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Prevalence of Intestinal Schistosomiasis Among School Children in Shelleng Local Government Area, Adamawa State, Nigeria

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*Department of Zoology, School of Pure and Applied Sciences, Modibbo Adama University of Technology, Yola, Nigeria**Author for Correspondence: +234-816-657-6496/nachae25@gmail.com***Abstract**

Schistosomiasis or bilharzia is carried by freshwater snails is a global public health challenge and affects over 240m people globally with an estimated 200,000 deaths annually. The research on prevalence of intestinal schistosomiasis among school children was carried out in Shelleng due to the type of settlement as a riverine area. Stool samples were collected from the month of March-April 2019 and examined in the laboratory. Both saline wet mount procedure and formalin-ether concentration techniques were used. Data was analyzed using SPSS version 22. The overall prevalence was (0.9%) and the intensity of infection was (0.0%) of the 442 study participants examined. There were no gender-related differences in the prevalence ($p < 0.05$). The age group 8 – 10 years had the highest prevalence (1.1%) followed by the age group 11 – 13 years (1.0%) while other age groups had (0.0%). Prevalence based on parent's level of education (PE) indicated that, children whose parents had secondary education had the highest prevalence rate (6.1%) the least were children whose parent had primary education with prevalence rate of (0.0%), statistically there was a significant difference ($p < 0.05$). Information recorded on parent occupation (PO) reveals that, children whose parents are civil servants had the highest infection of (1.3%) followed by children whose parents are farmers with (1.0%). The least infection rate was recorded among children whose parents are in to fishing (0.7%), there was no significant difference ($p < 0.05$). Information on praziquantel administered, water contact and

snail contact. Children that refused to take praziquantel chose (No) while those that took praziquantel chose (Yes) in the questionnaire. Children that chose (No) had the highest prevalence of (1.7%) while those that chose (Yes) had low prevalence (0.8%). Subjects that chose (Yes) in picking of snails had the highest rate of (1.1%). Subjects chose (Yes) for washing/bathing/swimming/drinking (WBSD) had the highest prevalence (1.4%) while (No) had the lowest prevalence (0.0%) and (0.0%) ($p < 0.05$). The prevalence rate was low generally due to the administration of praziquantel ten (10) days before stool samples were collected for microscopy. I recommend integrated method of control and treatment of the water bodies which is the source of infection to avoid re-infection.

Keywords: *Prevalence, Schistosomiasis, Shelleng, Stool, Parasite, praziquantel administration.*

Introduction

Schistosomiasis belongs to the group of helminth infections of the intestines or the urinary tract maybe infected (WHO, 2014). In Nigeria, *Biomphalaria* and *Bulinus* species of snails are involved in the transmission of schistosomiasis (Idris and Ajanusi, 2002). The disease is spread by contact with fresh water contaminated with the parasites. These parasites are released from infected freshwater snails. The disease is especially common among children in developing countries as they are more likely to play in contaminated water. Other high-risk groups include farmers, fishermen, and people using unclean water during daily living. The

urinary tract or the intestines may be infected with the parasite and symptoms include abdominal pain, diarrhoea, bloody stool, or blood in the urine. Those who have been infected for a long time may experience liver damage, kidney failure, infertility, or bladder cancer. In children, it may cause poor growth and learning difficulty (WHO, 2014). Although water is always present in most irrigation canals, which means constancy of water cancels rainfall effect, however, rainfall is presumed to facilitate transmission by washing the eggs of *S. mansoni* in faeces into water bodies (Idris and Ajanusi, 2002). Diagnosis is by finding eggs of the parasite in a person's urine or stool. It can also be confirmed by finding antibodies against the disease in the blood. Methods to prevent the disease include improving access to clean water and reducing the number of snails (WHO, 2014). There is paucity of data on the risk of intestinal Schistosomiasis among school children in Shelleng Local Government Area, Adamawa State, Nigeria. The aim of the study was to investigate the prevalence and sociodemographic characteristics of intestinal Schistosomiasis among school children in Shelleng Local Government Area, Adamawa State, Nigeria.

Materials and Methods

Description of Study Area

Shelleng is a Local Government Area (LGAs) of Adamawa State, Nigeria. It is situated on latitude 9°53'5" N and longitude 12°0'32" E (Wikipedia, 2020). Kiri dam is located in Shelleng L.G.A. It was built in 1982 and has a capacity of 615 million m³ for hydroelectric generation, provision of water for irrigation of sugar cane for the Savannah Sugar Company (SSC); a large-scale sugar cane plantation and processing company set up as a joint venture between the Federal Government of Nigeria and the Commonwealth Development Corporation (CDC), London (USTDA, 2011). The major water supply to the dam is from Dadin Kowa dam in Gombe State, and it is a tributary to river Benue via River Gongola. Communities around the Kiri dam consists of clusters of compounds each surrounded by locally made mats and mud wall (Chessed *et al.*, 2017).

Data Collection

Data was obtained using structured questionnaire. Each participant was administered a questionnaire to collect data on socio-demographic factor. Faeces samples were collected from the month of March-April 2019 and examined in the laboratory for *Schistosoma* parasite.

Collection of Faecal Sample and Laboratory Procedure

Faecal Sample was collected in a wide-mouthed, sterilized clean, leak-proof plastic container without contamination with urine, water or disinfectants. The containers were labeled with identification numbers and names which were distributed to the participants to collect stool sample. Faecal sample was handled with care to avoid acquiring infection with parasite, bacteria, or viruses. Information about name, age, gender and the result of stool examination for each participant was recorded on the stool examination book by the researchers. Furthermore, quality of reagents and instruments were certified and validated by an experienced Medical Laboratory Scientist. Macroscopic and microscopic examination of the stool sample was carried out using saline wet mount procedures and formalin-ether concentration techniques (Arora and Brij, 2010).

Data Analysis

Socio-demographic data and its effect on the prevalence of intestinal Schistosomiasis was analyzed using SPSS version 22. A p-value of <0.05 was considered statistically significant in all statistical analysis.

Ethical Clearance

The ethical clearance was obtained from the ministry of health Adamawa State, Nigeria. Approval was also obtained from the village heads, and also the health workers. Verbal informed consent was sought from Head Master of each school and obtained from participants before their specimen was collected on each sampling day.

Results

Table 1 shows the p-value of the association between Stool Infection and Socio-demography. The overall prevalence was (0.9%) among the

442 study participants investigated. Table 2 shows that there were no statistically significant differences in the prevalence of intestinal Schistosomiasis based on gender ($p < 0.05$). The age group 8 – 10 years had the highest prevalence rate of the infection (1.1%) followed by the age group 11 – 13 years (1.0%) while other age groups had (0.0%). The difference however was not statistically significant ($p < 0.05$). There was a statistically significant difference in the prevalence of intestinal Schistosomiasis based on the parent level of education (PE) ($p < 0.05$). Children whose parents had secondary education had the highest prevalence rate (6.1%) followed by children whose parent had tertiary education with (0.7%), the least were children whose parent had primary education with prevalence rate of (0.0%). Information recorded on parent occupation (PO) reveals that, children whose parents are civil servants had the highest infection of (1.3%) followed by children whose parents are farmers with (1.0%). The least infection rate was recorded among children whose parents are in to fishing (0.7%), there was no significant difference ($p < 0.05$).

Table 3 reveals information on praziquantel administered, water contact and snail contact. Children that refused to take praziquantel chose (No) while those that took praziquantel chose (Yes) in the questionnaire. Children that chose

(No) had the highest prevalence of (1.7%) while those that chose (Yes) had low prevalence (0.8%) ($p < 0.05$). Those that chose (Yes) in picking of snails had the highest rate of (1.1%) while those that chose (No) had low prevalence of (0.6%). The prevalence however was not statistically significant ($p < 0.05$). For washing in the water body, those that chose (No) had the highest prevalence (1.1%) while (Yes) had the lowest prevalence of (0.0%) there was no significant difference ($p < 0.05$). For bathing/swimming (BS), participants that chose (No) had the highest infection rate (0.9%) while participants that selected (Yes) had (0.0%) ($p < 0.05$). Participants who selected (No) for washing/bathing/swimming (WBS) had the highest infection rate of (1.1%) while (Yes) had the lowest infection rate of (0.0%) ($p < 0.05$). Participants who selected (Yes) for Washing/Bathing/Swimming/Drinking (WBSD) had the highest prevalence (1.4%) while (No) had the lowest prevalence (0.0%) and (0.0%) ($p < 0.05$). For none of the above, (Yes) had (0.0%) for prevalence while (No) had the highest prevalence (0.9%), ($p < 0.05$). The prevalence rate was low generally due to the administration of praziquantel ten (10) days before stool samples were collected for microscopy.

Table 1: Association between Intestinal Schistosomiasis and Socio-demography

Variable	P-value
Gender	1.000*
Age	0.960*
PE	0.014**
PO	0.876*
Praziquantel	0.430*
Pick snails	0.555*
Washing	0.417*
BS	0.727*
WBS	0.404*
WBSD	0.132*
None	0.662*
Gender	1.000*

Key: * Means $p > 0.05$, ** means $p < 0.05$ and *** means $p < 0.01$

Table 2: Association between Intestinal Schistosomiasis and Gender, Age, Parent Education, and Parent Occupation

Variables	No. Examined	Not infected	No. Infected	Intensity of infection		
				Low*	High**	Very High***
Gender						
Male	221(100)	219(99.1)	2(0.9)	0(0.0)	0(0.0)	0(0.0)
Female	221(100)	219(99.1)	2(0.9)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
Age						
5-7	39(100)	39(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
8-10	175(100)	173(98.9)	2(1.1)	0(0.0)	0(0.0)	0(0.0)
11-13	202(100)	200(99.0)	2(1.0)	0(0.0)	0(0.0)	0(0.0)
14-16	26(100)	26(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
Parent Education						
Non formal	248(100)	247(99.6)	1(0.4)	0(0.0)	0(0.0)	0(0.0)
Primary	10(100)	10(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Secondary	33(100)	31(93.9)	2(6.1)	0(0.0)	0(0.0)	0(0.0)
Tertiary	151(100)	150(99.3)	1(0.7)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
Parent Occupation						
Business	136(100)	135(99.3)	1(0.7)	0(0.0)	0(0.0)	0(0.0)
Civil Servant	157(100)	155(98.7)	2(1.3)	0(0.0)	0(0.0)	0(0.0)
Farmer	105(100)	104(99.0)	1(1.0)	0(0.0)	0(0.0)	0(0.0)
Fishing	44(100)	44(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)

Table 3: Association between Stool Schistosomiasis and Praziquantel, picking of snails, Washing, Bathing/Swimming, Washing/ Bathing/ Swimming and Washing/ Bathing/ Swimming/ drinking

Variables	No. examined	Not infected	No. infected	Intensity of infection		
				Low*	High**	Very high***
Praziquantel						
Yes	382(100)	379(99.2)	3(0.8)	0(0.0)	0(0.0)	0(0.0)
No	60(100)	59(98.3)	1(1.7)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
Picking snails						
Yes	268(100)	265(98.9)	3(1.1)	0(0.0)	0(0.0)	0(0.0)
No	174(100)	173(99.4)	1(0.6)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
Washing						
Yes	62(100)	62(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
No	380(100)	376(98.9)	4(1.1)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
BS						
Yes	13(100)	13(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
No	429(100)	425(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
WBS						
Yes	65(100)	65(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
No	377(100)	373(98.9)	4(1.1)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
WBSD						
Yes	283(100)	279(98.6)	4(1.4)	0(0.0)	0(0.0)	0(0.0)
No	159(100)	159(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
None						
Yes	19(100)	19(100)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
No	423(100)	419(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)
Total	442(100)	438(99.1)	4(0.9)	0(0.0)	0(0.0)	0(0.0)

Discussion

The overall prevalence (0.9%) observed in this research work was low compared to other studies. This could be due to the mass administration of praziquantel to school children in the area. Mass drug administration (MDA) has helped to reduce morbidity but it is not adequate to abate transmission in many areas of the country (Oyeyemi *et al.*, 2020). As identified recently, the fight against schistosomiasis might

take a longer time than expected if there are no drastic changes in the current adopted control policy in Nigeria (Oyeyemi, 2020). Other researches carried out in Nigeria include; Dawaki *et al* (2016) in Kano State reported a prevalence of (8.9%), Usman and Babeker (2017) in Bauchi state 3 (9.7%), Obed *et al.* (2010) in Jos, Plateau State recorded 13 (4.6%), Ikpe *et al.* (2020) Benue State recorded (10.4%) and among patients attending two medical

centers in Yola, Adamawa State 11(13.4%) by Na'acha *et al.* (2017), Ivoke *et al.* (2014) in Ebonyi State (15.3%). It is evident from these reports that Nigeria can possibly be able to achieve schistosomiasis free country if the Government and NGOs will continue in MDA for some years. The difference could be due to the study periods, location, method of laboratory diagnosis employed. Other countries records include Mnkugwe *et al.* (2020) recorded (90.6%) among school children in North-Western Tanzania, despite five rounds of national mass praziquantel administration but the treatment was interrupted in 2016 and might have contributed to the observed high prevalence of the disease. Spencer *et al.* (2017) reported (93.7%) among school-aged children in Madagascar. Western Kenya (76.8%) (Nagi *et al.*, 2014), Northern Tanzania, Mara region (>80.0%) (Kinung'hi *et al.*, 2017 and Munisi *et al.*, 2016) and Mwanza region (64.3%) (Mazigo *et al.*, 2010). This finding shows that Schistosomiasis is still high in some countries and affects all age groups but children are the most vulnerable. In this study, no difference base on gender but children who refused to take the drugs were more affected. Age, parent education and occupation are not a barrier to the contact with the water and also infection.

Conclusion

The result obtained shows that there is equal exposure to the source of infection irrespective of age, gender, parent occupation and education. The intervention method by the State Ministry of Health Yola, Adamawa State, Nigeria though effective but there is tendency of re-infection because the water body is used for domestic activities and also the children enjoy playing and swimming in the water.

Recommendation

We recommend that:

1. Integrated methods should be used. The water body should be treated alongside the population simultaneously.
2. State ministry of health should use temefos or temephos (trade name Abate or Skeeter abate) to treat the water body against *Schistosoma*.
3. Enlightenment on Schistosomiasis and its

impact especially in children should be embarked upon in Shelleng and Kiri by individuals or the government.

4. Adequate and safe water supply should be provided.

Conflict of Interest

The author declares that there is no competing interest.

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