Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.3, No.2, 2013

Epidemiology of Urinary Schistosomiasis Among Secondary School Students in Lafia, Nasarawa State, Nigeria

Rine C. Reuben[1*], Habibu Tanimu[1]and Jasini A. Musa[2]
[1]Department of Science Laboratory Technology, School of Science and Technology, Nasarawa State Polytechnic, P.M.B 109, Lafia, Nasarawa State, Nigeria
[2]Department of Veterinary Microbiology, Ahmadu Bello University, Zaria, Nigeria
[*]E-mail of corresponding author: reubenrine@yahoo.com

Abstract
Schistosoma haematobium infection is one of the parasitic diseases of public health importance affecting 100 million people worldwide; more than 75% live in sub-Sahara Africa. This study sought to determine the prevalence of urinary schistosomiasis among secondary school students in Lafia and the risk factors associated to it. One hundred and sixty (160) urine samples were obtained from students from both private and public schools in Lafia, Nasarawa State. Urine samples were analyzed in the Laboratory using sedimentation/centrifugation technique. The results indicate that 26(16.3%) of the urine samples collected were positive for *S. haematobium* eggs. The highest prevalence of 25% was recorded among students from Government Secondary School Shabu. Students between the age group 11- 15 had the highest prevalence of the infection. Infections were found to be high in males 23 (18.70%) than female 3(8.1%) students. Students using stream as their major water source had a high prevalence rate of 22.6%. Among those positive for the infection, 70% had haematuria alone, 14% had proteinuria alone and 50% had a combination of proteinuria and haematuria whereas 8.2% had none. The problems of lack of pure and portable water supply in schools and homes in Lafia makes the Children at high risk of exposure to schistosomiasis and the implications of this disease in the children affects socioeconomic development of the country. Health awareness education and massive chemotherapy as well as environmental measures that may reduce population density of snail; the intermediate host of *S. haematobium* will be useful in the control of urinary schistosomiasis.
Keywords: Schistosomiasis, infection, Secondary School Students, public health and ova.

1. Introduction

Human schistosomiasis, also known as bilharziasis due to *Schistosoma haematobium*, is widespread ranking second to malaria in terms of socio-economic and public health significance in tropical and sub-tropical areas. It is the most prevalent of the water-borne diseases, with a very great risk on the health of rural populations (Hunter, 1976; Biu *et al*., 2000). Schistosomiasis is common worldwide, causing 56% of known cases of calcifications in the bladder known as bladder stone. The disease affects more than 200 million people worldwide (8% of the word population) and as many as 500-600 million people have been exposed to schistosomiasis of all kinds, with the disease more common in Africa, Asia and South America (Robert *at al*., 2002).

The most serious complication of urinary schistosomiasis is the incidence of squamous cells carcinoma of the urinary bladder. Additional complications include; urolithiasis, ascending urinary tract infections, urethral and ureteral stricture with subsequent hydronephrosis and renal failure (Amy, 2002).

In Nigeria, urinary schistosomiasis is known to have existed from time immemorial and the low resource communities are mostly plagued by the disease. With approximately 20% of the population of sub-Saharan Africa, Nigeria is or once was the most highly affected country in Africa for schistosomiasis (Njepuome *et al*., 2009). Young individuals are mostly infected with peak prevalence and intensity of infection in the age group 11-15 years (Biu *et al*., 2009; Sarkinfada *et al*., 2009). Reports have established that both natural (McManus *et al*., 2011) and artificial water bodies (Duwa and Oyeyi, 2009) are transmission foci of the parasite.

Although, urinary schistosomiasis is endemic in Nigeria, it is usually a neglected common parasitic disease of childhood (Adewumi *et al*., 1991; Bello *et al*., 1992). 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 (Nokes *et al*., 1992; Engels *et al*., 2002; Gryseels *et al*., 2006).

This studies was designed to evaluate the prevalence and intensity of urinary tract schistosomiasis in secondary school students in Lafia, the capital city of Nasarawa State, Nigeria and to determine the predisposing factors of this disease, to find the level of awareness of the pupils with respect to the disease, to educate them on its mode of transmission and to identify ways of preventing and controlling the disease.

1.1 Material and Method

1.1.1 Sample Collection and Handling

Permission for the work was obtained from the principals of the selected schools and also the education officer of Nasarawa State educational inspectorate zone. Principals, teachers, and students of the selected schools were informed and consented as to the project and objective of this study.

One hundred and sixty (160) urine samples were randomly collected from students across 8 Secondary Schools in Lafia viz: Government Science School Lafia, Government College Lafia, Government Secondary School Maina, E.R.C.C Secondary School Azuba, Government Secondary School Shabu, National High School, Government Secondary School Mararaba Akunza and Government Secondary School Azuba respectively. Convenient sampling method was used for sampling.

About 25ml of urine sample was collected into a sterile corked plastic tube between the hours of 10:00h - 14:00h on each collection day (Cheesbrough, 2005) and then labeled appropriately. The urine samples were transported to the Biology Laboratory of the Department of Science Laboratory Technology, Nasarawa State Polytechnic, Lafia for laboratory analyses.

The students and their teachers were educated on the public health significant of the disease and the relevance of the study. Structured questionnaire containing information such as age, sex, history of deworming, parent's occupation and level of education were obtained from the selected students. Additional information on the risk factors were sought which included source of water for domestic use, such as: well, stream, river, tap, bore hole. Water contact activities prone to such as: swimming, fishing and farming. Each questionnaire was accompanied by a corresponding urine specimen.

1.1.2 Urine Analysis Using Visual Test Procedure with Combi – 9

Each urine sample was observed for evidence of turbidity, haematuria, proteinuria, urobilinogen, glucose, bilirubin, ketones, nitrates, leucocytes and ascorbic acid using a sample commercial prepared reagent strip combi- 9^{TM} (Boehringer Mannheim GMbH co, Korea) dipped in the urine sample and the resultant colour change compared with the standard colour scale provided by the manufacturer.

1.1.3 Analysis of Urine for *S. haematobium* Ova

Each urine sample collected was microscopically examined for the presence of *S. haematobium* ova. Urine sample with visible blood or cloudiness, two drops of saponin agent were added to dehaemoglobinize the red blood cells to enhance easier detection of egg (Cheesbrough, 2004). About 10mls of urine was transferred to test tubes and centrifuged at 3000rpm for 5 minutes to sediment the schistosome eggs. The supernatants fluid of the centrifuged urine was discarded and the sediment transferred to the centre of a clean grease-free slide using a Pasteur pipette and covered with a cover slip. This was mounted on a light microscope and examined at x10 and then x40 objectives to identify *Schistosoma haematobium* ova which appears as golden yellowish and elliptical in shape with a terminal spine. Urine samples containing egg(s) of *S. haematobium* and without eggs were recorded. The data obtained were analyzed using Chi-Square statistics.

1.1.4 Result

The study showed that out of the total of 160 urine samples examined from Secondary School Students in Lafia, 26(16.3%) harboured *S. haematobium* ova. The highest prevalence was observed in GSS Shabu while NHS had the least prevalence rate. (Table 1)

In relation to age, students between the age group of 11 – 15 had the highest prevalence while the least prevalence rate was observed in the ages of 21 > (Table 2A). With respect to sex, males had the highest prevalence rate of 18.70% while females had the prevalence rate of 8.11% respectively (Table 2B). Based on parents' occupation and level of education, respondents which parents are farmers had the highest prevalence of 37.2% while respondents whose parents had secondary education had the highest prevalence of 30% (Table 2 C and D)

The prevalence rate observed based on various sources of water used for domestic purposes revealed that those using stream as their water source had the highest prevalence rate whereas tap water users had the least (Table 3).

Based on laboratory analysis for clinical signs of urinary schistosomiasis, the most prevalence signs were haematuria (70%) and proteinuria (14.03%), while based on the combination of signs, those with both haematuria and

proteinuria had the prevalence rate of 50%. Those that had neither proteinuria nor haematuria but had schistosomes in their urine had the prevalence rate of 8.2 (Table 6).

1.1.5 Discussion

Studies have indicated that urinary schistosomiasis is a major health problem in the rural areas of Middle East and most African countries. It remains as one of the major health problems facing developing children. The endemicity of the disease in many rural areas are attributed to ignorance, poor living condition, inadequate sanitation, water contact activity with snail infected rivers, streams and ponds (WHO, 2003).

This present study shows that urinary schistosomiasis is present among Secondary School Students in Lafia, Nasarawa State, Nigeria with a prevalence rate of 16.3%. The prevalence of the infection is higher in males (18.7%) than females (8.1%). This finding is very much similar to the findings of Adeyeba, *et al.* (2002), Abdullahi *et al*. (2011) and Okwelogu *et al.* (2012).

Gadzane and Apkiri (2009) reported a prevalence of 23.7% among male students and 0% among females while Ajanusi *et al*. (2005) reported a prevalence of 19.40% among males and 3.11% among females. The low prevalence rate observed in females as compared to males in the study could be attributed to the shelter and reserved lifestyle of the females in the study area as a result of restrictions from religious and moral principles. This finding could be explained by considering the fact that boys are very active. The boys engaged in unbridle swimming, fishing and irrigation especially after school hours more than their females' counterpart. This practice exposes the boys more to risk of infection, since level of exposure or contact with water containing cercariae of the parasite and the risk of infection are linearly related (Abdullahi *et al*., 2011). However, gender differences in prevalence of urinary schistosomiasis in Lafia was not statistically significance ($P>0.05$). This is in line with the reports from other researchers (Okwelogu *et al.,* 2012; Akinboye *et al.,* 2011; Obiukwu *et al.,* 2008).

Infection with *S. haematobium* was found to be higher among students of the age group 11-15. This is similar to the findings of Abdullahi *et al.* (2011) where age group 9-12 and 11-15 had the highest prevalence rate of 20% and 50.0%. Also Bello and Edungbola, 1992 recorded high prevalence rate among this age group. Subjects of this age group are very adventurous and were seen to engage activities which necessitate more contact with water, because they are more matured to engage in activities such as fishing, swimming and irrigation than those of the lower age.

In relation to source of water supply, the highest prevalence rate was recorded among students using streams as their major source of water. This is in agreement with the findings of Nworie *et al.* (2012), who recorded a high prevalence rate of 18.5% among children using stream as their main source of water. This observation showed that the infection depends on the source of water supply. There was significant relationship ($P<0.05$) between *S. haematobium* infection and sources of water supply. Therefore, the recorded cases of infection among students using these sources of water supply may be as a result of contamination of these water sources with cercariae.

In relation to the school settings, Day schools had the highest prevalence (18%) of *S. haematobium* infections whereas the boarding Schools had the lowest (12.5%). Schools having both boarding and Day students had a median prevalence of 15.0%. The high prevalence among students of Day Schools may be attributed to the fact that after school hours these students are engaged in various activities such as fishing, farming, irrigation to support their parents or recreational activity like swimming, as their leisure. Boarding students are usually restricted; they do not mostly expose themselves to various activities which serve as risk factors for *S. haematobium* infection.

Students from the urban area of Lafia had a lower prevalence of *S. haematobium* infection (10%) as compared to students from Lafia Sub-urban where infection rate of (22.5%). Parents' occupation of most of the Lafia sub-urban students is farming therefore, the students actively engaged in these activities which expose them to *S. haematobium* which serves as a major risk factor for *S. haematobium* infection.

Proteinuria and haematuria are seen with urinary schistosomiasis (Eltoun *et al.,* 1992, Nmorsi *et al.,* 2004). High prevalence of the students with these symptoms is a reflection of the level renal involvement which may need further investigation. Haematuria is the most common clinical manifestation of urinary schistosomiasis as seen from this study. Some respondents had neither proteinuria nor haematuria yet the microscopical examination revealed the ova *S. haematobium*. However, most infected experience few, if any, signs and symptoms and only a small majority develop significant disease (Harrisons *et al*, 1987).

The problems of lack of portable water supply in schools and homes in Lafia and its environs put the children at high risk of exposure to schistosomiasis and the implications of these disease on life,(social, moral and academic reasoning and efficiency of learning in school) in the children as it affects socioeconomic development of the country.

1.1.6 Conclusion

There is a relatively high prevalence of *S. haematobium* infection among secondary school students in Lafia. It is therefore indispensable that a comprehensive epidemiological survey of urinary schistosomiasis in Nasarawa State, Nigeria at large in order to further identify high risk communities for successful design and implementation of control programme. Massive screening to identify the infected individuals and treat them in order to reduce transmission of the infection is imperative. There is need for intervention by local government, state government and concerned organization to step up measures in improving water supplies in these areas. Public, health education on the associated risk factors and the dangers posed by the disease further studies on the prevalence of schistosomiasis in Nasarawa state need to be carried out.

References

Abdullahi, M. K., Bassey, S. E. & Oyeyi, T. I. (2011). The epidemiology of *Schistosoma haematobium* infections in the 44 Local Government Areas of Kano State, Nigeria. *Nigerian Journal of Parasitology,* 32(1), 19-24

Adewumi, G. O., Furu. P., Christensen, N. O. & Olorunmola, F. (1991). Prevalence of urinary schitosomiasis in north-western Nigeria. *Journal of Tropical Medicine and Parasitology*, 42 (4), 332- 334

Adeyeba, O. A. & Akinlabi, A. (2002). Intestinal parasitic infections among school children in a rural community, southwest Nigeria. *Nigerian Journal of Parasitology,* 23, 11-18.

Ajanusi, J., Usei, N. M., Sani, A., Esievo, K. A. N. & Umoh, J. U. (2001). Index of potential contamination for urinary schistosomiasis in five settlements near river Kubanni in Zaria. *Nigeria Journal of Parasitology*, 24(60), 23-25.

Akinboye, D. O., Ajisebutu, J. U., Fawole, O., Agbolade, O. M., Akinboye, O. O., Amosu, A. M., Atulomah, N. O. S., Awodele, O., Oduola, O., Owodunni, B. M., Rebecca, S. N., Falade, M. & Emem, O. (2011). Urinary schistosomiasis: water contact frequency and infectivity among secondary school students in Ibadan, Nigeria. *Nigerian Journal of Parasitology,* 32(1), 129-134.

Akoh, J. I. (1980). Incidence of intestinal helminthiasis and schistosomiasis in rural school children in Jos, Plateau State. *Nigeria Journal of Parasitology,* 84(4), 548-550

Amy, J. B. (2002). Schistosomiasis of the bladder. *Medicine Instant Acces,* 2, 133-148.

Bello, A. B. & Edungbola, L. D. (1992). *Schistosdoma haematobium*: A neglected common parasitic disease of children. *Acta Paediatr*., 1(8), 601-604.

Biu, A. A., Nwosu, C. O. & Akuta, A. (2000). The incidence of human schistosomiasis in Maiduguri, Northern Nigeria. *Bioscience Res. Comm*., 12(1), 9-11

Biu, A. A., Kolo, H. B. & Agbadu, E. T. (2009). Prevalence of *Schistosoma haematobium* infection in school aged children of Konduga Local Government Area, Northeastern Nigeria. *International Journal of Biomedical and Health Sciences*, 5(4), 181-184

Cheesbrough, M. (2005). *District Laboratories Practice in Tropical Countries*. Part-2, Cambridge university Press. Pp 236-240.

Duwa, M.R. and Oyeyi, T.I. (2009). The role of Jakara dam in the transmission of schistosomiasis. *Bayero Journal of Pure and Applied Science*, 2, 58-63.

Eltoun, I. A., Suleiman. S. M., Ismail. B. M., Ismail, A. L., Ali, M. M. & Holmeida, M. M. (1992). Evaluation of haematuria as a direct screening test for schistosomiasis: A population based study in the white nile province Sudan. *Acta Tropica.*, 151, 151-157

Engels, D., Chitsulo, L., Montresor, A. & Savioli, L. (2002). The global epidemiological situation of Schistosomiasis. *Acta Trop*., 82(2), 139–146.

Harrison, T. R., Eugene, B., Kurt J. I., Robert, G. P., Jean, D. N., Joseph, B. M. & Anthony, S. F. (1987). *Principles of Internal Medicine*. McGraw Hill Book Co. 11th Ed. pp. 810-814.

Hunter, S.C.(1976). *Tropical Medicine*. W.B. Saunders Co. Philadelphia, London-Toronto. pp 543-561.

Gadzma, I. M. K. & Akpiri, R. F. (2009). Prevalence and sensitivity of Eosinophiluria in the diagnosis of urinary schistosomiasis among secondary school students in Zaria, Nigeria. *Best Journal,* 6(2), 85-88.

Gryseels, B., Polman, K., Clerinx, J. (2006). Schistosomiasis in children. *Lancet*, 368, 1106–1118.2.

McManus, D. P., Gray, D. J., Ross, A. G., Williams, G. M. & He, H. B. (2011). Schistosomiasis research in the dongting lake region and its impact on local and national treatment and control in China. *Journal of Tropical Diseases*, 5, 1053

Njepuome, N. A., Hopkins, D. R., Richards, F. O., Anagbogu, I. N. & Pearce, P. O. (2009). Nigeria's war on terror: Fighting dracunculiasis, onchocerciasis, lymphatic filariasis and schistosomiasis at the grassroots. *American Journal of Tropical Medicine and Hygiene*, 80, 691-698

Nmorsi, O. P. G., Egwunyega, O. A., Ukwandu, N. C. D. & Nwokolo, N. Q. (2004). Urinary schistosomiasis in a rural community in Edo State, Nigeria: Eosinophiluria as a diagnostic marker. *African Journal of Biotechnology*, 4(2), 183-186

Nokes, C., Granthan-McGregor, S. M., Sawyer, A. W., Cooper, E. S., Robinson, B. A. & Bundy, D. A. (1992). Moderate to heavy infection of *Trichuris trichuria* affects cognitive function in Jamaican school children. *Parasitol. Today*, 104, 539- 547

Obiukwu, M. O., Umeanaeto, P. U., Anyaike, C. E., Onyido, A. E. & Obianika, S. C. (2008). Community water-contact pattern activities in relation to urinary schistosomiasis in Akpugo-Eze, a rural community in Oji- River Area, Enugu State, Nigeria. *J. Advancement in Med, Pharmacol. Sci.,* 2(2), 37-41.

Okwelogu, I. S., Ikpeze, O. O., Ezeagwuna, D. A., Aribodor, D. N., Nwanya, A. V., Egbuche, C. M., Okolo, K. V & Ozumba, N. A. (2012). Urinary schistosomiasis among school children in Okija, Anambra State, South-Eastern Nigeria. *Journal of Biological Science*, 1(1), 1-6

Robert, T. L. & Cirillo, J. R. (2002). Schistosomiasis of the Bladder. *Instant Access*, 3, 22-30.

Sarkinfada, F., Oyebanji, A. A., Sadiq, I. A. & Ilyasu, Z. (2009). Urinary schistosomiasis in the Danjarima community in Kano, Nigeria. *J. Infect. Dev. Ctries*., 3, 452-457.

World Health Organization (2003). The world health report. Fighting disease, fostering development, WHO, Geneva. 24:172-179.

Table 1. Prevalence of Urinary Schistosomiasis Among Secondary School Students in Lafia

SCHOOL	NO. EXAMINED	NO. POSITIVE	%POSITIVE
GSSL	20	2	10
GCL	20	3	15
GSSM	20	2	10
ESSA	20	3	15
GSSS	20	6	25
NHS	20	1	5
GSSM	20	4	20
GSSA	20	5	30
TOTAL	**160**	**26**	**16.3**

Legend: GSSL; Government Science School Lafia, GCL; Government College Lafia, GSSM; Government Secondary School Maina, ESSA; E.R.C.C Secondary School Azuba, GSSS; Government Secondary School Shabu, NHS; National High School, GSSM; Government Secondary School Mararaba Akunza, and Government Secondary School Azuba.

Table 2. Demographic Variables Showing the Prevalence of Urinary Schistosomiasis Among Secondary School Students in Lafia.

A: AGE

BIODATA	**NO. EXAMINED**	**NO. POSITIVE**	**% POSITIVE**
5 – 10	27	2	7.4
11 – 15	58	18	31.0
16 – 20	63	5	7.9
21 >	12	1	8.3
TOTAL	**160**	**26**	**16.3**

B: SEX

MALE	123	23	18.70
FEMALE	37	3	8.11
TOTAL	**160**	**26**	**16.3**

C: PARENTS' OCCUPATION

TRADING	41	05	12.2
FARMING	35	13	37.2
CIVIL SERVANT	78	06	7.7
OTHERS	06	02	33.3

	02	33.3	
TOTAL	**160**		
	26	**16.3**	

D: PARENTS' LEVEL OF EDUCATION

PRIMARY	35	3	8.5
SEECONDARY	20	6	30
TERTIARY	81	11	13.6
NONE	24	6	2.5
TOTAL	**160**	**26**	**16.3**

Table 3. Prevalence of *S. haematobium* Infection According to Water Sources

SOURCE OF WATER	NO. EXAMINED	NO. POSITIVE	% POSITIVE
WELL	30	6	20
STEAM	53	12	22.6
BOREHOLES	40	4	10
RIVER	15	3	20
TAP	22	1	4.5
TOTAL	**160**	**26**	**16.3**

Table 4. Prevalence of *S. haematobium* in Relation to School Setting.

SCHOOL SETTING	NO. EXAMINED	NO. POSITIVE	% POSITIVE
BOARDING	40	5	12.5
DAY	100	18	18
MIXED	20	3	15
TOTAL	**160**	**26**	**16.3**

Table 5. Prevalence of *S. haematobium* Based on School Location.

LOCATION	NO. EXAMINED	NO. POSITIVE	% POSITIVE
URBAN	80	8	10
SUBURBAN	80	18	22.5
TOTAL	**160**	**26**	**16.2**

Table 6. Detection of Ova of Schistosomes in Sample Positive for Haematuria and Proteinuria by Strip Test

STRIP TEST POSITIVE	**NO. EXAMINED**	**NO. POSITIVE BY MICROSCOPY**	**% POSITIVE**
HAEMATURIA ONLY	10	7	70
PROTEINURIA ONLY	57	8	14
BOTH	8	4	50
NONE	85	7	8.2
TOTAL	**160**	**26**	**16.3**

This academic article was published by The International Institute for Science, Technology and Education (IISTE). The IISTE is a pioneer in the Open Access Publishing service based in the U.S. and Europe. The aim of the institute is Accelerating Global Knowledge Sharing.

More information about the publisher can be found in the IISTE's homepage: http://www.iiste.org

CALL FOR PAPERS

The IISTE is currently hosting more than 30 peer-reviewed academic journals and collaborating with academic institutions around the world. There's no deadline for submission. **Prospective authors of IISTE journals can find the submission instruction on the following page:** http://www.iiste.org/Journals/

The IISTE editorial team promises to the review and publish all the qualified submissions in a **fast** manner. All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Printed version of the journals is also available upon request of readers and authors.

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar