Journal of Medical Sciences

ISSN 1682-4474

science alert

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OPEN ACCESS Journal of Medical Sciences

ISSN 1682-4474
DOI: 10.3923/jms.2022.165.169

Research Article
Assessment of Urinary Schistosomiasis Amongst Children Attending Primary Schools in Okengwe, Kogi State, Nigeria

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Abstract

Background and Objective: Schistosomiasis, apart from being the most prevalent parasitic disease, also constitutes an important public health problem, especially in Nigeria and many developing countries. This study aimed to assess the prevalence of urinary schistosomiasis amongst children attending primary schools in Okengwe, Okene Local Government Area of Kogi State, Nigeria. **Materials and Methods:** A total of 100 urine samples were collected in sterile universal bottles from pupils and were examined macroscopically and microscopically for *Schistosoma haematobium* egg at Sauki Medical Laboratory in Okene, Kogi State. **Results:** The prevalence rate observed among age groups 5-10 years, 11-15 years were 18 and 32%, respectively, then the overall prevalence of the study was 25%. Analysis was focused on age, gender and water contact activities with a final probability value of statistical significance ($p<0.05$) at a confidence interval of 95% using the chi-square tool. It was observed that swimming activity poses the highest mode of transmission. This could be attributed to the high duration spent by the children in contaminated water during swimming. **Conclusion:** Though there was a minimal prevalence of *S. haematobium* in the study area, there is a need to sensitize the community and also intensify integrated control measures to reduce or completely eradicate the disease.

Key words: Transmission, schistosomiasis, prevalent, parasitic diseases, urine, children, swimming

Citation: Yusuf, L. and M.A. Abdulsamad, 2022. Assessment of urinary schistosomiasis amongst children attending primary schools in Okengwe, Kogi State, Nigeria. J. Med. Sci., 22: 165-169.

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Schistosomiasis is globally a common infection caused by the Schistosoma genus of a fluke. There are five schistosome species known to infect humans, *Schistosoma haematobium*, *S. japonicum*, *S. mansoni*, *S. mekongi*, *S. intercalatum*. Schistosomiasis is also known as bilharzia[1]. It is a parasitic disease of the tropics. It is caused by fluke worms (blood dwelling) of the genus *Schistosoma*. The adult worm is whitish to greyish and 7-20 mm in length. It has a cylindrical body with two terminal saucers, a complex tegument, a blind digestive tract and reproductive organs. It differs from trematodes due to the possession of separate sexes. The male's body forms a groove or gynaecophoric channel, where the longer and thinner female is attached.

The disease is endemic in both tropical and sub-tropic countries. Countries with high altitudes and as well containing a lot of freshwater, lakes or streams are prone to schistosomiasis. The WHO reported that, in 2014, 258 million people in the world had received preventive treatment against schistosomiasis and 61.6 million people who suffered from this disease had received treatment.

The Schistosomiasis infection is of two types, intestinal and urinary schistosomiasis. In intestinal schistosomiasis, the eggs migrate through the intestinal wall, eliciting mucosal granulomatous inflammation, pseudopolyposis, micro ulcerations and superficial bleeding[2]. In urinary schistosomiasis, the egg of *S. haematobium* elicits granulomatous inflammation leading to ulceration and pseudopolyposis of the vesical and urethral walls[3]. Intestinal schistosomiasis is caused by four species of schistosome namely, *Schistosoma japonicum*, *S. mansoni*, *S. intercalatum*, *S. mekongi* and urinary is caused by *Schistosoma haematobium* which is the focus of this research. Among the species of Schistosoma, *S. haematobium* is the most widely spread[4]. Transmission of urinary schistosomiasis usually depends on the presence of compatible snail intermediate host of the parasite and human contact with the infected water[5].

Urinary schistosomiasis is caused by *S. haematobium* affecting the urinary tract. Schistosomiasis usually occurs in individuals younger than age 30, it affects more males than females and it is one of the most common parasitic infections in the world[6] particularly in Sub-Saharan Africa, ranking second to malaria in terms of its socio-economical and public health importance in tropical and sub-tropical areas[6].

Schistosoma haematobium is a causative agent of urinary schistosomiasis and other complications like fibrosis, stricture and urinary tract calcification. However, in advanced intestinal schistosomiasis, hepatosplenomegaly, liver fibrosis and portal hypertension may result[7].

School-aged children are mostly infected with this silently destructive disease because of their playing habits, such as swimming in cercariae infested water bodies. *Schistosoma haematobium* transmission starts when infected persons urinate directly or indirectly into water bodies, thereby introducing eggs of *S. haematobium* which hatch into miracidia that infect the snail host[8]. In the snail, the miracidia develop into an infective stage called cercariae which when released into the water can infect man which is the definitive host. This can only be controlled by the provision of treated swimming pools for recreational activities, wearing of footwear to protect the legs against active penetration by the cercariae of the Schistosoma, provision of urinaries, the introduction of an effective sewage disposal system[8].

In Nigeria, urinary schistosomiasis is widespread in both rural and urban communities; with prevalence ranging between 2 and 90% and the vast majority cases occurring among the poor[9]. However, information on the endemicity of this disease is still scanty in some parts of the country and the available data is still not enough for planning an effective control programme[10].

Thus, this study was planned to provide on the prevalence status of schistosomiasis infection among children attending primary schools in Okengwe, Okene Local Government Area of Kogi State, Nigeria.

MATERIALS AND METHODS

Study area: The study was carried out in Okengwe, in Okene Local Government Area (latitude: 7°33'4.39"N, longitude: 6°14'9.20"E) of Kogi State. This community has a population of over 470, 000 and is located in the central part of Kogi State. This community is massively involved in the cultivation of yam, vegetable, pepper, tomato, maize. Okengwe is a rural area, with an average road and poor water supply. The inhabitants of Okengwe lack pipe-borne water and depend on several non-seasonal streams and wells in the area for their domestic needs. The study was carried out in the Microbiology Department laboratory, Kogi State University, Anyigba, Nigeria, from August to December, 2021.

Study population: The study population comprises 100 pupils between 5 and 16 years old who were willing and whose parents gave their consent were enrolled for this study.

Ethical consideration: Approval was granted by the School(s) Authority for the collection of samples from pupils who were willing to participate in the study. Questionnaires were administered to the pupils from whom urine samples were collected.

Inclusion/exclusion criteria: The inclusion criteria include pupils whose parents gave their consent and the pupils themselves who were willing to be sampled, pupils who were not below the age of 5 years and not above 16 years of age and pupils that were present in school on the sampling day.

The exclusion criteria include pupils whose parents didn't consent to the study, pupils who were not willing to be sampled and pupils who were below 5 years and above 16 years of age. Pupils who were absent from school on the sampling day were also excluded.

Sample collection: The mid-stream flow of urine samples was collected from pupils between the hours of 10 am and 1 pm into a labelled sterile container and was kept in a dry dark bag and transported to the laboratory for analysis.

Sample analysis: The urine sample was analyzed macroscopically and microscopically at Sauki Medical Diagnostic Laboratory, Okene as follows.

After collection of a urine sample from the pupil, it was labelled accordingly. Then macroscopic analysis was carried out and the colour and turbidity or cloudiness of the urine sample was recorded.

For microscopic analysis:

- The urine sample was shaken gently for the sample to mix properly. From the mixed urine, 5 mL of the sample was measured into a centrifuge test tube using a sterile disposable syringe or a Pasteur pipette
- The urine sample was centrifuged at 3000 rpm for 5 min
- The sample was taken out of the centrifuge and the supernatant was discarded using a Pasteur pipette or syringe leaving the sediments in the test tube
- The sediment was shaken properly and a drop was placed on a grease-free glass slide and then viewed under ×10 and ×40 objective lenses of the light microscope for the presence of schistosomal egg
- The schistosomal egg is pale yellow-brown, oval and has a terminal spine

Data collection: Data were collected from the report of the microscopy, with the positive and negative cases recorded respectively according to their sex and age.

Statistical analysis: Statistical Package for Social Sciences (SPSS) Version 21 was used to analyze collected data using the Chi-square tool and the results were interpreted into tables using the necessary risk factors and demographic factors. Percentage values were equally used to compare the pre-disposable risk factors and demographic factors.

RESULTS AND DISCUSSION

A total of one hundred primary school children volunteered to participate in the study. From the analysis (microscopic and macroscopic) of the 100 urine samples, a total of 25 samples were positive for *Schistosoma haematobium* eggs. Results were statistically analyzed with a significant p-value of less than 0.05 (<0.05) and/or a confidence interval of 95%.

This study shows a higher prevalence compared to studies carried out in the Afar Region, the middle Awash Valley and the Somali Region with the prevalence of (24.54%), (3.1%) and (16.0%) respectively[11]. It was also higher compared to studies conducted in Sudan (16%) and Swaziland (5.3%)[12]. However, it was lower than a prevalence reported from Hassoba in Afar Regional state Ethiopia, the White Nile River Basin of the Sudan and Nigeria with the prevalence of (47.6%), (45%) and (41.5%). The difference can be explained by differences in environmental factors that can in turn lead to differences in transmission intensity.

Results from this study (Table 1) shows that age 5-10 had the least infection rate (18%) and age 11-16 had the highest infection rate (32%) for both male and female pupils examined. The increase in prevalence observed with the age range of 11-16 could be attributed to the fact that age 11-16 tend to have frequent water contact activities than age 5-10. This is in agreement with the report of Aula *et al.*[13], in a review article on schistosomiasis with a focus on Africa.

Results from this study (Table 2) also shows that activities done in water shows that pupils who swim in water bodies had the highest prevalence rate (33.3%) and the lower prevalence was recorded among pupils who consume snail from water (20.0%) and who bath and wash with water (21.2%) and (26.1%), respectively. These risk factors were observed to be statistically significant at a p-value of 0.03. This could be attributed to the long period spent in the contaminated water which favours the parasite entry and replication. A similar observation was reported by Edosomwan *et al.*[14], who worked on malaria coinfection with Neglected Tropical Diseases (NTDs) in children at Internally Displaced Persons (IDP) camp in Benin City, Nigeria, that water contact activities and pupil's playing habits such as swimming are factors that enhance the transmission of the disease.

Table 1: Prevalence of *Schistosoma haematobium* with respect to age group

Age groups	Number Examined	Number Positive	Prevalence (%)	p-value	χ^2
5-10	50	9	18	0.02	30.3
11-16	50	16	32		
Total	100	25	25		

p-value: Probability value, χ^2: Chi square

Table 2: Prevalence of *Schistosoma haematobium* in relation to risk factors

Risk factors	Number Examined	Number Positive	Prevalence (%)	p-value	χ^2
Swimming	24	8	33.3	0.03	29.4
Bathing	33	7	21.2		
Washing	23	6	26.1		
Consumption of snail	20	4	20.0		
Total	100	25	25.0		

p-value: Probability value, χ^2: Chi square

Table 3: Prevalence of *Schistosoma haematobium* with respect to gender

Gender	Number Examined	Number Positive	Prevalence (%)	p-value	χ^2
Male	55	18	32.7	0.02	37.8
Female	45	7	15.6		
Total	100	25	25.0		

p-value: Probability value, χ^2: Chi square

Table 4: Predisposing risk factors to schistosomiasis

Variable	Frequency (100)	Percentage (%)
Age group		
5-10	50	50
11-15	50	50
Gender		
Male	55	55
Female	45	45
Water (river) contact activities		
Swimming	24	24
Bathing	33	33
Washing	23	23
Consumption of snail	20	20

Total population observed = 100

Out of the 55 male samples examined, 18 were infected with *Schistosoma haematobium*. The highest prevalence rate was observed among males with a prevalence of (32.7%) and in the 45 female samples examined, 7 females were infected 15.6% prevalence rate of the infection (Table 3). This research observation agrees with the report of Rudge *et al.*[15] which show that males had more contact with water compared to females because of their higher restlessness and so play more in water bodies. This is also in agreement with the findings of Alabi *et al.*[16].

Most of the inhabitants of the Okengwe community through educated lack awareness of the existence of this infection and hence believes there is no harm playing in the water, the infected ones refuse to seek medical attention till it becomes critical which leads to haematuria and are mostly unwilling to give samples for them to be examined.

The prevalence rate observed in age groups 5-10 and 11-16 were 18 and 32% respectively. This variation has been attributed to behavioural patterns from age to water contact activities. The prevalence rate increased with age, this may be because older pupils get more often in contact with infected water through swimming, washing clothes, bathing and consumption of snails from infected water and lower prevalence recorded in younger age groups, this may be since pupils of this age are prevented from going to water bodies such as streams and rivers by their parents. This observation agrees with the report of Aribodor *et al.*[17] and that children infected with the parasite were found to be more between the ages of 11-16 years. Identified risk factors for *S. haematobium* infection in the community include water-contact activities, ignorance, source of water supply among others.

Table 4 shows the predisposing risk factors to schistosomiasis infection. The male children were observed to acquire the infection above their female counterparts. Also, the various activities of these children having direct contact with the contaminated water bodies were observed as a major risk factor.

These age groups likely contribute to the potential contamination of the environment which results in the transmission of the disease. The report of this study is also supported by earlier findings by Ekpo *et al.*[10] that most of the pupils infected do not use the drug of choice following infections. This is probably due to the poor economic status of parents and guardians who are mostly ignorant of this infection and are mostly with little or no educational background.

CONCLUSION

The presence of Schistosomiasis in the study area is of great concern as it poses a significant health challenge to the children population in the study area. Most of the inhabitants of this study area (Okengwe community) though educated, were unaware of the existence of this infection and hence failed to resit the children from playing with these contaminated water bodies. Those with the clinical symptom of haematuria (presence of urine in the blood) refuse to seek medical attention till it becomes chronic. Adequate attention is needed from both individuals and policymakers to create awareness of the possible ways of prevention and control of the infection.

SIGNIFICANCE STATEMENT

This study was unique in this part of the country as most research focused on other health issues due to the belief and practices of the dwellers of the study population. The study discovers the prevalence of schistosomiasis among primary school children engaging in different activities with the water bodies. It also uncovers that these water bodies are contaminated and thus serve as a reservoir of pathogens. Thus, there is a need to sensitize the community and also intensify integrated control measures to reduce or completely eradicate the disease.

REFERENCES

1. Steinmann, P., J. Keiser, R. Bos, M. Tanner and J. Utzinger, 2006. Schistosomiasis and water resources development: Systematic review, meta-analysis, and estimates of people at risk. Lancet Infect. Dis., 6: 411-425.
2. Gryseels, B., K. Polman, J. Clerinx and L. Kestens, 2006. Human schistosomiasis. Lancet, 368: 1106-1118.
3. Nmorsi, O.P.G., N.C.D. Ukwandu, S. Ogoinja, H.O.T. Blackie and M.A.C. Odike, 2007. Urinary tract pathology in some *Schistosoma haematobium* infected Nigerians. Afr. J. Biotechnol., 6: 123-127.
4. van der Werf, M.J., S.J. de Vlas, S. Brooker, C.W.N. Looman, N.J.D. Nagelkerke, J.D.F. Habbema and D. Engels, 2003. Quantification of clinical morbidity associated with schistosome infection in sub-Saharan Africa. Acta Trop., 86: 125-139.
5. Agi, P.I. and E.J. Okafor, 2005. The epidemiology of Schistosoma haematobium in Odau community in the Niger Delta area of Nigeria. J. Appl. Sci. Environ. Manag., 9: 37-43.
6. Verjee, M.A., 2021. Schistosomiasis: Still a cause of significant morbidity and mortality. Res. Rep. Trop. Med., 10: 153-163.
7. Gray, D.J., A.G. Ross, Y.S. Li and D.P. McManus, 2011. Diagnosis and management of schistosomiasis. Br. Med. J., Vol. 342. 10.1136/bmj.d2651.
8. Mohammed, K., M. Suwaiba, T. Spencer, S. Nataala, O. Ashcroft, A. Nuhu and U. Asiya, 2018. Prevalence of urinary schistosomiasis among primary school children in Kwalkwalawa Area, Sokoto State, North-Western Nigeria. Asian J. Res. Med. Pharmaceutical Sci., Vol. 3. 10.9734/ajrimps/2018/38623.
9. Oladejo, S.O. and I.E. Ofoezie, 2006. Unabated schistosomiasis transmission in Erinle River Dam, Osun State, Nigeria: Evidence of neglect of environmental effects of development projects. Trop. Med. Int. Health, 11: 843-850.
10. Ekpo, U.F., A. Laja-Deile, A.S. Oluwole, S.O. Sam-Wobo and C.F. Mafiana, 2010. Urinary schistosomiasis among preschool children in a rural community near Abeokuta, Nigeria. Parasites Vectors, Vol. 3. 10.1186/1756-3305-3-58.
11. Deribew, K., Z. Tekeste and B. Petros, 2013. Urinary schistosomiasis and malaria associated anemia in Ethiopia. Asian Pac. J. Trop. Biomed., 3: 307-310.
12. Liao, C.W., H. Sukati, T. Nara, A. Tsubouchi and C.M. Chou *et al*., 2011. Prevalence of *Schistosoma haematobium* infection among schoolchildren in remote areas devoid of sanitation in Northwestern Swaziland, Southern Africa. Jpn. J. Infect. Dis., 64: 322-326.
13. Aula, O.P., D.P. McManus, M.K. Jones and C.A. Gordon, 2021. Schistosomiasis with a focus on Africa. Trop. Med. Infect. Dis., Vol. 6. 10.3390/tropicalmed6030109.
14. Edosomwan, E.U., I.O. Evbuomwan, C. Agbalalah, S.O. Dahunsi and B.I. Abhulimhen-Iyoha, 2020. Malaria coinfection with Neglected Tropical Diseases (NTDs) in children at Internally Displaced Persons (IDP) camp in Benin City, Nigeria. Heliyon, Vol. 6. 10.1016/j.heliyon.2020.e04604.
15. Rudge, J.W., J.R. Stothard, M.G. Basáñez, A.F. Mgeni, I.S. Khamis, A.N. Khamis and D. Rollinson, 2008. Micro-epidemiology of urinary schistosomiasis in Zanzibar: Local risk factors associated with distribution of infections among schoolchildren and relevance for control. Acta Tropica, 105: 45-54.
16. Alabi, P., S.O. Oladejo and A.B. Odaibo, 2018. Prevalence and intensity of urinary schistosomiasis in Ogun State, Southwest, Nigeria. J. Public Health Epidemiol., 10: 413-417.
17. Aribodor, O.B., C.E. Okaka, S.O. Sam-Wobo, B.C. Okpala, D.N. Aribodor and E.M. Obikwelu 2021. Urinary schistosomiasis and primary evidence of female genital schistosomiasis among pupils in Nsugbe Community, Anambra State, Nigeria. Niger. J. Parasitol., 42: 394-402.