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Prevalence and Intensity of Urinary Schistosomiasis among Primary School Pupils in Ndokwa-East lga of Delta State, Nigeria

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Abstract

Background: *Schistosomiasis is a water-borne tropical parasitic disease that is of a major public health problem. It is a neglected tropical disease that is still endemic in Nigeria and other West African countries. The complications associated with the infection on children is enormous. The aim of the study was to determine the prevalence and intensity of urinary schistosomiasis among primary school children in Ndokwa-East Local Government Area of Delta State.*

Methods: *This study was a cross-sectional descriptive study of primary school children aged 5-15 years in Ndokwa-East Local Government Area (NELGA) of Delta State. Urine microscopy (centrifugation method) was done for the pupils and the schistosoma eggs were counted and graded according to WHO standards. Relationship between the intensity of schistosomiasis infection and the infection prevalence were tested using chi-square analysis and Fisher's exact test where indicated.*

Results: *A total of 374 pupils were studied. Twenty-eight (7.5%) of them had urinary schistosomiasis; The mean egg count was 35.29 eggs per 10ml of urine (range of 5-120 eggs per 10 ml of urine) and 18 out of the 28 infected pupils (64.3%), had mild infection. Gender, age, distance of the school/home from water body, level of interaction of the pupils with water bodies, occupation of the caregivers/parents, and education level of the caregivers/parents, did not significantly influence the intensity of the infection.*

Conclusion : *In conclusion, the intensity of urinary schistosomiasis infection among primary school pupils in NELGA was not affected by socio-demographic characteristics of the subjects and their water contact activities.*

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Introduction

Urinary schistosomiasis is a disease of public health importance that is prevalent in Nigeria and in sub-Saharan Africa [1,2]. It is a disease that affects the health and development of the affected school children by affecting their physical fitness, school attendance, cognitive performance, nutritional status and growth [3]. The adults are not left out it is adversely affecting their health leading to loss of man-power from recurrent sick-day leave and reducing the productivity of the community [3-5]. The intensity of S.haematobium infection tends to vary according to several factors. This includes environmental factors like major source of water for their activities and the abundance of appropriate intermediate snail hosts in the water bodies, the activities being carried out in the water bodies (like fishing, washing, bathing, etc), the occupation of the individuals/caregivers, the age and the sex of the individuals [6,7]. There is paucity of data on the intensity of urinary schistosomiasis in NELGA as little attention is given to this huge but often neglected tropical disease that is still ravaging Nigeria and other West African countries. The aim of the study was to determine the prevalence and intensity of urinary schistosomiasis among primary school children in Ndokwa-East Local Government Area of Delta State, Nigeria.

Subjects and Methods

This was a crosssectional descriptive study of primary school children aged between 5 and 15 years, drawn from NELGA of Delta State. Subjects were grouped into age cohorts' 5-7 years, 8-10 years, 11-13 years, and 14 – 15 years, as of their last birthday. Subjects' recruitment was by multistage, stratified sampling method. The wards and the primary schools were selected by simple random sampling method. Basic Socio-demographic characteristics of the pupils and other information like history of contact with water bodies, previous history of passage of blood in urine, and administration of praziquantel in the past (within the last two years) were obtained using study questionnaire. Twenty milliliters of clean-catch, midstream/terminal urine samples collected between 10am and 2pm of the day (time of maximum egg excretion) were obtained from the selected pupils and transported to the laboratory at FMC Asaba for analysis [8]. The eggs were recovered from urine by the standard centrifuge-sedimentation technique [9]. Ten (10) mls of the urine collected from each subject was spun in a centrifuge at a speed of 2000 revolutions per minute for 5 minutes to sediment the residue, after which the supernatant was discarded and the sediment placed on a clean glass microscopic slide. A drop of 1% Lugol's Iodine was dropped on it, and covered with a glass coverslip for microscopic examination. Using the power 10 (10X) objective lens of light binocular microscope, the entire slide under the coverslip was examined for the ova of S. haematobium. The eggs were counted and recorded as number of eggs per 10millilitres of urine (EP10ml) and graded according to World Health Organization (WHO) standard; <50 eggs/10 ml urine considered as mild infection, and ≥50 eggs/10 ml of urine as heavy infection [9,10]. The data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 22. Socio-demographic characteristics and water contact activities of the pupils were treated as categorical variables and expressed using frequency tables and charts. Relationship between these categorical variables and intensity of infection were tested using chi-square analysis, and Fisher's exact test when indicated. Level of significance was set at a p-value of less than 0.05.

Ethical Consideration

Ethical clearance was obtained from the Ethics Committee, FMC Asaba. Written permissions were obtained from the State Ministry of Basic and Secondary Education, and NELGA. Informed consent was obtained from the caregivers of the study participants and assents were obtained from the participants.

Results

Twenty-eight (28) out of 374 pupils studied, had schistosoma haematobium eggs in their urine. Among the infected individuals, the mean egg count was 35.29 ± 31.09 eggs per 10ml of urine (range of 5-120 eggs per 10 ml of urine). Eighteen (18) out of 28 of the infected pupils (64.3%), had mild infection, while 10 pupils (35.7%), had severe infections. The proportion of infected pupils with severe infection from Ise-Onukpor community was highest compared to the other communities (FET, df = 5, p-value = 0.059). This is shown in the Figure 1

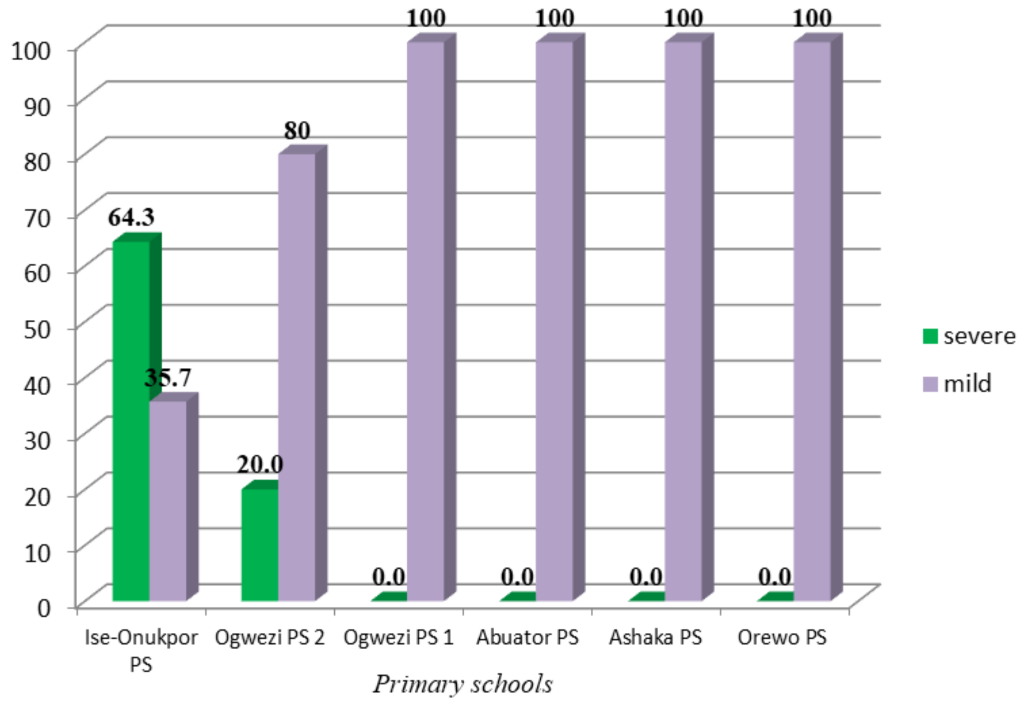

Figure 1: Comparison of intensity of urinary schistosomiasis among the primary schools

Table 1 shows the Socio-demographic characteristics of the subjects with intensity of infection. The proportion of the infected pupils between the age group of 5-7 years who had severe infection was 5/8 (62.5%) and this continued to reduce with increasing age. The proportion of infected females with severe infection was higher than that of males [5/12 (41.7%) vs 5/16 (31.3%)]. While none of the infected pupils who live or school at locations more than 15 minutes away from water bodies, had severe infections, 43.5% of the infected subjects whose homes or schools were less than 15 minutes from water bodies had severe infection.

Table 11 shows that the level of interaction of the pupils with water bodies had no significant relationship with the intensity of infection.

Table 111 shows the relationship between some socioeconomic indicators of the parents of the subjects with intensity of infection. The occupation and the highest educational attainment of the parents/caregivers affected the intensity of infection of the pupils but they were not significant.

Table I: Socio-Demographic Characteristics of The Subjects with Intensity of Infection

Intensity of infection (n = 28)					
Parameter		**Mild infection**	**Severe infection**	**FET**	**p-value**
		n (%)	**n (%)**		
Age	5-7 years	3 (37.5)	5 (62.5)	-	0.345
	8-10 years	3 (75.0)	1 (25.0)		
	11-13 years	10 (76.9)	3 (23.1)		
	14-15 years	2 (66.7)	1 (33.3)		
Gender	Male	11 (68.8)	5 (31.2)	-	0.698
	Female	7 (58.3)	5 (41.7)		
Walking distance from water body	<15minutes	13 (56.5)	10 (43.5)	-	0.128
	≥ 15minutes	5 (100.0)	0 (0.0)		

FET = Fisher's Exact Test

Table II: Relationship between the Level of Interaction of The Pupils with Water Bodies, and Intensity of Infection of The Pupils.

PARAMETER		**INTENSITY OF INFECTION (n= 28)**		**χ2**	**P-value**
		Mild	**Severe**		
		n (%)	**n (%)**		
Frequency of visit	**Daily**	5 (83.3)	1 (16.7)	FET	0.404
	1-4x/week	10 (52.6)	9 (47.4)		
	1-3x/month	1 (100.0)	0 (0.0)		
	No response	2 (100.0)	0 (0.0)		
Time spent in water body	**<10 mins**	3 (60.0)	2(40.0)	FET	0.429
	10-59 Mins	10 (55.6)	8 (44.4)		
	>59 mins	3 (100.0)	0 (0.0)		
	No response	2 (100.0)	0 (0.0)		
Major activity in water body	**Swimming/ bathing**	9 (56.3)	7 (43.7)	FET	<0.932
	Playing	1 (100.0)	0 (0.0)		
	Washing clothes	1 (100.0)	0 (0.0)		
	Fetching water	5 (62.5)	3 (37.5)		
	No response	2 (100.0)	0 (0.0)		

Table III: Relationship between Some Socioeconomic Indicators of the Parents of the Subjects with Intensity of Infection.

Parameter		Intensity of infection (n = 28)							
		Father				Mother			
		Mild n (%)	Severe n (%)	FET	p-value	Mild n (%)	Severe n (%)	FET	p-value
Occupation	Farming	13 (65.0)	7 (35.0)	-	0.088	14 (58.3)	10 (41.7)	-	0.265
	Fishing	1 (25.0)	3 (75.0)			-	-		
	Others	4 (100.0)	0 (0.0)			4 (100.0)	0 (0.0)		
Highest Educational Attainment	NFE	3 (60.0)	2 (40.0)	-	0.679	3 (60)	2 (40.0)	-	0.261
	Primary	12 (60.0)	8 (40.0)			10 55.6)	8 (44.4)		
	Secondary	3 (100.0)	0 (0.0)			5 (100.0)	0 (0.0)		

NFE = No Formal Education, FET = Fisher's Exact Test

Discussion

The mean intensity of 35.29EP10ml of urine observed in this study was in contrast to that of Kanwai et al, Bala et al and Awosolu et al, who reported mean intensity of 73.93EP10ml of urine, 77.63EP10ml of urine, and 65.60EP10ml of urine in various parts of Nigeria respectively [6,11,12]. The lower intensity in this study could be attributed to the success of MDA in the LGA, unlike in the community studied by Bala et al who had no MDA [11]. It could also be attributed to the presence of pipe-borne water in majority of the communities in this this index study, unlike in the other studies who depended on infested ponds/streams/rivers for their domestic activities [6,12].

This study showed that majority of the infected subjects had mild infections Kabiru et al, Ivoke et al, Dawaki et al and Ekanem et al, reported majority of their subjects to have mild infection, similar to this index findings [13-16]. The similarity may be attributed to the success of the control programs among the study population in the above studies, similar to the index study [13-16]. In contrast to this finding, Ogbonna et al reported that more than 50% of the subjects with the infection had heavy infection in a place where there was no active control program [17].

The highest proportion of infected pupils with severe infection was seen in Ise-Onukpor primary school, compared to the other community primary schools because almost all the inhabitants of this community have some activities to do in the water body (which serve as a major source of water in the community) on a daily basis, acquiring newer infections daily and possibly worse outcome. This finding was also similar to that of Kanwai et al at Kaduna State, who recorded highest intensity rate at Dumbin Ladan community that had infested ponds as major source of water, compared to the other communities [6].

This study showed inverse relationship between the age of the pupils and the proportion of pupils with severe infection. This trend was not statistically significant, probably due to the small number of infected pupils in the study. The finding was similar to what was obtained by Kanwai et al at Kaduna, and Chipeta et al at Malawi, which showed negative correlations of the infection intensity with the age [6,18]. Similarly, Oluwasogo et al at Lagos state, reported that heavier infection was recorded among pupils with mean age range of 7.5 ± 1.89 to 8.7 ± 2.05 years Simoonga et al in Zambia, Awosolu et al in Mauritania also reported that children aged 5-9 years, had higher intensity of infection than those in the older age group The similarity of the above findings to the present finding can be due to reduced worm burden following increased immune maturity with increase in age of the subjects [7,12,20,21]. In contrast, Okoli et al and Bolaji et al reported highest infection intensities among the age group 9-15 years, attributable to the differences in the study population, , as index study was among children from this endemic LGA between the age of 5-15 years, unlike those studied by (children ≥ 9 years) [22,23]. Subjects in this present study were from this endemic LGA, unlike the subjects studied by Okoli et al that included secondary school children who came from non-endemic communities to study at Ibadan [23]. They may not have developed immunity against the infection, hence the higher prevalence and intensity of infection among them compared to others. Geleta et al at Ethiopia however reported no significant difference in intensity of infections, in relation to age [24]. The dissimilarity from the index study can be attributed to the difference in behavioral characteristics of the study population, as majority of the subjects passing blood in the urine in this present study did not report or seek for treatment for the infection, unlike the study population by Geleta et al [24].

Gender had no significant influence in the intensity of the disease, presumably due to equal exposure of the pupils to the risk factors, as there was no gender bias towards water body restrictions or exposure, among the pupils in the community. Similar findings and deductions were made by Ogbonna et al [17]. This finding is however at variance to that of Bolaji et al, Okoli et al, Awosolu et al and Bala et al; who reported higher infection intensities in males compared to females [11,12,22,23]. This difference can be explained by the fact that quite unlike in the index study where both gender groups had equal exposure to the infection, social/ethno-religious restrictions of the females to some water contact activities like swimming, bathing and fishing in the latter studies, may have reduced their exposure to the infection, hence lower intensity [11,12,22,23].

Another observation from this study is that the average walking distance from the houses/schools of the pupils to the water bodies, affected intensity of the infection, though not significant. This can be due to the frequent exposure of those pupils to the infested water bodies because of its proximity. This finding however differs from that of Geleta et al at Ethiopia, who reported no significant difference in intensity of infection, in relation to distance from water bodies, probably because the subjects knew about the presence of treatment against the infection, reported bloody urine as symptom of urinary schistosomiasis, and they might have done self-reporting and had good access to the treatment, unlike in this present study [24].

From the analysis, the proportion of infected pupils whose parents/caregivers were either farmers or fishermen had high proportion of pupils with severe infection, compared to others. This trend did not reach statistical significance maybe due to the small population of infected pupils in the study. This is similar to what was obtained by Awosolu et al, reported that pupils whose parents' occupation were fishing/farming, had higher intensities than housewives/traders/wage earners [12]. The similarity can be explained by the fact that parents whose occupation were fishing and farming, may often times take their children to farm or catch fish, leading to frequent exposure to the infested water bodies, with more intense infection. In addition, because of the lower socio-economic status of the above occupations, they may not have access to other safe alternative sources of water compared to Civil servants/Traders, hence having more proportion of severe infections.

The proportion of infected pupils whose parents/caregivers had either primary level of education or no formal education, had high proportion of pupils with severe infection, compared to others, although not significant; maybe due to small population of infected pupils studied. Awosolu et al Reported similar higher intensity of infection among pupils whose parents had incomplete primary level of education, compared to those that had at least completed primary level of education, while reported higher infection intensities among pupils whose parents had primary level of education, followed by secondary level of education, then tertiary [12,18]. This may probably be multi-faceted as explained before; education affects attitudes and behavior in different ways [25]. The tendency to be exposed to the knowledge of prevention of water-borne diseases in general like water treatment and preference, during the course of education, reading articles, newspapers and books, hence being empowered with the knowledge is higher with higher literacy level. They will imbibe in their children, those behavioral practices that will protect them against the infection and reduce the intensity of the infection [25,26].

Conclusion

The intensity of infection among the infected subjects was not significantly influenced by age, sex, occupation of the caregivers, level of education of the caregivers, and distance of the home/school from water body.

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Conflicts of Interest: none

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