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Prevalence of Urinary Schistosomiasis among School Children in Bekwarra Local Government Area, Cross River State, Nigeria

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Abstract

This study was conducted to ascertain the prevalence of urinary schistosomiasis among school children in Bekwarra Local Government Area, Cross River State, Nigeria. A total of 400 urine samples were collected from school children and examined for *S. haematobium* ova using sedimentation technique. Out of this, 118 (29.5%) children were found to be infected. Male children had high prevalence of infection than the female even though, the variation observed was not statistically significant (P<0.05). The 10-14 years age group had the highest rate of infection, 78(36.6%) with *S. haematobium*. Prevalence of infection was highest in Sacred Heart Primary School Nyanya 30(60.0%) while Ujia Community Secondary School Ibiaragidi recorded the lowest prevalence 6(12.0%) (P>0.05). It was observed that children whose parents were farmers recorded the highest prevalence of infection 95(37.1.0%). Also, it was observed in the study that there were various sources of water supply in the study area with children who depend solely on water from Rivers/Stream having the highest prevalence 87(35.4 %) while subjects who had access to Tap/Borehole water recorded the least prevalence of infection 10(15.6%) (P>0.05). furthermore, it was also observed that children who fish had the highest infection with *S. haematobium* 45(42.5%), followed by those who engage in irrigation and Rice farming 80(40.6%), while children that swim in water bodies recorded the least prevalence 61(30.5%). The prevalence recorded in this study area is moderate; it is therefore recommended that vulnerable groups such as school children should have access to regular screening and treatment for urinary schistosomiasis and appropriate prevention measures should be promoted within their communities.

Keywords: Prevalence; Urinary Schistosomiasis; School Children; Bekwarra

Abbreviations: SPSS: Statistical Package for Social Sciences.

Introduction

Schistosomiasis or bilharziasis is a chronic water-borne infection caused by blood-dwelling trematode worms belonging to the genus Schistosoma. The disease is endemic in at least 76 tropical and sub-tropical countries, with estimation that at least 200 million people are infected with Schistosomiasis and another 700 million are at risk of the infection [1,2]. Estimate also suggests that 85% of all Schistosomiasis cases in the world are in Sub-saharan Africa [3,4]. Schistosomiasis is the second most prevalent tropical disease in Africa after malaria and is of great public health and socio- economic importance in the developing world [5]. The early signs of morbidity common to the infection in school age children are anaemia, poor cognition and sub-standard school performance, impaired growth, and development [6,7]. The later and life threatening consequences of schistosomiasis

include bladder cancer or serious kidney malfunction caused by *Scistosoma haematobium*, and severe complications of the liver and spleen in the case of intestinal schistosomiasis [8]. There are two main forms of the disease namely; urinary and intestinal schistosomiasis. The major aetiologic agents of the intestinal form are *Schistosoma mansoni* and *Schistosoma japonicum*. The less common species that have also been associated with intestinal disease are *Schistosoma mekongi, Schistosoma guineensis* and the related species *Schistosoma intercalatum*. *Schistosoma haematobium* is the only known agent of urinary schistosomiasis [2,9]. In Africa, especially Nigeria; *Schistosoma haematobium, S. mansoni* and *S. intercalatum* are the most predominant species [10]. *Schistosoma haematobium* predominate constituting a public health concern particularly in children [11,12]. The aim of this study therefore was to determine the prevalence of urinary schistosomiasis among school children in Bekwarra Local Government Area, Cross River State, Nigeria.

Materials and Method

Study Area

Bekwarra Local Government area is located in the Northern part of Cross River State, Nigeria with the longitude of $6^0 41''38N$, $8^0 58''3E$ and latitude $6^0 69''89N$, $8^0 96''50E$. It is bounded in the North by Benue State, South by Ogoja Local Government Area, East by Obudu Local Government Area and West by Yala Local Government Area. The major economic activities in this area include agriculture, cattle/goat and poultry rearing, petty trading. Majority of the indigenes Bekwarra Local Government Area are farmers whose produce are sold within and outside the state. Bekwara Local Government Area has an area of 306 km^2 and a population of 105,822 at the 2006 census [13].

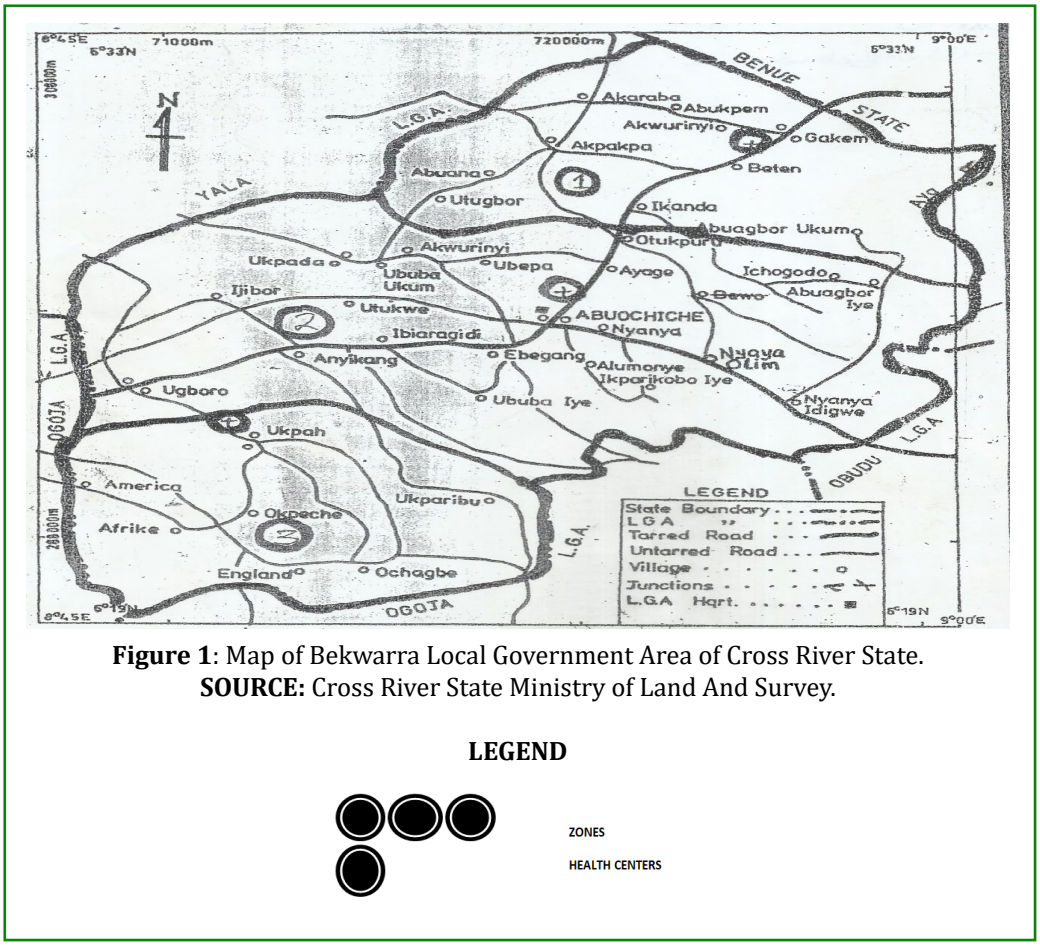

Figure 1: Map of Bekwarra Local Government Area of Cross River State.
SOURCE: Cross River State Ministry of Land And Survey.

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Ethical Consideration

Consents to carry out the study in the schools were obtained from the Local Government Education Secretary and school heads. Approval to collect urine samples of children were also obtained from parents or guardians of the school children one week before sample collection. A Pre-survey visit was made to the school in order to educate the school authorities and the children about the importance of the study.

Sample Collection

Four hundred sterile sample bottles were given to subjects from eight schools who were instructed on how to collect the samples so as not to contaminate them. Each Sterile sample bottle has provisions for number, sex, age and school of each subject. Information on water supply and water contact activities of children was collected using questionnaires. Urine samples were therefore collected from each subject in a 20ml sterile universal bottle by the children themselves following the instructions given to them. All collections were done between 10:00 am and 2:00 pm within the premises of each school [14] Samples were immediately moved to Model Primary Health Centre, Abuochiche for analysis.

Laboratory Investigations

Each urine sample was thoroughly mixed and 10mls of the samples were centrifuged to concentrate the Schistosoma ova if present. The supernatant was removed with a pipette leaving 0.5 ml of the fluid with the sediment at the bottom of the tube undisturbed. The remaining fluid and sediment were mixed using a pipette, and then a drop of the mixture was transferred to a microscope slide and covered with a cover slip. The slide was examined for *S. haematobium* ova using the x10 objective. The number of ova were counted and reported as egg per 10ml of urine. 1-49 egg/10 ml urine was considered as light infection and ≥50 eggs/10 ml of urine as heavy infection [15].

Data Analysis

Statistical package for social sciences (SPSS) was used for the analysis of data. Chi-square test was used to compare differences in prevalence between the various age group, sexes and schools. Association between prevalence of infection and occupation as well as water supply was also determined using Chi-square analysis.

Results

Prevalence and Intensity of *S. haematobium* Infection in Relation to Sex of Students

The overall prevalence of infection as measured by urine sedimentation was 118 (29.5%), with the male students recording the highest prevalence 71 (30.1%), followed by the females 47(28.7%). This variation was however insignificant (χ^2=0.112, P= 0.001) as can be seen in Table 1.

Prevalence and Intensity of *S. haematobium* Infection in Relation to Age of Students

In relation to age, a significant variation in the level of infestation was recorded (χ^2=14.563; P=0.000). The 10-14 year age group recorded the highest prevalence of infection 78 (36.6%) followed by the 5-9 year age group 34(25.0%). However, the infection decreased in the 15-19 year age group 6(11.8%) as shown in Table 1. Consequently, light intensity infection was observed to be higher in the 5-9 year age group 31(91.2%) while heavy intensity infection was highest in the 15-19 year age group 1(16.7%).

Prevalence and Intensity of *S. haematobium* Infection in Relation to Schools Visited.

As shown in Table 1, there was a very high significant difference (χ^2=63.222; P=0.000) in the prevalence of infection between the different schools visited. Sacred Heart Primary School Nyanya, had the highest prevalence 30 (60.0%) followed by Community Primary School Beten, 29 (58.0%) while Ujia Community Secondary School Ibiaragidi, recorded the lowest prevalence 6 (12.0%).

Studied parameters	Number examined	Number Infected with *S. haematuria*	(%)	Light Infection <50/10ml	(%)	Heavy Infection >50/10ml	(%)	χ^2	P-value
Sex									
Male	236	71	30.1	62	87.3	9	12.7	0.112	0.001
Female	164	47	28.7	44	93.6	3	6.4		
Total	400	118	29.5	106	89.8	12	10.2		
Age									
5 – 9	136	34	25.0	31	91.2	3	8.8	14.563	0.000
10 – 14	213	78	36.6	70	89.7	8	10.3		
15 – 19	51	6	11.8	5	83.3	1	16.7		
Total	400	118	29.5	106	89.8	12	10.2		
Schools									

Sacred heart's primary Sch. Nyanya	50	30	60.0	29	96.7	1	3.3	63.222	0.000
St David primary Sch.Afrike	50	16	32.0	15	93.8	1	6.3		
St Clement Pry Sch.Ugboro	50	8	16.0	8	100	0	0.00		
Community pry Sch.Beten	50	29	58.0	24	82.8	5	17.2		
Community pry Sch.Ijibor	50	13	26.0	9	69.2	4	30.8		
Community Sec Sch.Afrike	50	7	14.0	7	100	0	0.00		
Community Sec Sch.Ukpah	50	9	18.0	9	100	0	0.00		
Ujia Community Sec Sch.	50	6	12.0	5	83.3	1	16.7		
Total	400	118	29.5	106	89.8	12	10.2		

Table 1: Prevalence and intensity of *Schistosoma haematobium* infection rate among subjects in relation to sex, age and schools

Prevalence of *S. haematobium* Infection in Relation to Parent's Occupation and Water Source

It was observed that children whose parents were farmers recorded the highest prevalence 95 (37.1.0%), followed by children whose parents were farmers/traders 5/24 (20.8) while the least prevalence was observed among children whose parents were civil servants/ traders 3/28 (10.7%) as seen in Table 2. The variation observed was statistically significant (χ^2= 20.919; P=0.001). The study also identified various sources of water supply in the study area. Most children 87/246(35.4 %) who depend solely on water from rivers/stream were with the highest infected. This is closely followed by subjects who depend on Well water 21/90 (23.3%). However, subjects who had access to Tap/ Borehole water were observed to have the least prevalence of infection Table 2. A statistically significant difference was also observed in the prevalence of *S. haematobium* in relation to water source (χ^2=11.732; P=0.008).

Occupation	Number examined	Number infected	(%)	χ^2	P-value
Civil Servant	31	4	12.9	20.919	0.001
Farmer	256	95	37.1		
Trader	15	2	13.3		
Civil Servant/Farmer	46	9	19.6		
Civil servant/Trader	28	3	10.7		
Farmer/ Trader	24	5	20.8		
Total	400	118	29.5		
Water supply					
Well	90	21	23.3	11.732	0.008
River/ Stream	246	87	35.4		
Tap/ Borehole	64	10	15.6		
Total	400	118	29.5		

Table 2: Infection rate of subjects based on parent's occupation and water supply in the community

Prevalence of *S. haematobium* Infection in Relation to Water Contact Activities

Table 3 shows the prevalence rate of urinary schistosomiasis in relation to the various activities of the children that are associated with water contact. Children that fish in water bodies had the highest rate of urinary schistosomiasis 45 (42.5%) followed by those involved in irrigation/rice farming 80/197 (40.6%), while the lowest prevalence was observed among children that swim in water bodies 61 (30.5%). The variation observed in the different groups was significantly different (χ^2= 14.66, P= 0.028).

Risk factors	Response	Number examined	Number infected	(%)	χ^2	P-value
Swimming	Yes	200	61	30.5	1.093	0.002
	No	200	57	28.5		
Fishing	Yes	106	45	42.5	0.97	0.472
	No	294	73	24.8		
Swimming/fishing	Yes	95	32	33.7	0.84	0.512
	No	305	86	28.2		
Bathing	Yes	349	110	31.5	0.44	0.681
	No	51	8	15.7		
Washing	Yes	322	104	32.3	0.66	0.579
	No	78	14	17.9		
Fetching	Yes	300	98	32.7	0.99	0.468
Irrigation/Rice Farming	Yes	197	80	40.6	14.66	0.028
	No	203	38	18.7		

Table 3: Prevalence of *S. haematobium* infection in relation to water contact activities

Discussion

The result of this study shows an overall prevalence of 29.5% of urinary schistosomiasis among school children in Bekwarra Local Government area, Cross River State, Nigeria. This observation is similar to various reports across Nigeria and Africa. Dunah and Bristone [16] reported a prevalence of 27.2% in Mayo-Belwa Local Government area of Adamawa State Okon et al. [17] reported a prevalence of 35.0% in Adim community in Biase Local Government area Cross Rivers State, Banji, et al. [18] also reported a prevalence of 28.0% in Bida, North Central Nigeria while Wami, et al. [19] reported a prevalence of 35.9% among children in Murewa district, in the north-east of Zimbabwe. In contrast however, the result obtained in this study is much lower than the reports of Babatunde, et al. [20] who reported a prevalence of 48.2% among two peri-urban communities in Southwest, Nigeria, Amuta, et al. [21] who reported a prevalence of 55.0% in Guma Local Government Area of Benue State, Ogunremi and Adewole [22] who reported a prevalence rate of 68.0% among school children in Aramoko-Ekiti, Ekiti State and Mtethiwa, et al. [23] who also reported a prevalence of 51.2% in Malawi. However the prevalence recorded in this present study is higher than the findings of Nworie, et al. [24] whore ported a prevalence of 9.8% in Afikpo North Local Government Area of Ebonyi State, Nigeria, Sam-Wobo, et al. [25] who also reported a prevalence of 3.6% among primary school children in Abeokuta in Ogun State and Roman, et al. [26] who reported a prevalence of 6.4% among school children in Cameroon and also Iboyi et al. [27] who reported 16'4% in Katsina-Ala Local Government area of Benue state Nigeria.

The prevalence observed in this study could be as a result of agricultural practices especially rice farming which brings subjects close to water bodies. In relation to sex, the males showed the highest infection rate compared to the females. This observation agrees with reports of Nworie, et al. [24] and Amaechi [28] who also reported high infections among males than females. However, the finding in this study is contrary to the observations of Sam-Wobo, et al. [25] and Roman et al. [26] who reported a high infection among females than males even though, the difference was not statistically significant. Statistical analysis in this study showed no significant difference in the prevalence of schistosemiasis in both sexes. This observation disagrees with the findings of Ugbomoiko, et al. [29] in Osun and Nworie, et al. [24] in Ebonyi who reported significant relationship between *S. haematobium* infections and sex. The insignificant difference between the sexes recorded in this study could be due to engagement of the female children in some activities such as fetching of water, washing and irrigation farming which brings them into contact with the water bodies. The peak of infection was in the age group 10-14 years. This observation is similar to the works of Ekejindu, et al. [30], Hassan, et al. [31] and Amaechi [28], who also recorded a high prevalence rate among this age group. This is probably due to frequent recreational activities in contaminated water bodies within this age group which exposes them to the infection. The significant variation found between age group and *S. haematobium* infection is similar to the report of Nworie, et al. [24]. The current finding also showed that most infected individuals had light intensity (<50 eggs per 10 ml urine) infection and that a few of the population had heavy intensity infection. This observation is in conformity with the report of Anosike

et al. [32]. It was observed that prevalence of infection varied among the different schools visited. This observation agrees also with the report of Ogunremi and Adewole [22] who also reported variation in schistosoma infection among schools.

However, the prevalence recorded among each school in the current study was lower than the report of this author. Furthermore, it was observed that children, whose parents were farmers, recorded the highest prevalence of infection, with the least prevalence recorded among children whose parents were Civil Servants/ Traders. The variation recorded was significant and agrees with the finding by Akinboye, et al. [12]. The higher infection in children whose parents were farmers could be attributed to their frequent contact with water bodies as they use the water from the infested streams for their recreational, occupational and domestic activities. From interviews conducted on sources of water supply, it was observed that children who depend solely on water from Rivers/Stream had the highest prevalence of infection, followed by those who depend on Well water and Subjects who had access to Tap/Borehole water were observed to have the least prevalence of infection. This observation is in agreement with the works of Nworie, et al. [24] and Amaechi, [28] who also reported highest infection rate among children that sourced water from stream and river. In contrast, the result obtained from this finding deviates from Nworie, et al. [24] who reported no infection among children that sourced their water from tap/borehole. The fact that this group of people were found to be infected in this study could be that individuals that used Tap/bore hole water visit infested streams for other activities from where they got themselves infected. The prevalence of urinary schistosomiasis in relation to the various activities of the children revealed that, children that fished in water bodies had the highest rate of infection while children that swim in water bodies recorded the least infection. This finding however does not agree with the finding by Amuta, et al. [21] who reported highest prevalence among children that swim, did laundry in water bodies and those that engage in irrigation farming.

Conclusion

This paper has investigated the prevalence of urinary schistosomiasis among school children in Bekwarra Local Government Area, Cross River State, Nigeria. It is notable from the study that *Schistosoma haematobium* infection is prevalent in the study area with several factors accounting for this. To reduce the infection rate, children should be restrained from water contact activities, boiling of drinking water should be encouraged in the community as well as treating of water bodies. It is therefore recommended that the government should provide basic amenities, to reduce the transmission of the infection and there should also be integration of complementary intervention strategies by government and non-governmental organizations as well as the community in order to reduce the rate of the infection.

References

1. Fenwick A (2006) Waterborne infectious diseases–could they be consigned to history? Science 313(5790): 1077-1081.

2. World Health Organization (2012) Fact sheet on schistosomiasis, World Health Organization, Geneva.

3. Steinmann P, Keiser J, Bos R, Tanner M, Utzinger J (2006) Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. Lancet Infect Dis 6(7): 411-425.

4. Hotez PJ, Kamath A (2009) Neglected tropical diseases in sub-Saharan Africa: review of their prevalence, distribution and disease burden. PLoS Negl Trop Dis 3(8): e412.

5. World Health Organization (2010) Schistosomiasis, Fact Sheet No 115. World Health Organization, Geneva.

6. World Health Organization (2007) Schistosomiasis. World Health Organization Division. Geneva.

7. Verani JR, Abudho B, Montgometry SP, Mwinzi PN, Shane HL, et al. (2011) Schistosomiasis among young children in Usoma, Kenya. Am J Trop Med Hyg 84(5): 787-791.

8. Carter Center (2008) The Carter Center Schistosomiasis Control Program – Schistosomiasis Control Overview. The Carter Center Celebrates 1 Million Treatments for Schistosomiasis in Nigeria, pp: 15.

9. Webster BL, Southgate VR, Littlewood DT (2006) A revision of the inter-relationships of Schistosoma including the recently described *Schistosoma guineensis*. Int J Parasitol 36(8): 947–955.

10. Agi PI, Okafor EJ (2005) The epidemiology of *Schistosoma haematobium* in Odau community in the Niger Delta area of Nigeria. Journal of Applied Sciences and Environmental Management 9(3): 37-43.

11. Fana SA, Ekejindu IM, Nnamah AK (2009) Urinary schistosomiasis among school children in Argungu, Kebbi State. Nigerian Journal of Parasitology 30(2): 152-155.

12. Akinboye DO, Ajisebutu JU, Fawole O, Agbolade OM, Akinboye OM, et al. (2011) Urinary Schistosomiasis: Water contact frequency infectivity among secondary school students in Ibadan, Nigeria. Nigerian Journal of Parasitology 32(1): 129-134.

13. National Population Commission (2010) 2006 Population and housing census of the Federal Republic of Nigeria, priority tables. National Population Commission, Abuja, Nigeria 4: 9.

14. Cheesbrough M (2000) District laboratory practice in tropical countries, Part 2. Cambridge University Press. UK, pp: 3-442.

15. World Health Organization (2003) Manual of Basic Techniques for a Health laboratory 2nd edition. World Health Organization. Geneva, pp: 384.

16. Dunah CS, Bristone B (2000) The prevalence of *S. haemtobium* among primary school pupils in Mayo-Belwa Local Government area of Adamawa State. Nigerian Journal of Parasitology 21(1): 15-20.

17. Okon OE, Udoutun MF, Oku EE, Nta AI, Etim SE, et al. (2007) Prevalence of urinary schistosomiasis in Abini community, Biase local government area, Cross river State, Nigeria. Nigerian Journal of Parasitology 28 (1): 28-31.

18. Banji BB, Mann A, Nma E, Obi P U, Ezeako IA (2011) Prevalence of schistosomiasis and other intestinal helminth parasites among school children in Bida, Niger State, Nigeria. Eur J Sci Res 48: 621-626.

19. Wami WM, Nausch N, Midzi N, Gwisai R, Mduluza T, et al. (2015) Identifying and evaluating field indicators of urogenital schistosomiasis-related morbidity in preschool-aged children. PLOS Neglected Tropical Diseases 9(3): e0003649.

20. Babatunde TA, Asaolu SO, Sowemimo OA (2013) Urinary schistosomiasis among pre-school and school aged children in two peri-urban communities in Southwest Nigeria. Journal of Parasitology and Vector Biology 5(7): 96-101.

21. Amuta EU, Houmsou RS (2014) Prevalence, intensity of infection and risk factors of urinary schistosomiasis in pre-school and school aged children in Guma Local Government Area, Nigeria. Asian Pacific Journal of Tropical Medicine 7(1): 34-39.

22. Ogunremi TT, Adewole SO (2017) Urinary Schistosomiasis among School Children in Aramoko-Ekiti, Ekiti State, Nigeria. Journal of Health, Medicine and Nursing 41: 1-5.

23. Mtethiwa AHN, Bakuza J, Nkwengulila G (2015) Prevalence and intensity of schistosomiasis in communities around water reservoirs in Malawi. J Trop Dis 4: 1.

24. Nworie O, Nya O, Anyim C, Okoli CS, Okonkwo EC (2012) Prevalence of urinary schistosomiasis among primary school children in Afikpo North Local Government Area of Ebonyi State. Annals of Biological Research 3(8): 3894-3897.

25. Sam-Wobo SO, Ajayi TO, Ijaduola T, Ekpo UF, Adeleke MA, et al. (2013) Status of urinary schistosomiasis among primary school children in Abeokuta, Nigeria. International Journal of Medicine and Medical Sciences 5(3): 106-109.

26. Roman DNR, Jeannette T, Nkengazong L, Ojong L, Adamou M, et al. (2016) Prevalence of leukocyturia among *Schistosoma haematobium* infected school children in Cameroon. International Journal of Tropical Disease and Health 14(1): 1-7.

27. Iboyi MO, Onekutu A, Amuta EU (2018) prevalence and risk factors of urinary Schistosomiasis among school children in Katsina-Ala Local Government Area of Benue State, North Central Nigeria. European Journal of Pharmaceutical and Medical Research 5(11): 499-506.

28. Amaechi EC (2014) Urinary schistosomiasis among school age children in some rural community of Abia State, South Eastern Nigeria. Animal Research International 11(2): 1953-1957.

29. Ugbomoiko US, Ofoezie IE, Okoye IC, Heukelbach J (2010) Factors associated with urinary schistosomiasis in two Peri urban communities in South-Western Nigeria. Ann Trop Med Parasitol 104(5): 409-419.

30. Ekejindu IM, Ekejindu GOC, Andy A (2002) *Schistosoma haematobium* Infection and nutritional status of residents in Ezi-Anam, a riverine area of Anambra State, South Eastern Nigeria. The Nigerian Journal of Parasitology 23(1): 131-138.

31. Hassan AO, Amoo AO, Akinwale OP, Deji-Agboola AM, Adeleke MA, et al. (2012) Human water activities and urinary schistosomiasis around Erinle and Eko-Ende Dams, Southwest Nigeria. Global Advanced Research Journal of Medicine and Medical Sciences 11(4): 077-084.

32. Anosike JC, Nwoke A, Alozie JI, Okoro UO, Nwosu DC, et al. (2001) Endemicity to urinary schistosomiasis in the North-central Zone of Abia State, Nigeria. International Journal for Environmental Health and Human Development 2(2): 5-12.