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Prevalence of Urinary Schistosomiasis among Primary School Pupils in Keffi Local Government Area, Nasarawa State

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Abstract

Schistosomiasis, also known as bilharziasis or snail fever is primarily a tropical parasitic disease caused by eggs of adult stages of the blood flukes (trematode worms) of the genus known as *Schistosoma*. Schistosomiasis is the third most prevalent parasitic worm infection next to malaria and has significant economic and public health consequences in many tropical and subtropical countries. The aim of this research was to determine the prevalence of urinary schistosomiasis among pupils of primary schools in Keffi LGA. A survey of *Schistosoma haematobium* was carried out among primary school pupils between the ages of 4 – 12 years in three primary schools that were selected randomly. A Questionnaire was administered to obtain demographic data. A total of 250 urine samples were examined, comprising 152 from males and 98 from females. The sedimentation technique was used, and urine deposits were examined microscopically. Theover-all prevalence of infection with *S. haematobium* in this study was 31.6%. Prevalence of disease varied among different schools, with highest prevalencerecorded at NSUK Demonstration School (20.8%) followed by LEA PrimarySchool GRA (7.2%) while ECWA Primary School had the least prevalence of3.6%. Males had 20.8% while females had 10.8% prevalence in relation toGender. Infection prevalence based on age recorded highest among 10 – 12 agegroup with a prevalence of 20.4%. For prevalence based on source of water, thosewho used well water had prevalence of 23.2%; while for prevalence based onparent's occupation, Farmers had the highest with 22.4%. The study confirmed the prevalence of *S. haematobium* in the study area. Proper sanitation, water control programme and snail elimination are highly recommended to reduce *S.haematobium* infestation.

Keywords: Schistomiasis, *Schistosoma haematobium*, prevalence, urine, Primary School

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Introduction

Schistosomiasis, also known as bilharziasis or snail fever is primarily a tropical parasitic disease caused by eggs of adult stages of the blood fluke known as *Schistosoma*. The name bilharziasis was coined from the name of Theodor Bilharz, a German pathologist who first discovered the worms in 1851 [1, 2]. *Schistosomiasis* is the third most devastating tropical disease in the world, after malaria and intestinal helminthiasis [2]. Schistosomiasis is reported to be endemic in 53 countries in the Middle East and most of the African continent [3]. Although infections with schistosomes are asymptomatic; however, it could cause haematuria, dysuria, nutritional deficiencies, lesion of the bladder, kidney failure and elevated risk of bladder cancer and in children-growth retardation [4].

Accordingly, the estimates for morbidity and mortality in affected populations are high with school-aged children, usually presenting with the highest prevalence and intensity of infection [5]. Nigeria is one of the countries known to be highly endemic for urinary schistosmiasis with estimated 101.28 million persons at risk and 25.83 million people infected [6]. The Centre for Disease Control and prevention estimates that about 150-200 million persons throughout the world are afflicted with schistosomiasis [7]. Five species of schistosomes have been identified, out of which *Schistosoma mansoni* and *Schistosoma haematobium* are the most common worms while *Schistosoma japonicum*, *Schistosoma mekongi* and *Schistosoma intercalatum* have more limited distribution. Other species such as *Schistosoma matheei*and *Schistosoma bovis* are occasional parasites of human and *Schistosoma incognitum* may also prove infective to humans. In general, *S. mansoni* is the most widely spread [9]. *Schistosoma haematobium* is concentrated in Africa and the Middle East while *S. japonicum* is found in Asia [5]. Studies in Nigeria among school aged children in various parts of the country and in both rural and urban environment have shown that *S. haematobium* is clearly a problem of these aged children which ranges from 20-40% in typical communities [9]. The transmission of urinary schistosomiasis is due to the presence of infected water, intermediate host and contact with human population [10]. Human infection occurs as a result of contact with water contaminated with the infective stage of the parasites which penetrates the skin of humans who are involved in water-related activities, such as fishing, laundry, bathing and swimming [11].

The intensity of the urinary schistosomiasis is measured by quantitative egg counts of urine, which shows the heaviest burden in the youngest age group [6]. The child's risk of infection increases peaking between the age of 10 and 20 [8].

Control of schistosomiasis depends basically on the control of the snail vectors, a problem which presents an extremely complex ecological situation and one which has been reviewed in a number of major publications [12, 13]. Snail of the family planorbidae serves as intermediate hosts of *S. Mansoni* and *S. haematobium. Schistosoma mansoni* is transmitted by snails of the genus *Biomphalaria* and *S. haematobium* by *Bulinus* species. Snail population in any water reservoir starts to build up at onset of the rainy season around May; they become abundant between October and December [14, 13].

Materials and Methods

Study area

The study was carried out in Keffi Local Government Area in Nasarawa state of Nigeria. Nasarawa lies in the Niger – Benue trough (Middle-belt). Its vegetations are generally Guinea Savannah. It has an area of 5,704 km^2 and a population of 189,835 at the 2006 census. The inhabitants are predominantly farmers, traders and civil servants. Their sources of water include wells, rivers, borehole and dams. The supply of tap water is periodically.

Materials

Light microscope, Microscopic slide, Sample bottle, Cover slip, Hand gloves

Administration of questionnaires

Structured questionnaires were administered to the pupils as the samples were being collected. Demographic data obtained were: name of school, sex and age of the pupils, sources of water for drinking/household activities and occupation of parents.

Sample collection

A total number of two hundred and fifty (250) urine samples were collected in specimen bottles from school children. The samples were collected between 9am to 12 noon. Data based on sex and ages were recorded. The samples were properly labeled and transported immediately to the microbiology laboratory of Nasarawa State University Keffi for analysis.

Laboratory analysis of samples

Urine samples were examined by centrifugation technique [15]. Ten milliliter (ml) of each urine sample was centrifuged at 1500 revolutions per minute (rpm) for five minutes. The supernatant was decanted and the sediments were examined under the light microscope.

Statistical analysis

Descriptive analyses were expressed in terms of frequencies and percentages. Chi-squared test was used to test for association between sociodemographic variables (school type, sex, age bands, source of drinking water and parents' occupation) and incidence of urinary *Schistosomiasis haematobium* in the study participants. Statistical analyses were conducted using Statistical Package for Statistical Product and Service Solutions (IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY:IBM Corp). All tests were two-tailed with a *P-value*<0.05 set as the limit of statistical significance.

Results and Discussion

Table 1 showed that out of two hundred and fifty (250) respondents sampled, 79 were found to be infected having a prevalence of 31.6%. The NSUK Demonstration School had prevalence of 20.8%, followed by the LEA Primary School GRA with a prevalence of 7.2%, while ECWA Primary School had 3.6% prevalence. It could be seen that males had a higher prevalence (20.8%) than females with a prevalence of 10.8% as shown in Table 2.

Table 1: Prevalence of *S. haematobium* in relation to Schools in Keffi LGA

Sex	No. infected	No. not infected	Total	χ^2	*P-value*
	n (%)	n (%)	N (%)		
NSUK Demons. Schl	52 (20.8)	60 (24.0)	112(44.8)	21.97	<0.001
LEA Pry School	18 (7.2)	58 (23.2)	76 (30.4)		
ECWA Pry School	9 (3.6)	53 (21.2)	62 (24.8)		
Total	**79 (31.6)**	**171 (68.4)**	**250(100)**		

Table 2: Prevalence of *S. haematobium* in relation to gender

Sex	No. infected	No. not infected	Total	χ^2	*P-value*
	n (%)	n (%)	N (%)		
Male	52 (20.8)	100 (40.0)	152 (60.8)	1.22	0.269
Female	27 (10.8)	71 (28.4)	98 (39.2)		
Total	**79 (31.6)**	**171 (68.4)**	**250 (100)**		

Table 3: Prevalence of *S. haematobium* in relation to age group

Age (yrs.)	No. infected	No. not infected	Total	χ^2	*P-value*
	n (%)	n (%)	N (%)		
4 – 6	8 (3.2)	31 (12.4)	39 (15.6)	2.87	0.238
7 – 9	20 (8.0)	44 (17.6)	64 (25.6)		
10 – 12	51 (20.4)	96 (38.4)	147(58.8)		
Total	**79 (31.6)**	**171 (68.4)**	**250(100)**		

Table 3 showed indicated that of the two hundred and fifty (250) samples that tested, 3.2% were infected among individuals of age 4-6, 8.0% among individuals of age 7-9, and the highest prevalence of 20.4% among individuals of age 10-12. It could be seen from the Table 4 that pupils who use the well as source of water had the highest prevalence (23.2%) while pupils who use borehole recorded 8.4% prevalence. From Table 5, pupils whose parents are civil servants had the least prevalence 3.2%, followed by the business men with 6.0%, and the highest prevalence recorded for pupil whose parents are farmers with 22.4%.

Table 4: Prevalence of *S. haematobium* in relation to source of water

Source of water	No. infected	No. not infected	Total	χ^2	*P-value*
	n (%)	n (%)	N (%)		
Well	58 (23.2)	137 (54.8)	195(78.0)	1.41	0.235
Borehole	21 (8.4)	34 (13.6)	55 (22.0)		
Total	**79 (31.6)**	**171 (68.4)**	**250(100)**		

Table 5: Prevalence of *S. haematobium* in relation to parents' occupational status

Parents' Occupation	No. infected	No. not infected	Total	χ^2	*P-value*
	n (%)	n (%)	N (%)		
Civil servants	8 (3.2)	61 (24.4)	69 (27.6)	45.46	<0.001
Businessmen	15 (6.0)	65 (26.0)	80 (32.0)		
Farmers	56 (22.4)	45 (18.0)	101(40.4)		
Total	**79 (31.6)**	**171 (68.4)**	**250(100)**		

Infection with *Schistosoma haematobium* affects all age groups; however, school children are at the highest risk of the disease. In Nigeria, the transmission of schistosomiasis is still active and poses a serious health challenge as morbidity builds up in infected individuals. This study confirmed the existence of urinary schistosomiasis infection among primary school pupils in Keffi LGA, Nasarawa state, north central Nigeria with over all prevalence of 31.6%. The observed prevalence of urinary schistosomiasis was lower than in the studies conducted in various parts of Nigeria such as Ogun State (58.1%), southwestern Nigeria; Kwara (58.7%), and Benue State (55.0%), north-central Nigeria; and higher than in Ebonyi State with 21.5%. The prevalence could be associated with the predominant occupation of the indigenes, such as farming, fishing [11].

There is significant association of infection with *S. haematobium* and the primary school the pupils attended with the highest prevalence of 20.8% found at NSUK Demonstration School than others primary schools. This research even though is lower in prevalence is similar to the work of Abubakar *et al*. [16] in Kano who had high prevalence rate of infection among public primary schools compared with low prevalence rate among pupils that attended private schools. Some of the factors that made NSUK Primary school to have high prevalence rate of urinary schistosomiasis could be due to the large population density of the students who come from the surrounding communities most of whose parents are mostly farmer, traders, artisans and civil servants. The presence of streams and water bodies around the school could also play a role as pupils of that primary school age play a lot even though they may be restricted to get close to the water bodies within the school premises. According to WHO [17], Schistosomiasis mostly affects poor and rural communities, particularly agricultural and fishing populations. Women doing domestic chores of washing clothes in infested water are also at risk and can develop female genital schistosomiasis. Inadequate hygiene and contact with infected water make children especially vulnerable to infection.

This research indicated a prevalence of 20.8% in males and 10.8 % in female students which is in agreement that the influence of sex is an important epidemiological factor in the transmission of urinary schistosomiasis, though this study shows higher prevalence of infection amongst male students compared with female students but there is no significant association (p = 0.269) in consonance with the works of Afiukwa *et al*. [18] and Muhammad *et al*. [19] but differing with the research of Umoh *et al*. [11] and Okoli and Odaigbo [20] that showed significant association. The high infection rate of urinary schistosomiasis among males than the females is attributed to greater involvement in outdoor activities, such as swimming, washing, paddling of canoes, and irrigation. However, persons who have greater contact with the snail breeding sites are more likely to acquire the infection, regardless of their sex [21].

This study reported high prevalence of 20.4% of urinary schistosomiasis among age group 10-12 years old than other age bracket. This is similar to the research carried out by Afiukwa *et al*. [18] who reported 23% for ages 11-20 followed by those with 12.6% for ≤10 years age group. This research is also in alignment with the works of Okoli and Odaibo [20], Anosike *et al*. [21]. The high prevalence in this age group 10 and above indicates that they are more engaged with activities that bring them in contact with infested water bodies which serve as sources of infection. Anosike *et al*. posited that children are the most infected group of people in endemic areas which actively contribute to the contamination of the aquatic environment [21].

The lack of significant association of *S. haematobium* infection with source of water is in agreement with the work of Muhammad *et al*. [19], Dawaki *et al*. [22] and Abubakar *et al*. [16] which shows that pupils are equally exposed to contaminated water bodies which predispose them to infection because boreholes are enclosed system that does not give room for *S haematobium* infection. However, the work of Dawet *et al*. [23], and that of Nwachukwu *et al*. [24] differ as they reported a significant association of *S. haematobium* infection with source of drinking water since those who use stream were more infected than those who use well water. This study therefore signifies that the peoples who are infected with *S. haematobium* could have been infected from other sources other than use of well water or borehole.

This study shows a prevalence of 22.4% among pupils whose parent are farmers which is in agreement to similar researches that showed significant association between parents' occupation and the prevalence of urinary schistosomiasis in some parts of Nigeria which were associated mainly with the predominant occupation of the indigenes, such as fishing and farming [21, 25]. However, this work is opposite of the work by Umoh *et al*. [11] where the association between parents' occupation and the prevalence of urinary schistosomiasis was not statistically significant (p = 0.235).

Conclusion

In conclusion, the study has provided an idea on the prevalence of *S. haematobium* infection among primary school children in Keffi Local Government Area. The prevalence of *S. haematobium* among primary school children examined showed that schistosomiasis is a serious public health problem. Schistosomiasis should be controlled wholistically through intervention informed by appropriate and reliable mapping of the

disease, school-based deworming with Praziquantel, snail control, provision of safe water, and provision of health education to the community.

Conflict of interest: The authors declare that no competing interest to disclose.

References

[1] Nawal, M. N. (2010). Schistosomiasis: Health effects of Women. *Reviews in Obstetrics and Gynecology*, 3, 28-32.

[2] WHO (2010). Schistosomiasis, Fact Sheet No 115, February 2010. World Health Organization (WHO). https://www.who.int/mediacentre/factsheets/fs115/en/. Accessed: December 26, 2023.

[3] Chitsulo, L., Engels, D., Montressor, A. and Savioli, L. (2000). The global status of schistosomiasis and its control. *Acta Tropica*, 77, 41-51.

[4] Mostafa, M. H., Sheweita, S. A. and O'Connor, P. J. (1999). Relationship between Schistosomiasis and Bladder cancer. *Clin. Microbiol. Rev.*, 12, 97-111.

[5] WHO (2002). Prevention and Control of Schistosomiasis and Soil-Transmitted Helminthiasis: Report of a World Health Organization (WHO) Expert Committee. *WHO Technical Report Series*, 912, 1-57.

[6] Engels, D., Chitsulo, L, Montresor, A, and Savioli, L. (2002). The global epidemiological situation of schistosomiasis and new approaches to control and research. *Acta Trop*., 82(2), 139-46.

[7] Centers for Disease Control (2010). http://www.cdc.gov.

[8] Kabatereine, N. B., Brooker, S., Tukahebwa, E. M., Kazibwe, F. and Onapa, A. W. (2004). Epidemiology and geography of *Schistosoma mansoni* in Uganda: Implications for planning control. *Tropical Med. Int. Health*, 9, 372-380.

[9] Umar A. S., and Parakoyi, D. B. (2005). The Prevalence and Intensity of Urinary Schistoso-miasis Among School Children Living along the Bakalori Dam, Nigeria. *Niger Postgrad. Med. J*., 12(3), 168-72.

[10] Ekwunife, C. A., Ozumba, N. A. and Eneanya, C. I. (2008). Studies on the biology and population parameters of *Bulinusglobosus* and *Bulinustruncatus* in the laboratory. *Nigerian Journal of Parasitology*, 29, 11-14.

[11] Umoh N. O., Nwamini C. F., Inyang N. J., Umo A. N., Usanga V. U., Nworie A., Elom M. O. and Ukwah B. N. (2020). Prevalence of urinary schistosomiasis amongst primary school children in Ikwo and Ohaukwu Communities of Ebonyi State, Nigeria. *Afr. J. Lab. Med*., 24;9(1): 812.

[12] Jordan, P., Webbe, G. and Shurrock, R. F. (1993). Human schistosomiasis Wallingford. Oxfordshire: CAB International. © *Royal Society of Tropical mediums* of *Hygiene* Published by Elsevier Ltd.

[13] Nmorsi, O., Ukwandu, N. Egwunyenga, O. and Obliemi, N. 2005). Evaluation of CDH, CDH(+)/CD8+) status and urinary schistosomiasis among some rural Nigerians. *African Health Science*, 5(2), 126-130.

[14] Shurrock, R. F. (2001). The schistosomiasis and their intermediate hosts. In: Mahmood, AAF (ed) *Schistosomiasis*. Imperial College: London, 7-83.

[15] Ukaga, F. N., Onyeka, P. I. K. and Nwoke, B. E. B. (2002). Practical Medical Parasitology for Biological and Medical Students. *Avan Global Publication*. Owerri, Nigeria, 341pp.

[16] Abubakar, B. M., Abubakar, A. and Moi, I. M. (2022). Urinary schistosomiasis and associated risk factors among Primary School students in the Zaki Local Government Area, Bauchi State, Nigeria. *Dr. Sulaiman Al Habib Med. J.*, 4, 196–204.

[17] WHO (2023). https://www.who.int/news-room/fact-sheets/detail/schistosomiasis

[18] Afiukwa, N., Nwele, D, Uguru, O, Ibiam, G., Onwe, C., Ikpo, A., Agumah, N. and Odoemena, O., (2019). Transmission dynamics of urogenital schistosomiasis in the rural community of Ebonyi State, South Eastern Nigeria. *Journal of Parasitology Research*, 1-8.

[19] Muhammad, I. A., Abdullahi, K. and Bala A. Y. (2019). Prevalence of urinary schistosomiasis among primary school pupils in Wamakko Local Government, Sokoto State, Nigeria. *JoBAZ*, 80, 22.

[20] Okoli E. I. and Odaibo A. B. (1999). Urinary schistosomasis among school children in Ibadan, an urban community in South-Western Nigeria. *Trop. Med. Int. Health*, 4(4), 308-315.

[21] Anosike J. C., Njoku A. J., Nwoke B. E. B. *et al.* (2002). Epidemiology of urinary schistosomiasis in Ebonyi State, Nigeria. *lJEHHD*, 3(1), 59–63.

[22] Dawaki, S., Al-Mekhlafi, H. M., Ithoi I., Ibrahim, J., Abdulsalam, A. M., Ahmed, A. and Surin, J. (2016). Prevalence and risk factors of schistosomiasis among Hausa communities in Kano State, Nigeria. *Revista do Instituto de Medicina Tropical de Sao Paulo*, 58, 54.

[23] Dawet, A., Benjamin, C. B. and Yakubu, D. P. (2012). Prevalence and intensity of *Schistosoma haematobium* among residents of Gwong and Kabong in Jos North Local Government Area, Plateau State, Nigeria. *Int. J. of Tropical Medicine*, 7(2), 69-73.

[24] Nwachukwu, P. C., Ohaeri, C. C., Ukpai, O. M., Irole-Eze, O. P. and Amaechi, E. C. (2018). Prevalence of *Schistosoma haematobium* infection among school-aged children in Afikpo North Local Government Area, Ebonyi State, Nigeria. *Sri Lankan J. Bio.*, 3(2), 1–8.

[25] Nworie, O., Nya, O., Anyim, C., Okoli, C. S., Okonkwo, E. C. (2012). Prevalence of Urinary Schistosomiasis among Primary School Children in Afikpo North Local Government Area of Ebonyi State. *Annals of Biol. Research*, 3(8), 894-3897.

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