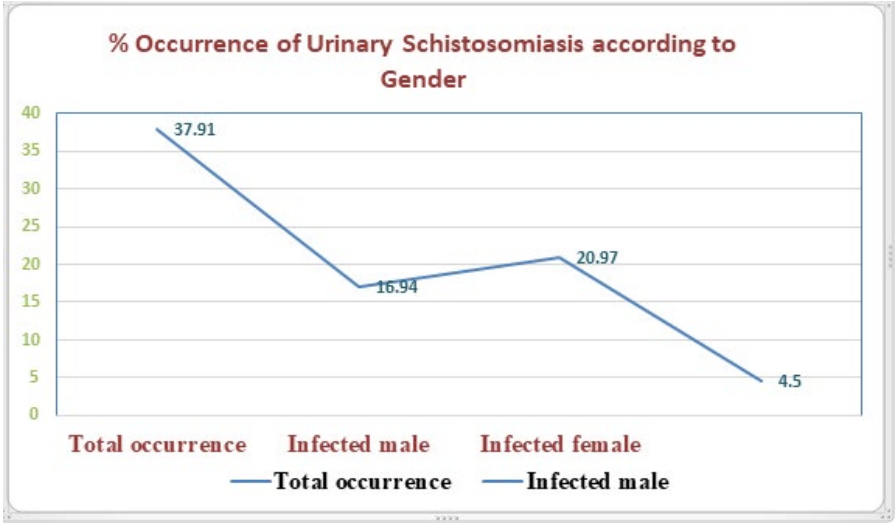

Figure 2) *Graphical presentation of urinary schistosomiasis infection with respect to gender*

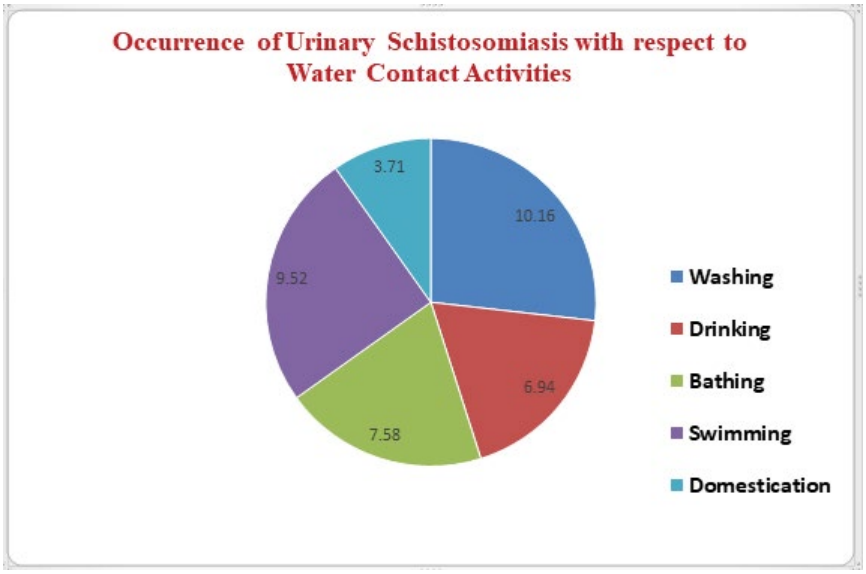

Figure 3) *Bar chart showing the various water contact activities by the subjects*

DISCUSSION

This study evaluated the overall prevalence of urinary schistosomiasis and water contact activity as risk factors in Wowyen community, Nasarawa Eggon local government of Nasarawa state. The prevalence of urinary schistosomiasis in this study was 37.91% from the six hundred and twenty (620) urine samples examined which can be further classified as moderate with respect to World Health Organization documentation on endemic communities (10). The major factors that may be responsible for the widespread of urinary schistosomiasis infection in this study area is ignorance of the infection as regard to water contact with snails infested streams and rivers, lack of basic amenities, inadequate and indiscriminate disposal of human sewage (11-16).

Age groups 5-10 years were more prevalent in the study with occurrence rate of 11.94% and the lowest occurrence recorded among the age groups 36 years and above 1.62%, respectively. This could be attributed to the high rate of water contact activities by the age groups and their susceptibility to infection with respect to their immune response.

Out of (300) male subjects examined, 105 were infected with 16.94% occurrence whereas out of (320) female subjects examined, 130 were infected with total occurrence of (20.87%) which showed that there is no significant difference in the age groups though female subjects were higher than the male subjects. Similar report by Mbata et al. (5) showed that there is no sharp difference between the rate of the infection between the males (23.13%) and the females (22.53%). This is apparently due to equal exposure to the risk factor as there were no limitations on movement and water contact activities between the sexes.

On the analysis of the various water contact activities in the community with respect to maturity (adult or children), adult subjects were 12.91% while children subjects were 25.01% occurring as the highest compare to their adult counterpart. According to Okpala et al. (8) as cited by Nworie et al. (7), the transmission of urinary schistosomiasis occur in places where fresh water snail vector is present and where there is contact between the population and infected water.

The statistical analysis showed that neither sex nor age had significant influence in the prevalence of the disease in the area ($p>0.05$).

CONCLUSION AND RECOMMENDATION

Based on the findings of this study which showed that urinary schistosomiasis is prevalent in the area even though it is moderate, the infection depends on water contact activities irrespective of age or sex. This study therefore recommended that schistosomiasis control program in the community should be embarked upon to educate the populace on risk factors that predispose an individual to urinary schistosomiasis and the need for proper sewage disposal, adequate provision of social amenities such as pipe borne water and toilet facilities to the study area in order to reduce the menace of the infection should be considered by the state government.

AUTHORS' CONTRIBUTIONS

Each author contributed immensely to the writing of the manuscripts. Abbas Abel Anzaku played the key role in the research study and writing of the manuscript, Onah Daniel Oche involved in writing of the manuscript, Akyala Ishaku reviewed the manuscript while Oche Daniel Idibiah contributed in carrying out statistical analysis.

ETHICAL CONSIDERATION

Considering ethical issues guiding research, consent about the research was granted by the District head and school authorities and parents for both urine collections from the school children as well as children at home for involvement. All human participants were asked for permission to source any form of information from them.

COMPETING INTEREST

All authors have declared that there is no competing interest in the manuscript publication toxicities.

REFERENCES

1. Central Intelligence Agency (CIA). Schistosomiasis. World fact-book. 2007;4.
2. Hotez PJ, Kamath A. Neglected tropical diseases in sub-Saharan Africa: Review of their prevalence, distribution and disease burden. J Negl Trop Dis. 2009;3(8):12-8.
3. Hassan O, Amoo O, Akinwale AJ, et al. Current status of urinary schistosomiasis in communities around the erinle and eko-ende dams and the implications for schistosomiasis control in Nigeria. S Afr J Infect Dis. 2014;29(4):137-40.
4. Amaechi EC. Urinary schistosomiasis among school age children in some rural communities of Abia State south eastern, Nigeria. Anim Res Intern. 2014;11:1953-17.
5. Mbata TI, Orji MU, Oguoma VM. High Prevalence of Urinary Schistosomiasis in a Nigerian Community. Afr J Biomed Res. 2009;12:2.
6. Stothard JR, French MD, Khamea IS, et al. The epidemiology and control of urinary schistosomiasis and soil-transmitted helminthiasis in schoolchildren on Unguja Island, Zanzibar. Trans R Soc Trop Med Hyg. 2009;(103):1031-44.
7. Nworie O, Nya O, Anyim C, et al. Prevalence of urinary schistosomiasis among primary school children in Afikpo North local government area of Ebonyi State. Ann Biol Res. 2012;3(8):3894-7.
8. Okpala HO, Agwu E, Ahta MI, et al. A survey of the prevalence of Schistosomiasis among pupils in Apata and Laranto areas in Jos, Plateau State. J Allied Health Sci. 2004;4:1.
9. World Health Organization. Preventive chemotherapy in human helminthiasis: Total coordinated use of anthelminthic drugs in control interventions. A manual for health professionals and programme managers Geneva. 2006.
10. Bala, AY, Ladan MU, Mainasara M. Prevalence and intensity of urinary schistosomiasis in Abarma village, Gusau, Nigeria: A preliminary investigation. Sci World J. 2012;7(2):1-4.
11. Cheesbrough M. District laboratory practice in tropical countries, Part 2. United Kingdom: Cambridge University Press, Cambridge. 2006;323-41.
12. Hotez PJ, Kamath A. Neglected tropical diseases in sub-Saharan Africa: Review of their prevalence, distribution and disease burden. J Negl Trop Dis. 2009;3(8):12-8.
13. Houmsou RS, Amuta EU, Sar TT. Profile of an epidemiological study of urinary schistosomiasis in two local government areas of Benue State, Nigeria. Intern J Med Biomed Res. 2012;1(4):39-48.
14. Ivoke, N, Ivoke ON, Nwani CD. Prevalence and transmission dynamics of *Schistosoma haematobium* infection in a rural community of southwestern, Ebonyi State, Nigeria. Trop Biomed. 2014;31(1):77–88.
15. Mbata TI, Orji MU, Oguoma VM. High prevalence of urinary schistosomiasis in a Nigerian community. Afr J Biomed Res. 2009;12:2.
16. Nigerian Postal Services. Post offices with map of local government areas. 2009;10-20.