

Status of *Ascaris* and *Schistosoma* Infections in Pupils of Two Public Primary Schools in Gwagwalada, FCT, Abuja

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Abstract: Ascariasis and Schistosomiasis are among the socio-economically devastating diseases in Nigeria. Investigation on the status of *Ascaris* and *Schistosoma* infections in pupils of two public primary schools in Gwagwalada was carried out between February and March. Four hundred and two urine and stool samples were collected randomly using clean and sterilized containers and examined using formal ether concentration method for stool samples and centrifugation separation method for the urine samples. The result obtained showed that 10.20% were positive for *Schistosoma* infection while 10.95% were positive for *Ascaris* infection. Infection rate of the *Ascaris* and *Schistosoma* infections were higher in the Old Kutunku primary school, 15.39% and 15.87% when compared with that of the UBE primary school, 6.19% and 4.12% respectively. However, for *Ascaris* infection, there is no significant difference in the rate of infection in both schools ($p=0.099$) while there is significant difference in *Schistosoma* infection ($p=0.000$). The females were found to be more infected in both infections (11.11% and 10.80%) than the males (10.67% and 9.21%) respectively. The chi square analysis, however, showed no significant difference in the overall prevalence of both infections in relation to sex (*Ascaris*: $p=0.885$ and *Schistosoma*: $p=0.770$). Age range 11-15 had the highest infection rate (11.72% and 13.70%). Based on these findings, efforts to eliminate these neglected tropical diseases (NTDs) through increased health education and practical personal hygiene in our primary schools must be intensified.

Keywords: Old Kutunku, Ascariasis, Schistosomiasis, primary school, NTDs.

INTRODUCTION

Ascariasis and Schistosomiasis are conditions due to the infection by helminth parasites *Ascaris lumbricoides* and *Schistosoma* sp. The World Health Organisation (WHO) estimated that more than one billion of the world's population including at least 400 million school age children are chronically infected with soil transmitted helminth in which *Ascaris lumbricoides* is one. Recent reports of the World Health Organisation (WHO) estimated that about 779 million people in 76 tropical and subtropical countries are at risk of schistosomiasis [1]. Schistosomiasis is highly endemic in Nigeria; it ranked second to malaria in terms of prevalence and persistence with grave public health and socio-economic importance in endemic communities [2, 3 and 4]. Children and pregnant women are the main sufferers from these parasitic infections [5]. The parasites are more common in rural areas in the developing countries of Asia, Africa and Central America and are often linked to poverty and other social problems such as poor sanitation and lack of clean water [6]. One billion people or 25% of the world's population harbour *A. lumbricoides*, making it the most prevalent helminthiasis of humans [7]. It is usually a mild disease with relatively low morbidity and

mortality rates. The infection is acquired via faecal-oral transmission through ingestion of food, water, or soil contaminated with embryonated eggs [8]. Although the infection is often asymptomatic, its effect may contribute substantially to child mortality when associated with malnutrition, pneumonia, enteric diseases and vitamin A deficiency [9]. In sub-Saharan Africa, 192 million are estimated to be infected with the two forms of schistosomiasis (intestinal and urinary schistosomiasis) and Nigeria recording the largest number of infection with about 29 million cases [10]. It is more prevalent in school age children, adolescents and young adults who also suffer from the highest morbidity and mortality [10]. Approximately two-thirds of the cases of schistosomiasis are associated with *Schistosoma haematobium* infection which represents an important cause of severe urinary tract disease [11]. This disease is mostly a rural occupational disease affecting those engaged in agriculture or fishing and residents in rural and peri-urban areas. Associated risk factors also include illiteracy, poor socio-economic standard, poverty, poor hygiene and inadequate public infrastructure. It is tragic that the increasing transmission and public health importance of these two helminth infections has not resulted in active

intervention and implementation of control programmes in Nigeria and specifically in FCT, Nigeria. The inadequate epidemiological and clinical data appear to support the prevalence of Ascariasis and Schistosomiasis in FCT, Abuja, Nigeria. Therefore, this study set out to assess the occurrence and the risk factors of *Ascaris* and *Schistosoma* infections among the school children in the study area in order to serve as a guide for health planners in the FCT in planning and evaluating worm control programmes among school age children.

METHODOLOGY

Study area

Gwagwalada, one of the FCT area councils' headquarters, is strategically located and this makes it easily accessible to other bordering area councils such as Kuje, Abaji, Abuja Municipal and Suleja in Niger State. Subsistence agriculture is the main economic activity of the rural populace and the major crops grown in the area council are sorghum, maize, yam, millet, cassava, rice, beniseed etc. It is also favourable for livestock production because of the abundant grazing land. The two public primary schools used in this study were randomly selected: UBE Primary School located along market road, Gwagwalada and Old Kutunku Primary School located in the heart of Kutunku village in Gwagwalada. From observation the schools are commonly attended by children of low-class parents who are predominantly farmers and traders. The major source of water is from Kutunku River, where the school aged rural dwellers are known to visit regularly to swim and to carry out domestic activities like washing, fetching water for cooking and other domestic purposes. There is poor housing and sanitation within the location of the school.

Sample Population

Pupils of Universal Basic Education Primary School located at New Kutunku and the Old Kutunku Primary School were involved in this study that was carried out in the months of February and March. The two schools were chosen out of the three public primary schools cited in the Kutunku area of Gwagwalada town. A total of two hundred and one (201) pupils from both schools agreed to take part in the study. Consent of the school Head Teacher, teachers, Parent-Teachers Association (PTA), and the participating students was obtained before the study commenced. The reason for the survey and procedures for stool and urine samples collection were explained to the pupils.

Sample collection

Two wide-mouthed screw-capped, pre-labelled, sterilized plastic containers were given to each pupil, to collect stool and urine samples. The subjects were instructed on how to collect the stool and urine samples. For urine they were instructed to collect the mid-stream urine not less than an estimated volume of

10ml and have the last few drops of the urine passed included in the bottle. The last drops often contain the highest number of eggs [12]. Urine samples were collected between the hours of 10am and 2pm along with the stool samples. These were taken to the laboratory in ice packed cooler where they were processed and analysed.

Examination of stool samples: The formol ether concentration technique as described by [12] was used to analyse the 201 stool samples for eggs of *Schistosoma* and *Ascaris* as follows; with an applicator stick, 1g of the stool sample was emulsified in 4ml of 10% formol ether contained in a tube. Additional 4ml of 10ml formol ether was added to the tube and homogenized. The emulsified faeces was sieved and collected in a tube. The suspension was transferred to a centrifuge tube into which 4ml of diethyl ether was added. The tube was stoppered and mixed for 1 minute. The stopper was loosened and the tube centrifuged at 1000g for 1 minute. After centrifuging, the faecal debris was loosened and decanted along with the ether and formol water leaving the sediment at the bottom of the tube. The bottom of the tube was then tapped to re-suspend and mix the sediment. The sediment was placed on the slide, covered with cover slip and examined microscopically using x10 and x40 objectives [12].

Examination of urine samples: urine examination for *Schistosoma* eggs was carried out on the 201 samples. The standard centrifugation method as described by [12] was used. The content of each specimen bottle was well mixed after which a sterilised disposable 10ml syringe was used to draw urine samples into centrifuge tube and this was centrifuged for 5min at 3000 rpm. The supernatant was decanted while the sediment was re-mixed by tapping the bottom of the tube and a little drop placed on a slide. This was covered with a cover slip and examined microscopically.

RESULTS

Out of the 201 stool samples examined, 22 (10.95%) were positive for Ascariasis. The highest prevalence (15.39%) was observed in Old Kutunku Primary School while UBE Primary School, New Kutunku had a prevalence of 6.19% as shown in Table 1. Out of 402 samples (201 stool and 201 urine samples) examined for schistosomiasis, 41 (10.20%) were infected. Highest prevalence of 15.87% was recorded in Old Kutunku Primary School while UBE Primary School had a prevalence of 4.12% (Table 2). Table 3 showed the specific prevalence of the two *Schistosoma* infections (infections caused by *S. haematobium* and *S. mansoni*) in relation to the samples collected (urine and stool respectively). *Schistosoma mansoni* had the highest prevalence of 17.41% while *Schistosoma haematobium* had 2.99% infection rate.

Table-1: Overall prevalence of *Ascaris* infection in school age children

Sample sites	Number examined	Number infected	Prevalence (%)
Old kutunku Sch.	104	16	15.39
UBE School	97	6	6.19
Total	201	22	10.95

Chi-square = 2.720 with 1 degree of freedom; P = 0.099 – not significant

Table-2: Overall prevalence of *Schistosoma* infection in school age children

School	Number Examined	Number Infected	Prevalence (%)
Old Kutunku Sch.	208	33	15.87
UBE School	194	8	4.12
Total	402	41	10.20

Chi-square = 11.262 with 1 degree of freedom; P = 0.000 - significant

Table-3: Specific prevalence of *Schistosoma* species infections in relation to the different samples collected

Samples	Number Examined	Number Infected	Prevalence (%)
Urine	201	6	2.99
Stool	201	35	17.41
Total	402	41	10.20

Chi-square = 17.300 with 1 degree of freedom; P = 0.000 - significant

Figure 1 showed the prevalence rate of Ascariasis in relation to age among the pupils of Kutunku primary schools of Gwagwalada town, FCT, Nigeria. The age group 11-15 years had the highest prevalence rate of 11.72% while least prevalence rate 0.00% was found in age groups <6 years and >15 years.

Figure 2 showed the prevalence rate of Schistosomiasis in relation to age and age group 11-15 years had the highest prevalence rate (13.67%). The age groups <6 years and >15 years had the least prevalence rate (0.00% respectively).

Figure 3 showed prevalence rate of *Ascaris* and *Schistosoma* infections in relation to sex among the pupils of primary schools in Kutunku area in Gwagwalada, FCT, Abuja. The prevalence rate was observed to be highest in females for both *Ascaris* and *Schistosoma* infections (11.11% and 10.80% respectively) when compared to that of the males in the two infections (10.67% and 9.21% respectively). The Chi square test however showed no significant difference in the overall prevalence of both infections in relation to sex (*Ascaris*: p= 0.885 and *Schistosoma*: p=0.770).

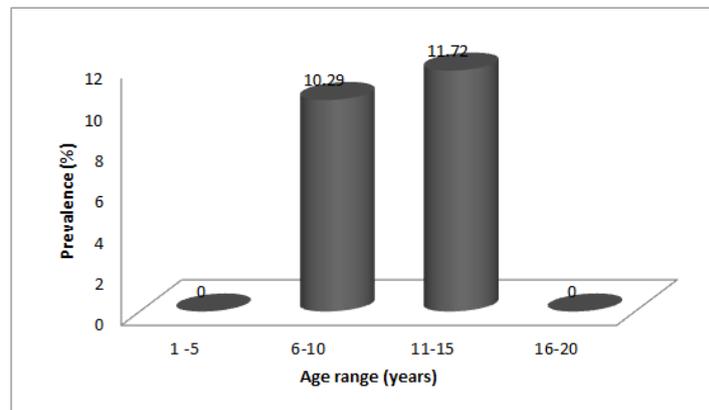


Fig-1: Prevalence of *Ascaris* infection in relation to age

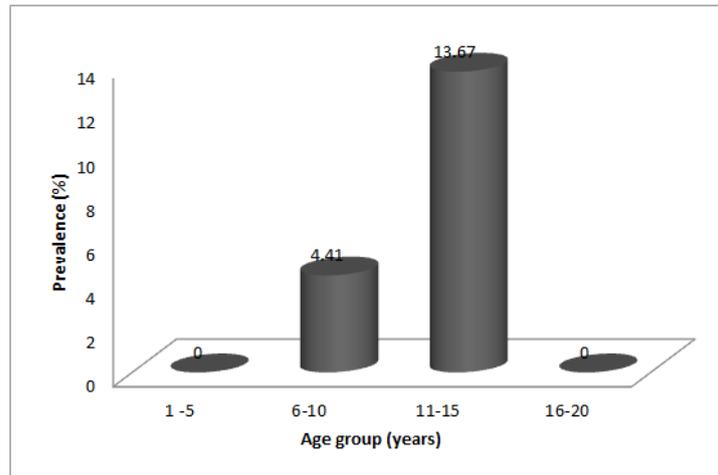


Fig-2: Prevalence of *Schistosoma* infection in relation to age

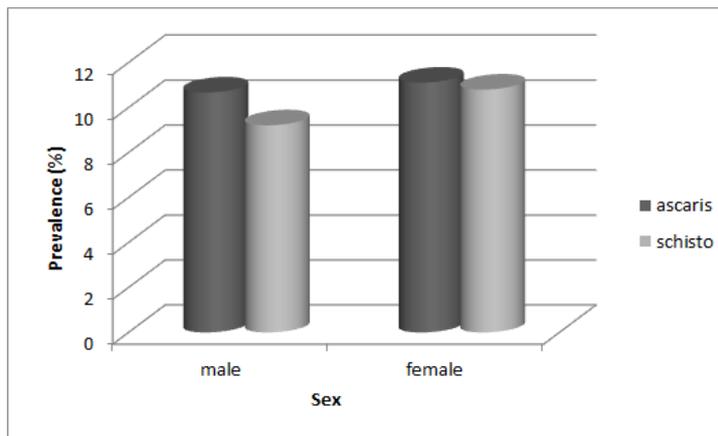


Fig-3: Prevalence of *Ascaris* and *Schistosoma* infections in relation to sex

Chi-square = 0.021 with 1 degree of freedom; P = 0.885 (*Ascaris* infection) – not significant
 Chi-square = 0.086 with 1 degree of freedom; P = 0.770 (*Schistosoma* infection) – not significant

DISCUSSION

Prevalence of ascariasis and schistosomiasis in the two schools are relatively low (10.95% and 10.20% respectively) according to [13]. The low prevalence obtained in the *Schistosoma* infections are in accord with the findings of [14] in Niger-Benue Basin of Kogi State who recorded a low prevalence of 18.7%; 15.7% urinary schistosomiasis in Anambra by [15]; 11.5% in Adamawa by [16]; 11.8% in Anambra State by [17] and 17% in Malunfashi, Bauchi State by [18]. The prevalence obtained in this study was however lower than the ones observed by [19] who recorded 83% infection rate in *S. haematobium* and 38% *S. mansoni* in Kwali, FCT, Abuja; [20] recorded overall prevalence of 31.3% for *S. haematobium* in FCT, Abuja; [21] observed 41.5% infection rate in Buruku and Katsina-Ala LGAs of Benue State; 57.4% was recorded in the Western part of Nigeria by [22] and [23] observed 29.4% prevalence in the Eastern part of Nigeria.

In this study, the 10.95% overall prevalence of *Ascaris* infection agreed with the 6.17% prevalence recorded by [7]. The prevalence is higher than the findings of [24] and [25] who recorded 1.0% in Plateau

State respectively. Higher prevalence of Ascariasis was recorded by [26] who observed 36.2% prevalence in Ilie, Osun State; 19.36% in Thika district of Kenya by [27] and 15.38% in Ozubulu, Anambra State by [28]. The difference in prevalence could be attributed to seasonal differences and timing of conducting the survey, environmental conditions and other geographical factors in the different study areas. This present study was carried out in the peak of dry season in Gwagwalada (February and March) which could have been the cause of low prevalence of the two infections in the study areas.

Highest infection rate in relation to age, in this study was observed within the age group 11-15 years (11.72% and 13.67% for *Ascaris* and *Schistosoma* infections respectively). Age group 11-20 had been variously observed to have high prevalence of *Ascaris* and *Schistosoma* infections. [15] also recorded the highest prevalence rate (21.6%) of schistosomiasis in age group 11-20; 42.1% in age group 10-14 in FCT, Abuja by [20]; 46.10% in age group 15-19 in Kwali, Abuja by [19]; 6.47% in age group 14-16 in Akwanga, Nasarawa State by [7] and 21.37% in age group 11-13

in Ozubulu, Anambra State by [28]. This age group are much more in contact with infected water bodies through swimming, laundry and other domestic and commercial activities that need streams and ponds.

Females were observed to be more infected in this study (Ascariasis 11.11% and Schistosomiasis 10.80%) than the males (Ascariasis 10.67% and Schistosomiasis 9.21%). There was however no significant difference in infection in relation to sex. This is consistent with the result of [29, 30]. However [19], reported higher infection rates (41.30%) in males than females (39.90%) [20, 21] also reported higher infection rates in males. The reason for this variation could be because females do more of the activities which necessitate more contact with the parasites such as fetching water from the stream most especially during the dry season when there is scarcity of water supply, sweeping the surroundings and washing the toilets.

UBE Primary school, New Kutunku had lower prevalence rates than the Old Kutunku for the two infections under investigation. This could be attributed partly to a better toilet and water facilities found in the formal school than the later one.

CONCLUSION

This study has shown that Ascariasis and Schistosomiasis are prevalent in varying magnitude among the school children from the two schools under investigation. Control activities such as mass deworming with anti-helminthic drugs, good personal hygiene and provision of portable water and improved sewage disposal should however, be put in place. The efforts to eliminate these neglected tropical diseases (NTDs) through increased health education in our primary schools must be intensified.

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REFERENCES

1. Steinmann P, Keiser J, Bos R, Tanner M, Utzinger J. Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. *The Lancet infectious diseases*. 2006 Jul 1;6(7):411-25.
2. Sleigh A, Jackson S, Li X, Huang K. Eradication of schistosomiasis in Guangxi, China. Part 2: Political economy, management strategy and costs, 1953-92. *Bulletin of the World Health Organization*. 1998;76(5):497.
3. Utzinger J, Bergquist R, Shu-Hua X, Singer BH, Tanner M. Sustainable schistosomiasis control—the way forward. *The Lancet*. 2003 Dec 6;362(9399):1932-4.
4. Kazibwe F, Makanga B, Rubaire-Akiiki C, Ouma J, Kariuki C, Kabatereine NB, Booth M, Vennervald BJ, Sturrock RF, Stothard JR. Ecology of *Biomphalaria* (Gastropoda: Planorbidae) in Lake Albert, Western Uganda: snail distributions, infection with schistosomes and temporal associations with environmental dynamics. *Hydrobiologia*. 2006 Sep 1;568(1):433-44.
5. WHO Expert Committee on the Control of Schistosomiasis, World Health Organization. Prevention and control of schistosomiasis and soil-transmitted helminthiasis: report of a WHO expert committee. Who; 2002.
6. World Health Organisation. It's a worming world. Geneva, World Health Organisation (document WHO/CTD/SIP/98:4). 1998.
7. Mamman AS, Maikenti J. Prevalence of Ascariasis among secondary school students in Akwanga, Central Nigeria. *Journal of Biology, Agriculture and Healthcare*. 2014; 4 (23): 115-119.
8. Gaash B. *Ascaris lumbricoides*. *Indian J Practising Doctor*. 2004;1(3):11-2.
9. Montresor A, Crompton DW, Hall A, Bundy DA, Savioli L, World Health Organization. Guidelines for the evaluation of soil-transmitted helminthiasis and schistosomiasis at community level: a guide for managers of control programmes.
10. Hotez PJ, Kamath A. Neglected tropical diseases in sub-Saharan Africa: review of their prevalence, distribution, and disease burden. *PLoS neglected tropical diseases*. 2009 Aug 25;3(8):e412.
11. Verlé P, Stelma F, Desreumaux P, Dieng A, Diaw O, Kongs A, Niang M, Sow S, Talla I, Sturrock RF, Gryseels B. Preliminary study of urinary schistosomiasis in a village in the delta of the Senegal river basin, Senegal. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 1994 Jul 1;88(4):401-5.
12. Cheesbrough M. Clinical features and pathology of *Schistosoma*. *Medical Laboratory Manual for Tropical Countries* (2nd edition) 1: 331. Cambridge University Press. 2002.
13. World Health Organization. The Control of Schistosomiasis: Report of a World Health Organisation Expert Committee. World Health Organisation Technical Series. 1985.
14. Ejima IAA and Odaibo AB. Urinary schistosomiasis in the Niger-Benue basin of Kogi State, Nigeria. *Intl. J. Trop. Med*. 2010; 5: 73-80.
15. Ugochukwu DO, Onwuliri CO, Osuala FO, Dozie IN, Opara FN, Nwenyi UC. Endemicity of schistosomiasis in some parts of Anambra State, Nigeria. *Journal of Medical Laboratory and Diagnosis*. 2013 Nov 30;4(5):54-61.
16. Nale Y, Galadima M, Yakubu SE. Index of potential contamination for urinary schistosomiasis in five settlements near river Kubanni in Zaria. *Nigerian Journal of Parasitology*. 2003;24(1):95-101.

17. Ekejindu IM, Ekejindu GO, Agbai A. Schistosoma haematobium infection and nutritional status of residents in Ezi-anam, a riverine area of Anambra state, south-eastern Nigeria. *Nigerian Journal of Parasitology*. 2002;23(1):131-8.
18. Akogun OB. Water demand and schistosomiasis among the Gumau people of Bauchi State, Nigeria. *Japanese Journal of Tropical Medicine and Hygiene*. 1989 Jun 15;17(2):185-9.
19. Olanrewaju CA and Ekpenwa CC. Investigation of the incidence of schistosomiasis infections in Kwali, Abuja, Nigeria. *International Journal of Advancement in Biological Sciences*. 2014; 6 (1): 95-100.
20. Ifeanyi CIC, Matur BM and Ikeneche NF. Urinary schistosomiasis in the Federal Capital Territory, Abuja, Nigeria. *Acta. Parasitologica Globalis*. 2010; 1 (2): 15-19.
21. Houmsou RS, Amuta EU and Sar TT. *Int J Med Biomed Res*. 2012;1(1): 39-48.
22. Adeyeba OA and Ojeaga SOT. Urinary and concomitant urinary tract pathogens schistosomiasis among school children in metropolitan Ibadan, Nigeria. *African J. Biomedical Sci. Res*. 2002; 5: 103-107.
23. Anosike JC, Nwoke BEB and Njoku AJ. The validity of haematuria in the community diagnosis of urinary schistosomiasis infection. *J. Helminthol*, 2001; 75: 223-225.
24. Dangana A, Abayomi RO and Way GD. Survey of *Ascaris lumbricoides* among pupils of primary school in Jos South LGA of Plateau State. *J. Med. Sci*. 2012; *Adv*. 1 (1): 21-26.
25. Amaechi AA, Onyeka PI, Itheme JE, Ejiofo EL, Nwokeji CM. Prevalence of intestinal helminthes among school children and pregnant women in a low socio-economic area, Odenkume-Obowu, south east, Nigeria. *International Journal of Natural and Applied Sciences*. 2011;7(4):414-7.
26. Adefioye OA, Efunshile AM, Ojurongbe O, Akindele AA, Adewuyi IK, Bolaji OS, Adedokun SA, Adeyeba AO. Intestinal Helminthiasis among School Children in Illie, Osun State, Southwest Nigeria. *Sierra Leone Journal of Biomedical Research*, 3, 36-42.
27. Ngonjo TW, Kihara JH, Gicheru M, Wanzala P, Njenga SM, Mwandawiro CS. Prevalence and intensity of intestinal parasites in school age children in Thika District, Kenya. *Afr J Health Sci*. 2012 Apr;21(3-4):153-60.
28. Ezeagwuna D, Okwelogu IS, Ekejindu IM, Ogbuagu CN. The Prevalence and socio-economic factors of intestinal helminth infections among primary school pupils in Ozubulu, Anambra State, Nigeria. *The internet journal of Epidemiology*. 2009;9(1):50-7.
29. Rabello A, Pontes LA, Dias-Neto E. Recent advances in the diagnosis of *Schistosoma* infection: the detection of parasite DNA. *Memorias do Instituto Oswaldo Cruz*. 2002 Oct;97:171-2.
30. Aboagye IF, Edoh D. Investigation of the risk of infection of urinary schistosomiasis at Mahem and Galilea communities in the Greater Accra Region of Ghana. *West African Journal of Applied Ecology*. 2009;15(1).