



Prevalence of schistosomiasis among primary school pupils in Guma LGA of Benue state

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Abstract

A study was carried out to determine prevalence of Schistosomiasis among primary school pupils in Guma Local Government Area (LGA) of Benue State. Parasitological screening was carried out on 643 pupils, 455 (70.8%) males and 188 (29.2%) females. Out of the total figure, 352 tested positive [252 (55.4%) males and 100 (53.2%)] for the infection. There was also a significant difference in the prevalence rate in the male and female population with the males having higher infection than females, (X^2 cal = 6.61 > X^2 crit. = 5.99 at $p \leq 0.05$ and 2df). The prevalence of the infection was significantly higher in Yelwatta (68.0%) than Gbajimba (51.1%) and Daudu (50.4%), (X^2 cal = X^2 crit. = 5.99 at $p \leq 0.05$ and 2 df). The intensity of infection on the other hand was significantly higher in Daudu (39.2%) than Gbajimba (31.8%) and Yelwatta (29.0%), (X^2 cal = 11.83 > X^2 crit. = 5.99 at $p \leq 0.05$ and 2df). Individuals aged 6-10 years old were the most infected, and the intensity of infection was higher among males. To control urinary schistosomiasis infection, some managerial tools should be integrated to improve preventive strategies with emphasis on health education, information and communication.

Keywords: Prevalence, Schistosomiasis, Primary school pupils, Guma

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1. Introduction

Urinary schistosomiasis is caused by *Schistosoma haematobium* and it is reported as endemic in over 53 countries in the Middle East and most of the African continent (Chistulo et al., 2000). It is still known to be one of the major public health problems facing humanity, with severe social and economic consequences (World Health Organization, 1990). Schistosomiasis is one of the main occupational hazards encountered in the rural farming population of developing countries. It is one of the commonest water borne parasitic diseases of public health importance in the tropic and sub-tropic countries. The disease can lead to chronic ill health condition and is considered as a major public health concern mostly in rural dwellers of tropical and sub-tropical regions of the world (Amuta and Houmsou, 2014). It is second to malaria amongst the six most important tropical endemic diseases (Okpala et al., 2004). In schistosomiasis, the various snail intermediate hosts are found in fresh water, stream and riverine areas used for irrigation and fish farming. These stages takes place in those

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intermediate hosts were human water contact is equally high (Olusanya et al., 1998). Nigeria is one of the countries known to be highly endemic for urinary schistosomiasis with estimated 101.28 million persons at risk and 25.83 million people infected (Chistulo et al., 2000). Accordingly, the estimates for mortality and morbidity in affected populations are high with school age children usually having the highest prevalence and intensity (Okoli and Odaibo, 1999; and World Health Organization, 2002). Although an infection with schistosomes does not always result in clinical disease, quite often, the infection assumes an absolutely asymptomatic nature. Persons with these infections in resource-constrained tropical areas of the world often present for care with severe illness only after complications have developed (Latif, 2004). According to Umeh et al. (2001), the disease is an important determinant of weakness, nausea, and loss of weight, disability, morbidity and attrition. Urinary schistosomiasis, therefore, ranks high among parasitic diseases in terms of socioeconomic and public health importance in tropical and subtropical areas. Unfortunately, not much has been achieved in the control of urinary schistosomiasis in the country, largely because the disease is mainly a rural occupational disease that affects people engaged in agriculture, fishing or water related occupations and other people residing in rural agricultural and periurban areas (Nmorsi et al., 2005). The aim is to determine the prevalence of Schistosomiasis in the study area and establish the relationship between age, sex and locality.

2. Materials and methods

2.1. Study area

Guma Local Government Area (LGA) is located between longitude 6° E and 9° E of the Greenwich meridian and Latitude 6° N and 8° N of the equator. It is bounded by Logo LGA to the East, Makurdi LGA and Tarka LGA to the South, Awe LGA of Nasarawa State to the West and Keana LGA to the North. The climate of the area is tropical and the vegetative characteristics are predominantly low land rainforest with an average temperature of 30° C.

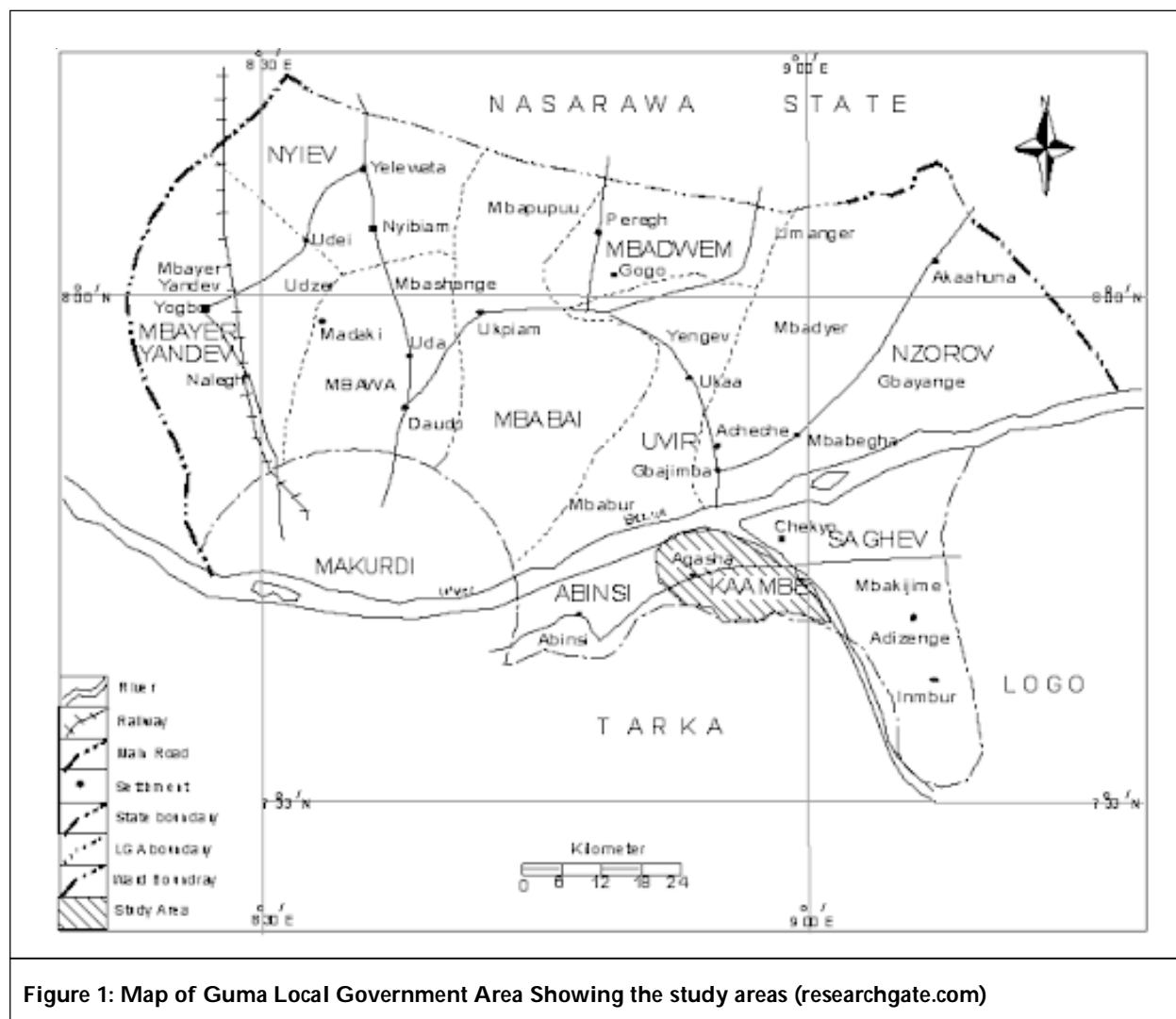


Figure 1: Map of Guma Local Government Area Showing the study areas (researchgate.com)

2.2. Study population

A total of nine primary schools were randomly selected from the three zones including Gbajimba, Daudu and Yelwatta, a total of 643 pupils were screened for urinary Schistosomiasis between the ages of 5-20 years with respect to age and sex.

2.3. Sampling techniques

Sterile sample bottles were provided to the pupils who collected about 20 ml of clean midstream urine samples between 10.00 h and 14.00 h since eggs output reach peak value at this time of the day (WHO, 2003). The specimens were labeled appropriately with identification numbers and packed in a thermo cool flask loaded with ice packs to prevent egg hatching by adding two drops of 10% formaldehyde (World Health Organization, 2003; and Cheesebrough, 1998).

2.4. Laboratory analysis

The urine concentration technique was used in screening the samples (Theinpoint et al., 1986) through sedimentation by centrifugation. 10 ml of each urine sample was centrifuged at 500 rpm for 5 min. Thereafter, the supernatants were discarded and the sediments transferred onto a clean microscope slide by the use of a suction tube covered with a clean slip and examined for the eggs of *S. haematobium*. The result was analyzed as the number of eggs/10 ml of urine and was categorized as light (≤ 50 eggs/10 ml of urine) and heavy (≥ 50 eggs/10 ml of urine) according to school, age, sex and water contact activities of the pupils. A few drops of saponin solution were added to samples with visible haematuria to enhance clarity of eggs in microscopy. Data was presented in tables and differences were evaluated using the chi-square test for inference.

3. Data presentation and statistical analysis

Data were presented in tables, figures and graphs. Differences in proportion were evaluated using the chi square test.

4. Results

In Gbajimba study area, a total of 219 pupils were screened for urinary schistosomiasis infection (167 males and 52 females). Among the total population screened 112 (51.1%) tested positive (87 (52.0%) males and 25 (48.0%) females). The highest infection was recorded at Nomadic school (59.6%) followed by Cornerstone Nursery and Primary School (57.4%) and LGEA Central Primary School recorded the least infection of 48.5% as presented in Table 1. The male population was more exposed to the infection (52.0%) than the female (48.0%). Statistical analysis showed no significant difference in the prevalence of Schistosomiasis in Gbajimba study area ($\chi^2_{cal} = 1.67 < \chi^2_{crit} = 5.99$ at ≤ 0.05 and 2df)

Figure 1 showed that the prevalence of Schistosomiasis infection in Gbajimba increased from 0-5 years to 6-10 years of age were more exposed to the infection. There was a gradual decrease in infection from 11 -15 years to 16-20 years.

Table 1: Prevalence of Schistosomiasis infection in Gbajimba area in relation to sex and school

Schools	Male			Female			Total		
	No. Tested	No. +ve	%	No. Tested	No. +ve	%	No. Tested	No. +ve	%
LGEA	85	44	51.7	20	9	45.0	105	53	48.5
Cornerstone	32	18	56.2	15	7	46.0	47	25	57.4
Nomadic	50	25	50.0	17	9	52.9	67	34	59.6
Total	167	87	52.0	52	25	48.0	219	112	51.1

Note: $\chi^2_{cal} = 1.67$, $\chi^2_{crit} = 5.99$, $df = 1 \times 2 = 2$, $p \leq 0.05$; **Key:** No. – Number, χ^2 – Chi Square, +ve – Positive cases, % - Percentage

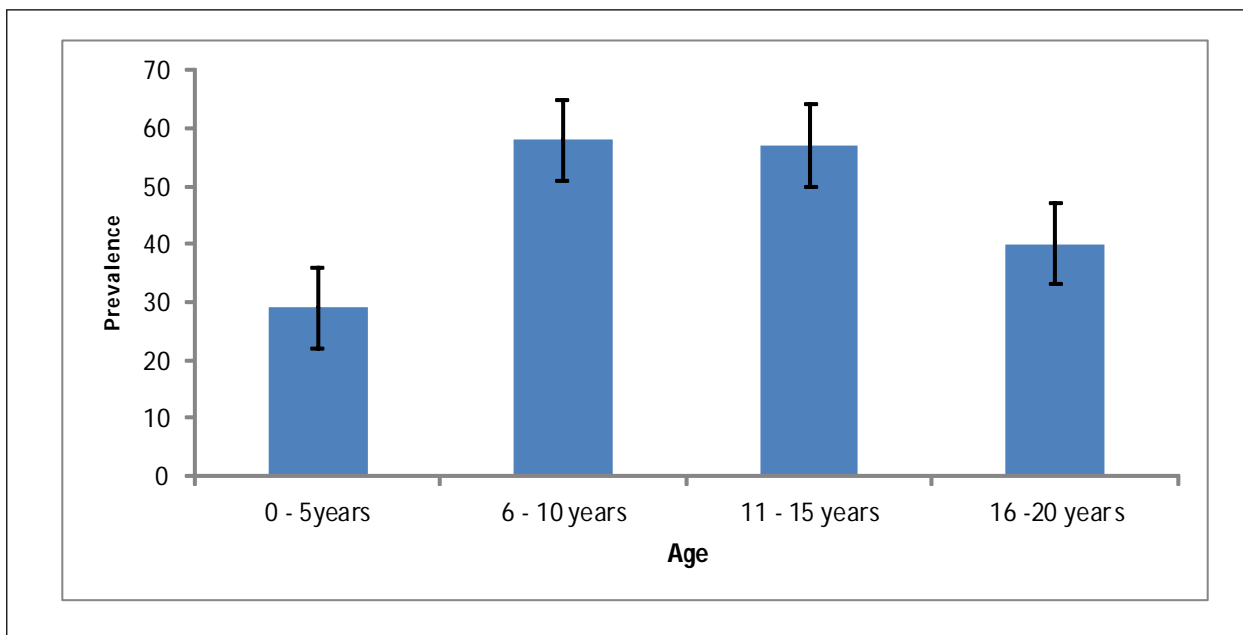


Figure 2: Prevalence of Schistosomiasis infection in relation to age in Gbajimba

In Daudu study area, 274 pupils (188 males and 86 females) were screened for urinary schistosomiasis. Of the screened population, 138 (50.4%) tested positive for the infection {97 (51.5%) males and 4 (47.6%) females}. The result is presented in Table 2 which shows that the male population was highly infected than the females 51.5% vs 47.6%. RCM Primary School was more exposed to the infection (56.8%) than LGEA with (51.2%) and Alaki Nursery Primary School (40%). There was no significant difference in the prevalence of Schistosomiasis infection in Daudu study area in relation to sex and school (χ^2 cal = 4.32 χ^2 crit = 5.99 df = 1×2 = 2 $p \leq 0.05$)

The presentation in Figure 2 shows that pupils between 6-10 years were more exposed to the infection than any other age group.

Table 2: Prevalence of Schistosomiasis infection in Daudu study area in relation to sex and school

Schools	Male			Female			Total		
	No. Tested	No. +ve	%	No. Tested	No. +ve	%	No. Tested	No. +ve	%
LGEA	86	47	54.6	35	15	42.8	121	62	51.2
RCM	62	36	58.0	26	14	53.8	88	50	56.8
Alaki	40	14	35.0	25	12	48.0	65	26	40.0
Total	188	97	51.5	86	41	47.6	274	138	50.4

Note: χ^2 cal = 4.32, χ^2 crit = 5.99, df = 1×2 = 2, $p \leq 0.05$; **Key:** No. - Number, χ^2 - Chi Square, +ve - Positive cases, % - Percentage

In Yelwatta study area, 150 pupils (100 males and 50 females) were screened for urinary schistosomiasis. Of the screened population, 102 (68.0%) tested positive for the infection {68 (68.0%) males and 34 (68.0%) females}. The result is presented in Table 3 which shows that RCM Primary School was more exposed to the infection (73.5%) than LGEA with (62.5%) and Baptist Nursery Primary School (60%). There was no significant difference in the prevalence of Schistosomiasis infection in Yelwatta study area in relation to sex and school (X^2 cal = 0.99 X^2 crit = 5.99 df = 1×2 = 2 $p \leq 0.05$).

In Figure 3, pupils of ages between 6-10 years were more exposed to the infection; there was a steady decrease in infection with increase in age.

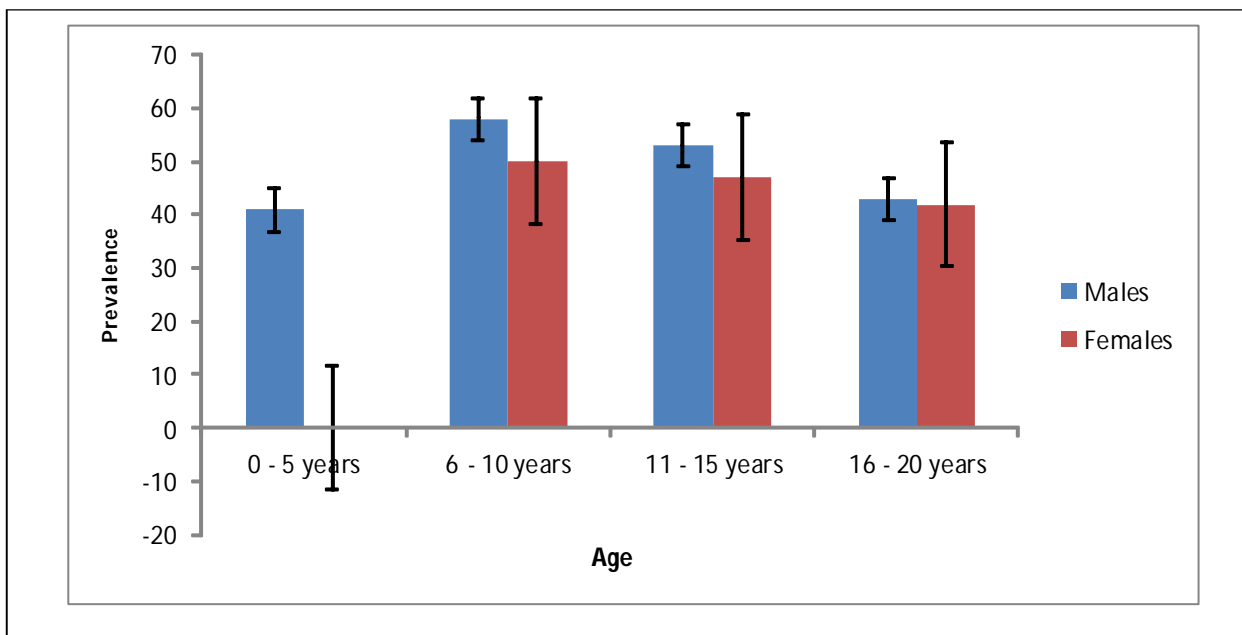


Figure 3: Prevalence of Schistosomiasis infection in relation to sex and age in Daudu

5. Discussion

The study revealed 54.7% overall prevalence of the schistosomiasis infection in the study area. This agrees with Bajah (2004) in Katsina-Ala Township, Banke (1995) around Katsina-Ala River Basin, Okon and Emenayon (2006) in Adim Community Cross River State and Orpin et al. (2016).

Schools	Male			Female			Total		
	No. Tested	No. +ve	%	No. Tested	No. +ve	%	No. Tested	No. +ve	%
RCM	58	43	74.1	25	18	72.2	83	61	73.5
Baptist	22	13	59.1	13	8	61.5	35	21	60.0
LGEA	20	12	60.0	12	8	66.7	32	20	62.5
Total	100	68	68.0	50	34	68.0	150	102	68.0

Note: χ^2 cal = 0.99, χ^2 crit = 5.99, df = 1x2 = 2, $p \leq 0.05$; **Key:** No. – Number, χ^2 – Chi Square, +ve – Positive cases, % - Percentage

The result also showed that, males had higher prevalence rate than the females which also agree with the works of (Okoli and Odaibo, 1999; Bello et al., 2003; Anum et al., 2014; and Orpin et al., 2017). The higher infection in males is due to higher water contact activities by the male pupils where they easily expose themselves to the infested water than the female particularly in activities like swimming, fishing and hunting of snails which are the intermediate host for the infection.

The likely reason for the trend of infection presented in Gbajimba may be that, Nomadic School is closest to the River bank than any of the other Primary Schools and as such water activities are very high. Apart from that, lack of good water supply is also a challenge for domestic and recreational activities in the School which makes the infection transmission very high because of activities at the water banks (Secor et al., 1996). Cornerstone and LGEA schools also recorded high infection; the schools are situated in rural areas which lack all basic amenities.

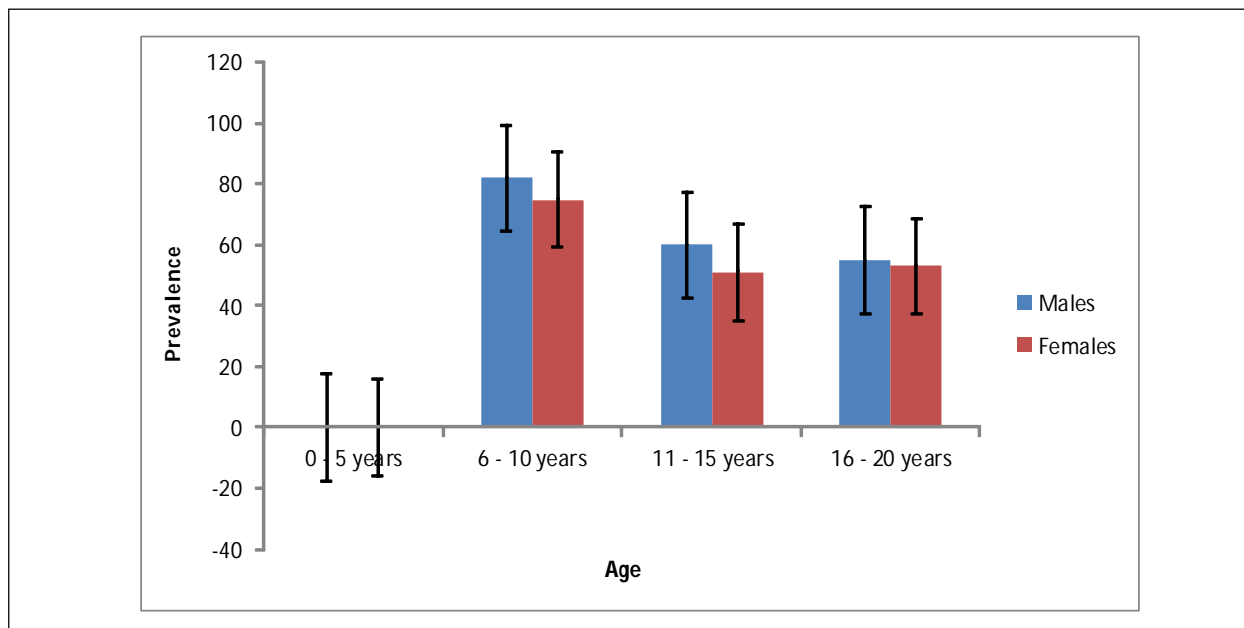


Figure 3: Prevalence of Schistosomiasis infection in Yelwatta in relation to age and sex

A steady rise of the infection was observed from pupils of 0-5 years and reached its peak within the 6-11 years old, this agrees with the works of Uneke *et al.* (2007) in Ebonyi State, Agbolade and Odaibo (Agbolade and Odaibo, 1996) in Ogun State. In other studies, peak prevalence was reported as follows 10-14 years, 11-14 years, 9-11 years and 10-19 years by Bello *et al.* (2003), Ekejindu *et al.* (1999), Abolarinwa (1999), and Okon and Umeache (2003). At these ages, young boys and girls are emerging from late childhood to adolescence and their involvement in strenuous work which increases the chances of disease transmission.

In Daudu area, the prevalence of infection was more in RCM Primary School and LGEA and the least was recorded in Alaki N/P School. The exposure of RCM Primary School and LGEA been high in prevalence was because the schools are close to a stream which supplies water to the entire village. Secondly, both schools are public schools attended by wards of low income earners. In addition, the pupils are not restricted in any way and are not checked in their movement even during break time and after school hours. The reason why Alaki N/P School has the least prevalence is probably because the pupils come from families of high income earners and are conscious of personal hygiene and sanitation.

The result also revealed that the males were more exposed to the infection than the females which agrees with the research carried out by Anum *et al.* (2014) and Uneke *et al.* (2007) both in Nigeria, Nduomugyeinyi and Minijias (2001) in Tanzania and Yapi *et al.* (2005) in Cote D Ivoire.

The trend of gradual increase from 0-5 years and peak of infection at 6-10 years and then a decrease with increase in age is as a result of individual's acquisition of body immunity with age. In similar studies, Umeh *et al.* (2001) reported higher prevalence among younger age group of between 10-15 years and attributed frequent visit to the open bodies of water, poor knowledge of the infection and general low education of the epidemiology of the disease transmission.

In Yelwatta area, the results showed high prevalence rates in both RCM and LGEA Schools which are all public schools than Baptist School. This is likely because public schools do not have much restriction on the pupil's movements together with poor knowledge of the disease and general low education attainment of the people in the entire area.

There was however no significant difference in the rate of exposure between the male and female population. The results reflected increased exposure with the age group of 0-5 years and reached its peak at the age of between 6-10 years and then decreased with increase in age owing to naturally acquired body immunity.

Considering the results obtained in the area, the infection rate falls within the WHO classification as endemic (World Health Organization, 2002). Other reports by Banke (1995); Bajah (2004) and Umeh *et al.* (2001) may be related to the common geographical features of the areas which do not have abundant streams,

tributaries, ponds and intensive water activities like washing of clothes, swimming and bathing are on the increase.

This present study supports a number of previous reports which have consistently shown an upsurge in Schistosomiasis infection particularly in the rural areas with school age children at greater risk (Orpin *et al.*, 2017; and Bello and Edungbola, 1992).

Poverty, ignorance, poor living conditions, inadequate sanitation and water supplies as well as deplorable personal and environmental hygiene which are the characteristics of many rural countries were identified as important factors exacerbating the transmission of schistosomiasis. Indiscriminate disposal of human sewage and lack of portable water are other factors that may be responsible for the endemicity of the disease in the study area.

6. Recommendations

The epidemiology of Schistosomiasis is only partially known in spite of efficient control tools being available, no clear control strategies and drugs are in place or available to endemic communities. As a public health measure, it is recommended that schistosomiasis control measures be enhanced the capacity of health services be strengthened with emphasis on integration of control and decentralization of decision making and delivery (World Health Organization, 1990).

References

- Chistulo, L., Eagles, D., Montresor, A. and Saviola, L. (2000). *The global status of schistosomiasis and its control. Acta Tropical, 77, 41-51.*
- World Health Organization. (1990). *Report of the WHO Informal Consultation on Schistosomiasis Control WHO/CDS/CPC/SIP/99.2 for WHO, Geneva.*
- Amuta, E.U. and Houmsou, R.S. (2014). *Prevalence intensity of infection and risk factors associated with the transmission of schistosomiasis. Global research Journal of Medicine, 65, 74-102.*
- Okpala, H.O., Agba, M.I., Chimezie, O.R., Nwobu, G.O. and Ohimion, A.A. (2004). *A survey of the prevalence of schistosomiasis among pupils in apata and laranto areas in Jos, Plateau state. Journal of Health Applied Science, 1, 1-14.*
- Olusanya, I., Shonekan, O.O. and Odionu, F.A. (1998). *Schistosomiasis progress in clinical biological research. 162A, 95-143.*
- Okoli, E.I. and Odaibo, A.B. (1999). *Urinary schistosomiasis among school children in Ibadan, an Urban Community in south-western Nigeria. Tropical Medicine and International Health, 4, 308-315.*
- World Health Organization. (2002). *Prevention and control of schistosomiasis and soil transmitted helminthiasis. WHO Technical Report Series. No. 912: I-IV. WHO, Geneva.*
- Latif, A.S. (2004). *Urogenital infections in the tropics. The Australian College of Tropical Medicine, 28, 150-156, available at www.triompmed.org/primer/chapter08... on May 28, 2008.*
- Umeh, J.C., Umeh, E.U. and Banke, R.O.K. (2001). *Impact of urinary schistosomiasis on the rural labour use. Development Africa Consortium, 14, 37-46.*
- Nmorsi, O.P.G., Egwunyenga, O.A., Ukwandu, N.C.D. and Nwokolo, N.Q. (2005). *Urinary schistosomiasis in a rural community in Edo state, Nigeria: Eosinophiluria as a diagnostic marker. African Journal of Biotechnology, 4(2), 183-186.*
- World Health Organization. (2003). *A Manual of Basic Techniques for a Healthy Laboratory. 2nd Edition. WHO, Geneva. 400 pp.*
- Cheesebrough, M. (1998). *District Laboratory Practice in Tropical Countries. Part 1: Cambridge University Press, London. 560 pp.*
- Theinpoint, D., Rochette, F.V. and Vanpariys, O.F.J. (1986). *Diagnosing helminthiasis by chronological examination. Research Foundation, Belgium. 157pp.*

- Bajah, D.J. (2004). Occurrence of urinary schistosomiasis among selected primary school pupils in katsina-ala township Benue state Nigeria. NCE Project Report Submitted to Biology Dept. College of Education Katsina-Ala (Unpublished).
- Banke, R.O.K. (1995). Study of some aspects of the epidemiology of sub-urban and rural urinary schistosomiasis in Katsina – Ala Basin of Nigeria. University of Jos Ph.D Thesis (Unpublished) 103 pp.
- Okon, O.E. and Emenayon, A.I. (2006). Reliability of self-reported blood in urine for diagnosis of *Schistosoma haematobium* in Adim Biase LGA, Cross River state, Nigeria. *Ghana Journal of Science*. (in press).
- Orpin, J.B., Manyi, M.M., Bem, A.A. and Mzungu, I. (2016). Prevalence of urinary schistosomiasis in oju local government area of Benue state Nigeria. *FUDMA Journal of Science and Educational Research*, 2(1), 35-43.
- Okoli, E.I. and Odaibo, A.B. (1999). Urinary schistosomiasis among school children in Ibadan, an Urban Community in south-Western Nigeria. *Tropical Medicine and International Health*, 4, 308-315.
- Bello, Y.M., Adamu, T., Abubakar, U. and Muhammed, A.A. (2003). Urinary schistosomiasis in some villges around the Goronyo Dam, Sokoto state. *Helminthologia*, 24, 109-114.
- Anum, T., Orpin, J.B., Bem, A.A., Mzungu, I. and Aliyu, Y. (2014). Human water contact behaviour and schistosoma haematobium infection among primary school Pupils in Guma LGA of Benue state. *Journal of Pharmacy and Biological Sciences*, 9(4), 147-151.
- Orpin, J.B., Bem, A.A. and Usman, A. (2017). Prevalence of urinary schistosomiasis in selected secondary school students of faskari local government area, Katsina state. *FUDMA Journal of Sciences*, 1(1), 7-11.
- Secor, W.E., Del Cerral, H., Reis, M.G., Ramos, E.A., Zimon, A.E., Matos, E.P., Reis, M.E., Do Carmo, T.M., Hirayama, K., David, R.A., David, J.R. and Harn, D.A. Jr. (1996). Association of hepatosplenic Schistosomiasis with HLA-D0B1 0201. *Journal of Infectious Diseases*, 174, 1331-1135.
- Uneke, C.J., Oyibo, P.G., Ugwuoro, C.D.C. and Nwanokwai, A.P. (2007). Urinary schistosomiasis among school age children in Ebonyi state, Nigeria. *The Internet Journal of Laboratory Medicine*, 1, 1-11. Retrieved from www.ispub.com/ostia/index.../schisto.xml on May 7, 2008.
- Agbolade, O.B. and Odaibo, A.B. (1996). *Schistosoma haematobium* infection among Pupils and Snail intermediate hosts in ago – Iwoye. *Nigerian Journal of Parasitology*, 17, 17-21.
- Ekejindu, I.M., Onyali, I.O., Ozuma, N.A. and Ibe, C.C. (1999). Prevalence and intensity of urinary schistosomiasis in Agulu, Anambra state. *Nigerian Journal of Parasitology*, 20, 71-76.
- Abolarinwa, S.O. (1999). Urinary schistosomiasis in children in esie community, Kwara state, Nigeria. *Nigerian Journal of Parasitology*, 20, 77-80.
- Okon, O.E. and Umeache, N. (2003). Distribution of urinary schistosomiasis among high school students in Otukwang Obudu, Cross River state. *Global Journal of Medical Sciences*, 2(1), 19-22.
- Nduomugenyi, R. and Minjas, J.N. (2001). Urinary schistosomiasis in school children in Dar-es-salam, Tanzania and the factors influencing its transmission. *Annals of Tropical Medicine and Parasitology*, 95, 697-706.
- Yapi, Y.G., Briet, O.J., Diabetes, S., Vounatson, P., Akodo, E., Tanner, M. and Teuscer, T. (2005). Rice irrigation and schistosomiasis in savannah and forest areas of Cote d'Ivoire. *Acta Tropical*, 33, 219-224.
- Bello, A.B. and Edungbola, L.D. (1992). *Schistosoma haematobium*: a neglected common parasitic disease of childhood in Nigeria. *Incidence and Intensity of Infection. Acta Paediatric*, 81, 601-604.

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