MICROBIOZ JOURNALS
Journal of Microbiology and Biomedical Research

Microbioz Journals, Journal of Microbiology and Biomedical Research
ISSN 2395-5678, Volume: 5th Issue:2nd
Access online: www.microbiozjournals.com

Prevalence and Intensity of urinary Schistosomiasis in school children of Anguwan –dodo, a semi-urban community in Gwagwalada, Abuja

Corresponding Author: Biyaya Beatrice Nwankwo[1], Adebowale Ernest Onifade[2]
1 Department of Community Medicine, University of Abuja, Abuja
Email: biyayanwankwo@yahoo.com
Phone: +234-8023805229
2 University of Abuja Teaching Hospital Gwagwalada

Abstract

Schistosomiasis or bilharziasis was named after Theodore Bilharz a German surgeon who worked in Cairo. He was the first person to identify the aetiological agent *Schistosoma haematobium* in 1851[1].Urinary schistosomiasis is a chronic inflammatory disease that affects urinary bladder caused by the schistosomes (eggs) laid by the helminth *Schistosoma haematobium*.[2]

The aim of the study was to determine the prevalence and intensity of urinary schistosomiasis among primary school children in Angwan-dodo community. A multistage sampling method was used.Using a sterile universal bottle, urine samples were obtained from the subjects and transported immediately to the laboratory for analysis. A total number of 336 samples were examined for the presence of the ova of Schistosoma among children within the ages of 6-17years in Angwan Dodo.Mean egg intensity was 30.0 ± 17.2 standard deviation(SD) with highest intensity being 59 eggs/10ml and the lowest 8 ova/10ml. The age group 12-14 years had the highest prevalence rate(19.6%) and highest mean ova intensity (33.9 ova/10ml urine) while the age group 6-8 years had the lowest rate. Overall, light intensity was (7.4%) while heavy intensity was (2.7%). Among those infected, light intensity (73.5%) was significantly higher than heavy intensity (26.5%). There was statistical significance in the prevalence (P = 0.002) in relation to age group however, no significance in mean intensity (P > 0.05 among the age groups. Higher prevalence of infection was seen in the public school (15.6%) children compared to private schools with statistical significance (P = 0.003) but there was no statistical significance in the mean intensity between them (P > 0.05). Boys had the higher prevalence (15.9%) than girls (4.2%) respectively with statistical significance between them in prevalence (P = 0.002).

Keywords: *Schistosoma heamatobium*, Anguwan Dodo.

Date of Submission : January 2019
Date of Publication : June 2019
Type of article : Research Article
Corresponding author : Biyaya Beatrice Nwankwo

Correspondence : Department of Community Medicine, University of Abuja, Abuja
Email: biyayanwankwo@yahoo.com

Introduction

Schistosomiasis or bilharziasis named after Theodore Bilharz a German surgeon who worked in Cairo, he was the first person to identify the aetiological agent *Schistosoma haematobium* in 1851, and Schistosomiasis is a parasitic infection caused by the schistosomes or blood flukes that belong to the class Trematoda of the Phylum Platyhelminths.[1]

Urinary schistosomiasis occurs as a result of chronic inflammation of the urinary bladder caused by the presence of schistosomes (eggs) of the helminth *Schistosoma haematobium*.[2] The other species of schistosoma such as *japonicum*and *mansoni*cause chronic inflammatory disease of the liver and intestines respectively.[2] Although, infection with schistosomes do not always result in clinical manifestation, thus many infections are asymptomatic, infected individuals could however present with blood stained urine (often called male menstruation in men), painful micturition, and increased frequency of micturition[2]. Other major clinical presentations by infected individuals include; anaemia, nutritional deficiencies, poor growth, renal impairment, and bladder cancers later on in life.[3]

Schistosomiasis isone of the Neglected Tropical Disease as classified by WHO, it is estimated to affect about 200 million people worldwide with over 700 million people at risk of getting infected with Sub-Saharan Africa bearing the greatest burden of the disease (93%), thusmaking it one of the most important parasitic infections in the tropics, coming second to Malaria affecting children more than adults with high morbidity and mortality amongst them.[4,5]

The disease is endemic in the following African countries Ethiopia, Kenya, Cameroon, Uganda, Malawi, Mozambique, among others.[6]In Sub-Saharan Africa, it is endemic in Tanzania(19%), Ghana and DRC Congo (15%).[7] In Nigeria alone, the prevalence of urinary schistosomiasis between 1994-2015 was estimated to be 34.7%.[7]

Previous studies done in the Federal Capital Territory showed prevalence of between 25-36.5% in typical communities with close proximity of human water contact activities such as playing and swimming in polluted rivers, washing and fetching water for house hold use, making them very vulnerable to infections, this is coupled with the fact that these communities lack or are in shortage of potable water supply, poor environmental sanitation, poverty, and ignorance[8].

Several diagnostic procedures detect urinary schistosomiasis infection, this range from simple use of questionnaires to ask for blood in urine, physical inspection of urine for blood, and dipsticks to more complex procedures such as sedimentation technique, immunological techniques and the DNA PCR. For prevalence studies the sedimentation technique is the most widely used because of its simplicity and cost effectiveness[10].

The most important method of control of transmission to break the cycle at various points which include; provision of safe water, proper sanitation, snail control, mass treatment with praziquantel, and health education on risk the factors and preventive measures[9].

Aim and objective

To determine the prevalence and intensity of urinary schistosomiasis among primary school children in Angwan-dodo community.

Methodology

Study Area

The study was conducted in Angwan-dodo a small semi-urban community in Gwagwalada area council of the Federal Capital Territory. It is bounded on the south-west by River Gwagwalada and on the east by Abuja-Lokoja road separating it from the main Gwagwalada town.

There is scarcity of data on the population characteristics of this community. The major inhabitants of the community are the Bassa, Gbagyi, Nupe people who are mostly uneducated with a mixed population of various other ethnic groups such as the Igbo's, Hausa's, Yoruba's, and other minority ethnic nationals of Nigeria. Fishing is the predominant occupational activity carried out mainly by the Bassa people. Other recreational and domestic activities carried out in the river include; swimming, playing, bathing, washing, and defecation.

The river is most patronized during the dry season like (January to April) when there is scarcity of rain to provide water for household use.

The community has only one public school (LEA primary school) which is quite some distance away from the river with several small private schools scattered all over the community. There are reports of a high number of children mostly from the public school going to swim and play in the river after school hours. The community has no public health care centre but has patent medicine stores and private clinics that are run by non-doctors. Due to inadequate safe water supply to the community, the people depend on the river, well water and water vendors popularly known as the "Mairuwa" who get water from unknown source to sell to people in the community. Finally, the sanitation practices of the people are poor as refuse dumps litter the streets.

Study Population

The study population were primary school children between ages 6 to 17 within Angwan-dodo community of the one public primary school (LEA) in the community and over 15 private schools. The total population of school children in the community was about 2500.

Sampling Technique

A multistage sampling method was used.
Stage one was the selection of central ward from the ten wards in Gwagwalada Area Council using a simple random sampling method by way of balloting.
Stage two was the selection of Angwan-dodo community from among the 4 communities in the previously selected ward bordering Gwagwalada River using a simple random sampling.
Stage three was the assembling of all the schools in Angwan-dodo and stratification into private and public, then the selection of five private schools from the 15 private schools in Angwan-dodo using a simple random sampling method by balloting without replacement, and the only public school in the community, bringing the total number of schools to 6.
Half of the sample size (175) was selected from the five private schools (35 per school) while the remaining half (175) was selected from the only public school in the community (LEA primary school)
In each school, all the classes were stratified, and within each class participants were selected using the simple random sampling technique by balloting without replacement. Proportionate allocation was also used to select the required number of participants in each class.

Data Collection and sampling process

The procedure was explained to the subjects (study participants) and a number was assigned to each subject. Terminal urine samples (20ml) were collected into a labelled sterile universal bottle. Samples were collected between 10:00am and 2:00pm after a mild physical activity, as this coincides with the circadian rhythm of the eggs excretion in *S. Haematobium* Samples were collected within the school premises with the help of the teachers for the much younger age subjects. The samples were transported to the laboratory and immediately analysed.

Diagnostic Technique

Macroscopy examination of the urine samples for haematuria was done,followed by microscopic examination of the sediment after centrifugation of the urine sample. 10ml of each urine sample was poured into a test tube and then centrifuged for 5 minutes at 3000 rmp (revolution per minute) after which the supernatant was decanted and the sediment containing was examined under a light microscope at 10x and confirmed with40x objective.
Sample that showed the presence of ova of Schistosoma was recorded as positive while that without ova of Schistosoma was recorded as negative. For the positive samples, the ova was counted and each average count was recorded as number of ova's/10ml of urine sample and categorized into light intensity (<50 ova/10ml of urine) and heavy intensity (≥50 ova/10ml of urine).

Results

A total of 336 respondents were studied with majority of the respondents being, 170 (50.6%) males,Mean age of the study population was 10.3 ± 2.3 years, with majority (44.3%) falling within 9-11 years age group,Based on ethnicity, majority of the respondents, 66 (19.6%) were Igbo by tribe while Bassa made up 8.3% of the respondents.

Table 1.0 Prevalence and intensity of infection in relation to age group

Age group	Number	Number	Number	Mean	Intensity	
Examined (%)	Uninfected (%)	Infected	Ova		Light Intensity (%)	Heavy Intensity (%)
6-8	83	79 (95.2)	4 (4.8)	24.5	3 (3.6)	1(1.2)
9-11	149	140 (94.0)	9 (6.0)	28.4	7 (4.7)	2 (1.3)
12-14	92	74 (80.4)	18 (19.6)	33.9	12 (13.0)	6 (6.5)
15-17	12	9 (75.0)	3 (25.0)	18.7	3 (25.0)	0 (0.0)
Total	336	302 (89.9)	34 (10.1)	30.0	25 (7.4)	9 (2.7)

$\chi^2 = 20.799$, P = 0.002, One way Anova F = 0.891, P = 0.457.

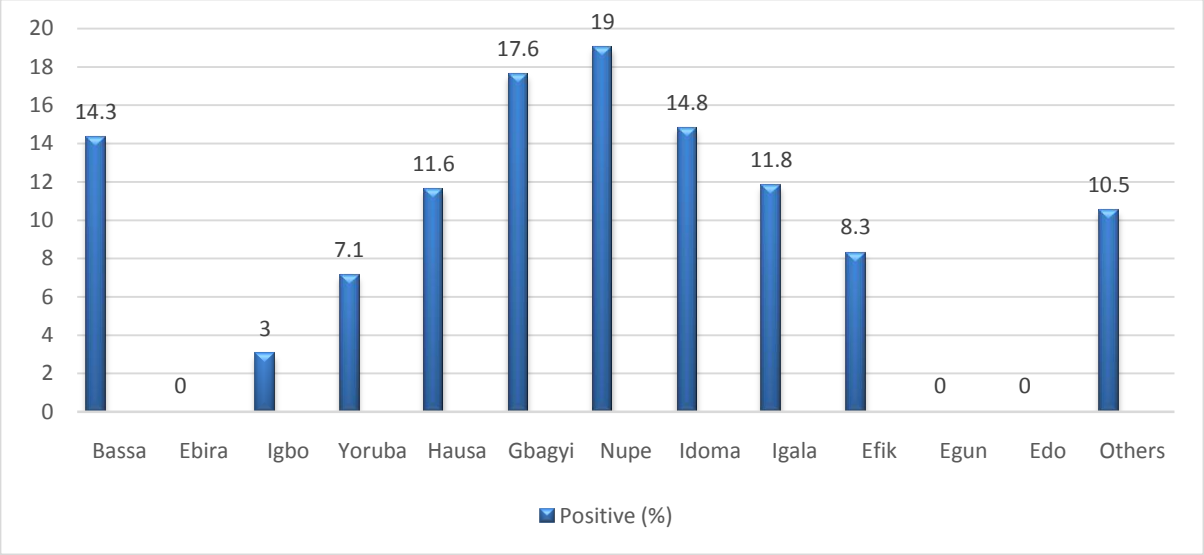
Mean ova intensity was 30.0 ± 17.2 SD with highest intensity being 33.9 ova/10ml and the lowest 8 ova/10ml. Highest prevalence of *Schistosoma haematobium* was in age group 12-14 (19.6%) so also was the mean intensity (33.9 ova/10ml urine) while prevalence was lower in age group 6-8 yrs. Overall, Light intensity was (7.4%) while heavy intensity was (2.7%). Among those infected, light intensity (73.5%) was significantly higher than heavy intensity (26.5%). There was statistical significance in the prevalence (P = 0.002) in relation to age group however, no significance in mean intensity (P > 0.05) among the age groups.

Table 1.1 Prevalence and intensity of infection in relation to type of school

Type of School (%)	Number Examined (%)	Number Uninfected	Number Infected	Ova	Mean Intensity	
					Light Intensity (%)	Heavy Intensity (%)
Private	163	156 (95.7)	7 (4.3)	32.4	5 (3.1)	2 (1.2)
Public	173	146 (84.4)	27 (15.6)	29.4	20 (11.6)	7 (4.0)
Total	336	302 (89.9)	34 (10.1)	30.0	25 (7.4)	9 (2.7)

$\chi^2 = 11.822$, P = 0.003, t = 0.413, P = 0.682

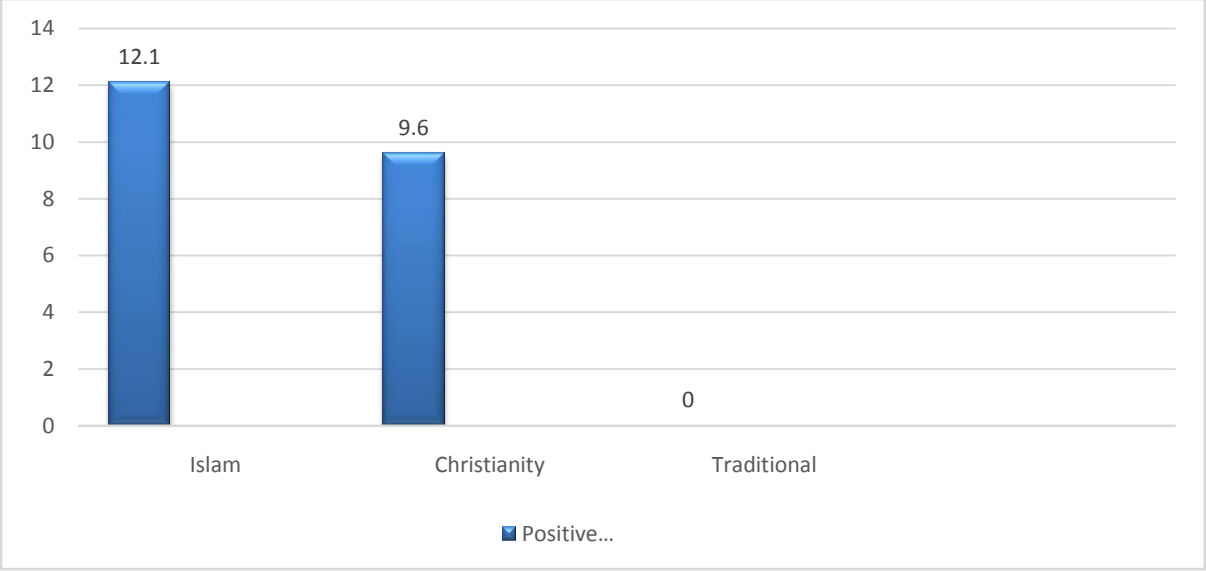
Higher prevalence of infection was seen in the public school (15.6%) compared to private schools with statistical significance (P = 0.003) but there was no statistical significance in the mean intensity between them (P > 0.05).



$\chi^2 = 11.097$, P = 0.269

Figure 1: Prevalence in relation to ethnicity

Highest prevalence was observed among the Nupe respondents (19%), Gbagyi (17.6%) and Idoma (14.8%) ethnic groups while lowest prevalence was among Ebira, Egun, and Edo ethnic groups (0%). However, no statistical significance in prevalence amongst them.(P > 0.05).



$\chi^2 = 1.679$, P = 0.432

Figure 2: Prevalence in relation to religion

Pupils who lived very near the river had the highest prevalence (13%) while pupils living outside Angwan-dodo had the lowest prevalence (0.0%). However, there was no statistical significance in prevalence in relation to closeness to the river. (P > 0.05).

Discussion

Prevalence and intensity

In this study the overall prevalence of urinary schistosomiasis was found to be 10.1%, this prevalence rate is classified by WHO as moderately endemic (>10% <50%)[11]. This study has revealed that there is no much change in prevalence compared to the earliest study done in Gwagwalada 23 years ago which showed a prevalence rate of 10.3%[12], however the prevalence is much lower than what was reported (31.3%) in the FCT 9 years ago by Casmir IC etal [8]. Other studies reported prevalence rate of 55.0% in Guma Benue[13], 30.5% in Keffi Nasarawa[14]. The finding is however higher than 1.5% as reported by Akpan S.S etal in Ikom Cross River[15]. Compared to findings in other African countries, the prevalence in this study is higher than that reported in Malawi (6.9%)[16], but lower than findings in Kumba Cameroun (32.1%)[17]and Zimbabwe (60%)[18].

The mean egg intensity in this study was found to be 30.0 ± 17.2 SD with highest intensity being 59 eggs/10ml and the lowest intensity of 8 eggs/10ml. Other studies by Atalabi et alreported mean egg intensity of 25.0 eggs/10ml urine ± 71.5 SD around Zobe dam Kastina[19], 1.11eggs/10ml urine in Abeokuta Ogun by Ekpo UF[20].

Among infected subjects, prevalence of light intensity of infection (73.5%) was significantly higher than heavy intensity (26.5%) and this is similar to other studies that reported a higher prevalence of light intensity (86.6%) relative to heavy intensity (13.3%) in Guma Nasarawa[13], light intensity (55.3%), heavy intensity (44.7%) in Ajase-Ipo Kwara[21], light intensity (94.4%), heavy intensity (5.6%) around Abua Rivers[22].

Prevalence and intensity in relation to age and sex

Highest prevalence of *S.haematobium* was in age group 15-17 (25.0%) followed by age group 12-14 (19.6%) with statistical significance. Other studies reported highest prevalence among age group 6-12 years in Gwagwalada Abuja[12], 9-12 years (19.1%) at Abua Rivers state[22], 9-12years (2.6%) in Ikom Cross River[15], 13-15 years (67.5%) around Zobe dam Kastina[19], and 11-13 (24.8%) in Nguru Yobe[23].

Highest mean intensity (33.9eggs/10ml urine), Light intensity (13.0%) and heavy intensity (6.5%) were in age group 12-14 years however, with no statistical significance in mean intensity (P > 0.05). A study done around Zobe dam Kastina reported highest mean intensity of 28.9eggs/10ml urine among children within age group 10-12years with statistical significance (P<0.05)[19]. Other studies reported a higher intensity among age groups 9-12years (15.6%) in Ajase-Ipo Kwara[22], 11-15years (27.8%) Guma Nasarawa[13] with no statistical significance (P>0.05).

Boys had a higher prevalence (15.9%) and mean intensity(30.7eggs/10ml urine) compared to girls (4.2% prevalence with mean intensity 27.1eggs/10ml urine) with

statistical significance of (P=0.001) but no significance in mean intensity (P>0.05) between them. This is comparable to a similar study done around Zobe dam Kastina which reported a higher prevalence (55.8%) and intensity (28.7 eggs/10 ml of urine) among boys compared to girls (2.83 eggs/10 ml of urine).[19]Similarly studies done in Ajase-Ipo Kwara[22], Guma Nasarawa[13], and Ezza-North Ebonyi corroborated this findings.[24] However, some studies reported equal to or higher prevalence among girls (59.2%) than in boys (57.1%) in Abeokuta Ogun[25],girls (15.5%) and boys (15.0%) in Keffi Nasarawa[14] with no statistical signifcance. Possible explanation for the higher prevalence and intensity in boys than girls could be attributed to the adventurous nature of boys.

Prevalence in relation to ethnicity

Based on ethnicity, the highest prevalence was observed among the Nupe respondents (19%), Gbagyi (17.6%) and Idoma (14.8%) ethnic groups. However, there was no statistical significance in prevalence amongst them. (P > 0.05**).**Though majority of the study participants were Igbo's, (19.6%) there was zero prevalence of infection in this ethnic group. The Bassa's are one of the predominant ethnic groups in the community made up of 8.3% of the respondents with the prevalence of urinary schistosomiasis amongst them at (10.7%).

Conclusion/Recommendation

Overall prevalence of urinary schistosomiasis was 10.1%with amean egg intensity of 30ova/10ml urine sample ± 17.2SD. Light intensity (73.5%) was significantly higher than heavy intensity (26.5%). Similar to other studies, this study identified age, sex, type of school, the highest prevalence of urinary schistosomiasis was seen among pupils in age group 15-17 (25%), boys (15.9%), children in the public school (15.6%).

Based on the findings of this study, an integrated approach to the eradication of urinary schistosomiasisis recommended to the Government, the schools and the community as follows-:

Creation of public awareness on the dangers of this disease and its mode of infection is important towards the control of schistosomiasis

Creation of barrier to prevent the children from gaining access to play in the river

Provision of sustainable chemotherapeutic intervention with Praziquantel® to reduce its prevalence below the threshold of public health significance.

Acknowledgement

The authors wish to acknowledge and appreciate the cooperation of those school children that make up the study population.

References

1. Cooks G. Manson's Tropical Disease. Bath Press, Avon, Great Britain. 1996; 321-341.
2. WHO. The Control of Schistosomiasis. WHO, Geneva. 1985; Report of A WHO Expert Committee, Technical Report Series. 728.
3. King CH, Dickman K, Tisch DJ. Reassessment of The Cost of Chronic Helminthic Infection; A Meta-analysis of Disability-Related Outcomes in Endemic Schistosomiasis. Lancet, 2005; 365 [9470]: 156.
4. Hottez PJ, Kamath A. Neglected Tropical Diseases in Sub Saharan Africa: Review of Their Prevalence, Distribution and Disease Burden. Plos Neglected Tropical Disease. 2009; 3(8): 42.
5. WHO. Prevention and Control of Schistosomiasis and Soil Transmitted Helminthiasis. WHO Technical Report Series.1999; No.912: i-vi WHO Geneva. Pp. 79-55.
6. Chitsulo L, Engels D, Montresor A, Savioli L. The global statusof schistosomiasis and its control. Acta Trop 77(1) (2000): 41-51.
7. AbdulkadirA, Ahmed M, AbubakarBM, Suleimana,I.E. et'al; Prevalence of urinary schistosomiasis in Nigeria, 1994–2015: Systematic review and meta-analysis. Afr J Urol (2017).
8. Ifeanyi CIC, Matur BM, Ikeneche NF. Urinary Scistosomiasis and Concomitant Bacteriuria in the Federal Capital Territory Abuja Nigeria. New York Science Journal. 2009; 2(2): 1-8.
9. Adetokunbo OL, Herbert MG. Short Textbook of Public Health Medicine for The Tropics. Hodder Arnold Group. 4th Edition. 2003; Pp143.
10. McCarthy J, Lustigman S, Yong GJ. A Research Agenda for Helminth Disease of Humans: Diagnostics for Control and Elimination Progress. Journal. Pntd.0001601.S003.
11. 11.WHO Expert Committee. Prevention and control of schistosomiasis and soil-transmitted heliminthiasis.World Health Organ Tech Rep Ser. 2002; 912: 1-57.
12. Azare BA. Prevalence and Intensity of Urinary Schistosomiasis in Gwagwalada F.C.T. Using School Children as Tracers. Global Journal of Pure and Applied Sciences. 2000. 6;(3)553-556
13. Amuta EU, Houmsou RS. Prevalence, intensity of infection and risk factors of urinary schistosomiasis in preschool and school aged children in Guma Local Government Area, Nigeria. Asian Pacific Journal of Tropical Medicine. 2014. 34-39.
14. Ishaleku D, Yako AB, Usman D, Azamu SA.*Schistosoma haematobium* Infections among school children in Keffi Town, Nasarawa State, Nigeria.Scholarly Journal of Medicine. 2012. 2(7). 104-107.
15. Akpan, S. S, Dike, P.C and Mbah, M.The Prevalence of Urinary Schistosomiasis among School Children in Nkarasi and Edor Communities in Ikom Local Government Area of Cross River State, Nigeria.Pyrex Journal of Medicine and Medical Sciences. 2017; 4 (1) 1-4.

16. Bowie C, Purcell B, Shaba B, Makaula P, Perez M. A national survey of the prevalence of schistosomiasis and soil transmitted helminths in malawi. BMC Infect. 2004; Dis 4: 49.
17. Sama MT, Oyono E, Ratard RC. High risk behaviours and schistosomiasis infection in Kumba, Southwest Province, Cameroon. Intl J Environ Res Public Health. 2007;4: 101-105.
18. Brouwer KC, Munatsi A, Ndhlovu PD, Wagatsuma Y, Shiff CJ. Urinary schistosomiasis in Zimbabwean school children: predictors of morbidity. Afr Health Sc. 2004; 4: 115-118.20. 58.
19. 19.Atalabi TE, Lawal U and IpinlayeJS.Prevalence and intensity of genito-urinary schistosomiasis and associated risk factors among junior high school students in two local government areas around Zobe Dam in Katsina State, Nigeria, Parasites & Vectors.2016 9:388.
20. Ekpo UF, Laja-Deile A, Oluwole AS, Sam-Wobo SO, Mafiana CF. Urinary schistosomiasis among preschool children in a rural community near Abeokuta, Nigeria. Parasites&Vectors.2010; 3:58.
21. 21.Bolaji OS, Elkanah FA, Ojo JA, Ojurongbe O, Adeyeba OA. Prevalence and Intensity of *Schistosoma haematobium* among school children in Ajase-Ipo, Kwara State, Nigeria.Asian Journal of Biomedical and Pharmaceutical Sciences.2015; 5: 06-11.
22. Goodhead DA, Dirisu CG. Prevalence of Urinary Schistosomiasis among Pupils in Endemic Communities of Rivers State, Nigeria.American Journal of Microbiology and Biotechnology.2016. 3 7-12.
23. Dagon AG. Prevalence of *Schistosoma haematobium* among selected Tsangaya school children in Nguru, Local Government Area, Yobe State, Nigeria.Merit Research Journal of Environmental Science and Toxicology 2014. 2(6) 129-134.
24. 24.Nwosu DC, Obeagu, Emmanuel I, Ozims SJ, Ezeama MC, Uduji HI. Prevalence of Urinary Schistosomiasis Infection among Primary School Pupils InEzza-North Local Government Area of Ebonyi State. Int.J.Curr.Microbiol.App.Sci.2015 4(5): 1151-1157.
25. Ekpo UF, Laja-Deile A, Oluwole AS, Sam-Wobo SO, Mafiana CF. Urinary schistosomiasis among preschool children in a rural community near Abeokuta, Nigeria. Parasite&Vectors.2010; 3:58.

How to cite this article

AEO Biyaya Beatrice Nwankwo1
Microbioz Journals, Journal of Microbiology and Biomedical Research 5 (2)