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Original Research Article

Prevalence of Urinary Schistosomiasis among Pupils in Pilot Primary School Jos North Local Government of Plateau State, Nigeria

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Abstract: Schistosomiasis is one of the public health diseases affecting the poor population in the developing countries in Africa and Nigeria in particular. The study was carried out on the prevalence of Urinary Schistosomiasis in Pilot Primary School, Jos. Urinary samples collected were processed by ordinary centrifugation sedimentation technique and examined. Of the 100 samples examined, there is prevalence of 36 (36%) for *Schistosoma heamatobium* ova. Both gender were included in the study to show Females (15%) and Males (21%). The range of age with highest prevalence is 16-16 years (10%) and the least is ≤8years (3%). The pupils that are very close to the streams showed 23% unlike the pupils that are distant (13%). The study of pupils from Islamiya Pilot primary school recorded high prevalence of Schistomiasis. The implication of these findings on the community health management will be discussed with appropriate authorities and public health professionals for urgent attention and for future strategies.

Keywords: Schistosomiasis, Primary pupils, Urinary Schistosomiasis, community health.

1. INTRODUCTION

Schistosomiasis is one of the most widespread of all human parasitic diseases, ranking second only to malaria in terms of its socio-economic and public health importance in tropical and subtropical areas. It is caused by blood flukes Schistosome. Schistosomiasis is known as bilharzia or bilharziasis in many countries, after a German physician Theodor Bilharz, who first described the cause of urinary schistosomiasis in 1851 (Ross, 2014). The first physician who described the entire disease cycle was Brazilian parasitologist Pirajá da Silva by examining 6,200 years old skeleton. Most human schistosomiasis is caused by *S. haematobium, S. mansoni,* and *S. japonicum*. Less prevalent species, such as *S. mekongi* and *S. intercalatum*, may also cause systemic human disease. Less importantly, other Schistosomes with avian or mammalian primary hosts can cause severe dermatitis in humans (e.g., swimmer's itch secondary to Trichobilharziaocellata) (Chitsulo, 2002).

Urinary schistosomiasis is caused by *Schitosoma haematobium* is endemic in the sub-Saharan region of Africa, including Nigeria. About 200 million people in some 74 countries are infected worldwide and at least 600 million are at risk of infection with an estimated annual mortality rate of about 20,000 worldwide. Although there is no current estimate for the disease in Nigeria, past estimate have calculated infection rates of about 25 million people and 101 million at risk of infection. In terms of Urinary schistosomiasis endemicity, Nigeria has been divided into three zones: a hyperendemic zone, a moderately endemic zone, and a zone with low or no endemicity. Urinary schistosomiasis is a human disease condition, which is caused by infection of the trematode *Schistosoma heamatobium*. The parasite is found in the venous plexus draining the urinary bladder of humans (WHO, 1985). During infection, the parasites deposit terminal spined eggs which clog the venous plexus, impeding blood flow. This bursts the veins, allowing blood and eggs to enter the urinary

bladder, resulting in the characteristic symptom of blood in urine or haematuria (WHO,1985) In sub-Saharan Africa alone it is estimated that 70 million individuals experience heamaturia, 32 million with difficulty in urinating (dysuria), 18 million with bladder-wall pathology, and 10 million with major hydronephrosis from infection caused by Schistosoma haematobium. Mortality rate due to non-functioning kidney (from S. haematobium) and haematemesis has been put at 150,000 per year (Van der, 2003). The above figures imply that urinary schistosomiasis is an important public health problem in sub-Saharan Africa and second to malaria in morbidity.

Urinary schistosomiasis is endemic in Nigeria in general (WHO, 1985). Although there is no current estimate of the disease in the country, past estimates have put the infection at about 25 million people and 101 million at risk of infection respectively (Chitsulo, 2003). In Ogun State, urinary schistosomiasis has been reported in several communitie (Ogbe, 1989). However, these studies were based on school-aged children and adults with little or no information on pre-school children. Recently, urinary schistosomiasis infections have been reported in pre-school children in settlements near Oyan dam, Ogun State and Adim, Cross River State, all in Nigeria (Mafiana, 2003). Even then, there is still the need to obtain more information on schistosomiasis in this age group in order to justify their inclusion in mass treatment programmes.

Schistosoma haematobium (urinary blood fluke) is a species of digenetic trematode, belonging to a group (genus) of blood flukes (Schistosoma). It is found in Africa and the Middle East. It is the major agent of schistosomiasis, the most prevalent parasitic infection in humans. It is the only blood fluke that infects the urinary tract, causing urinary schistosomiasis, and is the leading cause of bladder cancer (Ishida & Hsieh, 2018; Berry etal. 2017). The diseases are caused by the eggs and the adults are found in the venous plexuses around the urinary bladder and the released eggs travels to the wall of the urine bladder causing haematuria and fibrosis of the bladder. The bladder becomes calcified, and there is increased pressure on ureters and kidneys otherwise known as hydronephrosis. Inflammation of the genitals due to S. haematobium may contribute to the propagation of HIV and the control of schistosomiasis may reduce HIV burden (Patel *et al*. 2021).

Along with other helminth, S. *hematobium* is found in Africa and the Middle East, where infants and young children are most infected (Colley, 2014). Infection is most prevalent in both the Nile Delta and the Nile Valley South of Cairo. The first epidemiological survey in 1937 indicated that infection rate was as high as 85% among people in the Northern and Eastern parts of the Delta. Following construction of the Aswan Dam, basin irrigation is converted to perennial irrigation system, and this has significantly reduced.

Accordingly, the estimates for morbidity and mortality in affected populations are high with school age children usually presenting with the highest prevalence and intensity of infection. Nigeria is one of the countries known to be highly endemic for urinary schistosomiasis and some studies in Nigeria among school aged children in various parts of the countries and in both rural and urban environments have shown that *S. haematobium* is clearly a problem of children (Ejinaka *et al*., 2019, Ross, 2014).

Five species of *Schistosomes* have been identified, of which the most commonly found three are *schistosoma mansoni, S. japonicum,* and *S. haematobium*. *S. mansoni* is the most widely spread; S. *haematobium* is concentrated in Africa and the Middle East, while *S. Japonica* is found in Asia. The *S.mansoni* and *S.japonica* cause chronic hepatic diseases and intestinal fibrosis. The *S. haematobium* affects the urinary tracts and kidney as well as the reproductive system. People are affected by contact with stagnant water used in normal activities such as personal hygiene and swimming or by professional activities such as rice cultivation and irrigation. The transmission of urinary schistosomiasis is contingent on the presence of infected water, intermediate host and contact with human population. Once excreted by the snail, the infective free swimming cercariae then penetrate the intact skin of humans (Ejinaka *et al*., 2019, Ross, 2014; Chengi *et al*., WHO, 2014). Several studies have revealed the public health implications of schistosomiasis in Jos-Nigeria and across the globe (Ali & Ndams, 2012; Adeboye *et al*. 2011; Okoli *et al*. 2006; Ekpo & Mafiana, 2004; WHO, 2007. Cheng, 1993).

As a result of consequences of schistosomiasis infections in children up to this day and not minding the WHO declaration to eradicate the menace by 2020 (Chiamah *et al.,* 2019) this study therefore, is aimed at determining the prevalence of urinary schistosomiasis among primary school pupil in a public school in Jos Metropolis with specific objectives to: investigate the prevalence of urinary schistosomiasis among Islammiya Pilot Primary School in Jos Metropolis so as to establish a relationship between age and gender in the distribution of the disease and determine the source of the infection.

2. MATERIALS AND METHODS

Study Design

The study employed the survey research design, using the descriptive method. This provides appropriate methodology for investigating prevalence of urinary schistosomiasis among primary school pupils in Jos metropolis. It

was adequate, since the population under study is quite large and there is need to collect and analyze data from only a few respondents to be regarded as fair representative of the entire population. The study was approved by Federal School of Medical Laboratory Science Ethical Committee.

Geographical Location

The study was carried out in Pilot Primary School Jos North Local Government Area of Plateau State Nigeria. located between latitudes 7° and 1.1 °N and longitude 7° and 25°E with elevation of 1200m'above sea level. The area lies within Northern Guinea Savannah ecological zone. The climate to this area is generally humid tropical with an annual rainfall of about 146-14'8mm: with approximate mean temperature of 22.82 C with a .range of 15.00~3.1.20^{0}C: and relative humidity of about 77.62%. The rain starts around March, ending April and extends at late September early October; the highest precipitation is recorded in the month of August. The coldest period is from November to January and hottest period is from April to June.

This experiment was carried out under room temperature from June to August in 2021.

Materials/Apparatus

Materials used in this project work include universal specimen containers, markers, glass slides, cover slips, Pasteur pipetes, test tubes and test tube racks. The apparatus include electric centrifuge and microscope. 10% of normal saline was used as preservatives.

Sample Size

100 urine samples was collected from both male and female pupils. Before collecting the pupils (males and females) were asked to run round the school as a form of exercise. Sample collected based on age and sex.

Laboratory processing of samples

a. **Macroscopic Examination:** All the urine sample collected from 100 pupils from the schools were taken to Plateau Hospital Jos Nigeria were examined macroscopically for haematuria by careful macroscopic examination of the bottle of the urine sample.
b. **Microscopic Examination:** All the sample collected were analyzed microscopically, 10m/s of the terminal urine was centrifuged at 3000rmp for 5 minutes to concentrate eggs of schistosomes. The deposits was examined under microscope using the x 10 and x 40 objectives for the characteristics eggs according to Ochei & Kolhatka, (2007). Pus cell, red cells and crystals in the sample were noted.

3. RESULT

Urine sample of 100 children were collected and examined for urinary schistosomasis infection in Pilot Primary School, Jos. 64 was found to be Negative and 36 showed positive as shown in table 1. The prevalence related to gender, age groups, and closeness to water source to the schools were noted in tables 2, 3 and 4 respectively.

Table-1: Prevalence of urine Schistosomiasis in Pilot Primary Government School

Sample size	100	Prevalence (%)
Positive	36	36
Negative	64	64
Total	100	100

Table-2: Prevalence of urine Schistosomiasis in related to Gender

Sex	Sample examined	Sample Positive	Prevalence (%)
Male	45	21	21
Female	55	15	15
Total	**100**	**36**	**36**

Table-3: Prevalence of urine Schistosomiasis in relation to age

Age group (Years)	Number of sample examined	Number of sample positive	Prevalence (%)
≤8	17	3	3
9-10	17	4	4
11-12	17	6	6
13-14	17	8	8
15-16	17	10	10
≥17	15	4	4
Total	**100**	**36**	**36**

Table-4: Prevalence in relation to closeness to stream water

Items	Sample Examined	Sample Positive	Prevalence (%)
Closeness	64	23	23
Non closeness	36	13	13
Total	**100**	**36**	**36**

4. DISCUSSION

The survey conducted on the prevalence of urinary schistosomiasis among primary school children in Pilot Primary school in Jos North Local Government Area of Plateau State which was conducted during the month of July/August reveal that the area is endemic to urinary schistosomiasis. The result shows a prevalence of 36 (36%) out of 100 pupil enrolled for the study. This prevalence is such higher than the result recorded by Damen *et al*. (2006) who reported a prevalence of 19.0% among school children in Tema'a Local Government, Kaduna State around the boundary with Plateau State. Dawet *et al*. (2012) reported 2.07% prevalence around Kabong of Jos North. This study showed a higher prevalence may be because of proximity to stream that could be the source of drinking water for majority of the students. It could also be due to less awareness and treatment of that population.

The prevalence in relation to age group shows that pupils of 15-16years category are mostly affected in this study with the highest prevalence of 10(10%). Also pupils of age group 13-14 years shows the prevalence of 8(8%) followed by pupils of age 11-12 with the prevalence of 6(6%) and the ages of ≤8 years showed the least prevalence of 3%. This high prevalence may be attributed to the active participation or involvement in water contact activities like swimming, farming, washing, bathing and some other activities among higher aged pupils.

The study shows that females had the least prevalence with 15(15%) while the male had 21(21%). This agree with the finding of Dawet *et al*. (2012) and Damen *et al*., (2006) who reported a higher prevalence among males than females. Umar *et al*. (2016) in a study in Minjibir Local Government reported that males had a higher prevalence than females. This may be attributed to social cultural practice such as bathing, washing, swimming and fishing in contaminated water bodies which facilitate disease transmission and since male participate more in such activities thus they are more prone to be infected.

Pupils whose source of water is stream/pond as represented by proximity to the stream showed a higher prevalence of 23 (23%) followed by those whose sources of water dug well or taps as represented by farness to the stream had a prevalence of 13 (13%). A higher prevalence recorded among pupils whose sources of water is stream/ponds is attributed to the fact that these sources of water are good breeding site for the snail intermediate host and coupled with the water contact increases the chances of transmission of the infection.

The high prevalence recorded in the school may be due to the fact that the pupils after school hours may engage themselves in water contact activities such as swimming bathing and washing in the river, stream/pond and even indiscriminate urination into water bodies. The high prevalence recorded in this survey agreed with a similar study carried out by Damen *et al*. (2006). While it disagreed with a similar work carried out among primary school pupils in Apata and Laranto, Jos by Okpala *et al*. (2004) who reported a lower prevalence 1(0.55%). It is obvious that environment contributes to the endemicity of schistosomiasis.

Similarly when comparing this result with the work of Uneke (2007) who conducted a study within some selected primary schools in Ohaukwu and Onicha, in Ebonyi State, Nigeria, obtained a prevalence of 235 (26.8%) which agreed with the findings of this study among pupils. The difference in this study (36%) may show different geopolitical zones prevalence between South East and North central Nigeria.

5. CONCLUSION

Schistosomiasis is endemic in this study area where Islamiya Pilot Primary school is located in Jos North Local Government Area of Plateau State. This also implies the possibility for the presence of the snail intermediate host (Bulinus) in the area though not searched for during the study. This study has revealed that schistosomiasis is still with us in 2021.

It is established that age between ≤8 years has least prevalent cases of Schistosomiasis as they recorded 3% unlike 15-16 years that recorded 10%. Similarly, the female gender has less Schistosomiasis cases (15%) unlike the males (21%) in the distribution of pupils in the Primary School.

The source of water close to the study area as provided by the river Moda, ponds and streams in the study area together with water contact activities such as swimming, washing, irrigation famine contributed to the increased prevalence of the infection.

Based on the findings, the following preventive measure are recommended

- Avoiding swimming or wading in fresh water when you an in area in which shcistosomiasis occur.
- Sanitation should be improved to decrease fresh water contamination with sewage/urine so as to decrease prevalence.
- Proper health education that include improving water supplies, sanitation and public enlightenment on the causes and mode of transmission of the disease should be embarked upon by the relevant authorities.
- Bathing water should be heated for up to 100^{o}C and held in a storage tank for at least 48hours should be safe for drinking and showering
- Early treatment after high risk exposures should be encouraged to minimize morbidity.

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