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PREVALENCE OF *SCHISTOSOMA HAEMATOBIUM* INFECTION AMONG PRIMARY SCHOOL CHILDREN IN FASKARI AND FUNTUA LOCAL GOVERNMENT AREAS OF KATSINA STATE, NIGERIA

***[1]Bello, S., [2]Eberemu, E. C., [2]Orpin, J. B. and [3]Ya'u, S.**

[1]Department of Biological Science, Faculty of Pure and Applied Sciences, Federal University Wukari, Taraba State, Nigeria
[2]Department of Biological Science, Faculty of Life Science, Federal University Dutsin-Ma, Katsina State, Nigeria
[3]Department of Biochemistry, Faculty of Natural and Applied Science, Umaru Musa Yar'adua University Katsina, Nigeria.

*Corresponding authors' email: bellosagir332@gmail.com Phone: +2347067715596

ABSTRACT

Schistosomiasis is a water-borne parasitic disease caused by *Schistosoma*; the digeic trematode found in the blood vessels of a man and livestock. This study was conducted to determine the prevalence of *schistosoma haematobium* infection among the Primary Schools pupils in Faskari and Funtua Local Government Areas of Katsina State. A total of 496 of urine samples were collected from children of 8 Primary Schools in the study areas; 4 from each local government. A questionnaire was used to collect socio-demographic and other exposure information to explore *Schistosoma* infection for urine, and urine sedimentation microscopic technique was used for sample analysis. Data were expressed in prevalence (%) and subjected to Chi-square analysis at $p < 0.05$. Out of the 496 children assessed, 160 (32.2%) were positive for urinary schistosomiasis. The prevalence is significantly ($p<0.05$) higher in Faskari Model Primary School with (48.3%). It was found from the result that, there was no significant relationship (P=6.608) between source of water and *Schistosoma haematobium* infection among the pupils in the study areas. There was also no statistical association (P= 1.570) between the source of water for bathing and the infection of urinary schistosomiasis among the students in the study areas. Therefore, schistosomiasis is prevalent in the study areas with Faskari local government having higher prevalence of the infection.

Keywords: Faskari, Funtua, Prevalence, Primary school pupils, *Schistosoma haematobium*, Urine sample

INTRODUCTION

Schistosomiasis is a water borne parasitic disease caused by *Schistosoma*; the di-genic trematode found in the blood vessels of man and livestock (Bello *et al.*, 2015). About 15% of African population is said to be infected with the disease (Bello *et al.*, 2015). In Nigeria, about five species (Spp) of the genus *Schistosoma* have been reported to be pathogenic to man, each having a well-defined distribution which is quiet important in diagnosis. These species include *S. haematobium*, *S. mansoni*, *S. japonicum*, *S. intercalatum* and *S. mekongi* (Uko *et al.*, 2011; Agi and Okafo, 2013). Among the five species mentioned, three species namely *S. haematobium*, *S. mansoni* and *S. japonicum* account for more than 95% of all human cases of schistosomiasis found in the world (Mutapi *et al.*, 2015).

The disease caused by S. *haematobium* is characterized by bloody urine, lesion of bladder, kidney failure and bladder cancer in children (Butterworth, 2016), and is the major cause of female genital schistosomiasis, which is a risk factor for transmission of sexually transmitted diseases and human immune deficiency and acquire immune deficiency syndrome (HIV/AIDS) (TDR, 2011). *Schistosoma mansoni* infection on the other hand is characterized by bleeding from gastro-oesophageal region, splenohepatomegaly, persistent bloody diarrhea, delayed sexual maturity and chronic dermatitis (WHO, 2018). The disease is transmitted by several species of *Bulinus*, *Planarbis*, *Oncomelanis*, *Lymnea* and *Indoplanorbis* (Tierney *et al.*, 2015). Intestinal and urinary schistosomiasis is estimated to affect at least 500 million people in 76 tropical and subtropical countries (Tierney *et al.*, 2015).

The intermediate host is mollusc which has a bilateral symmetric soft body covered by thin mantle that commonly secretes limy shell. The snails are mostly found in salt water or fresh water and some are on land (TDR, 2016). They can also be found in pools, lakes, irrigation canals or slow flowing rivers streams (Akongun *et al.*, 2013). The intermediate hosts of S. *japonicum* is an amphibious snail of the genus *Oncomalenia* which is found open bodies of water, rice paddy fields and deep fallow lands (Imafidon, 2010). Though the disease kills few people, its clinical effects, prevalence and association with agriculture and water development projects, movement of population and increase in population density makes it a problem of great health importance (WHO, 2015).

MATERIALS AND METHODS

Study Area

The study was conducted in two Local Government Areas of Katsina State, Nigeria. Katsina is located at latitude of 12.513932^0N and longitude of 7.61142^0E in the North Western part of Nigeria generally experience moderate temperature throughout the year, the rainy season lasts from April to the end of October (Topographic sheet, 2000). The main source of water supply in the study area are the Dams, ponds, rivers, streams and wells. The people in the study area are mainly farmers.

Sample population

A total of eight primary schools from the study areas were selected for the study; four from each of the two local governments. Exactly sixty- two number (62) of urine samples were collected for each of the selected primary school. Therefore, in each of the selected local governments, two hundred and forty-eight samples were collected and used from each local government of the study areas.

Administration of questionnaires
Questionnaires were distributed to all participants to obtain their information on the following: age, sex, occupation, water activities and water supply after which two container were given to all participants for urine sample.

Sample collection
Urine sample were collected from school aged children between 10:00am to 2:00pm as was described by Grist *et al.* (2011). Ethical clearance for the conduct of the research was obtained from Education Secretary to each local government after a brief explanation of the work to them. In the study areas, a brief lecture was conducted to highlight the importance of the research prior to sample collection. The sample collected was immediately transported to the laboratory for the conduct of examination/investigation.

Analysis of urine sample
Laboratory analysis of urine sample was carried out to determine the presence of *S. haematobium* eggs using sedimentation technique as explained by Cheese-brough (2009). Each urine sample was mixed thorough with a glass rod and 10ml was transferred into a 10ml centrifuge tube using 10ml syringe and centrifuge at 2000rpm for 5 minutes at a room temperature. The supernatant was discharged and sediments transferred to a microscope glass slide and covered with cover slip. Examination of the sediments was done microscopically using the x10 and x40 objectives. A drop of Lugol's iodine was added to the slides of cover slips prior to examination. Eggs with terminal spine is a characteristic of *Schistosoma haematobium* were counted for each positive sample and the result was recorded as the number of eggs/10 ml of urine (Cheese-brough,2009).

Data analysis
Data obtained was summarized in prevalence and presented in tables. Chi-square analysis was used to test for statistical differences between distributions of schistosomiasis infection.

RESULTS AND DISCUSSION

Prevalence of *Schistosoma haematobium* infection among pupils of the study areas
Table 1 presents the prevalence of *Schistosoma haematobium* infection among the pupils of the study area. From the result, of the four hundred and ninety-six (496) samples of urine examined, 160 samples (32.2%) were found to be infected with the parasite. Among the primary schools children examined in Faskari local government area, Faskari Model Primary School had a highest number of infected pupils, followed by Pilot Primary School all in Faskari, the head-quarter of the local government. In schools of Funtua Local Government Area however, the data obtained showed that Shehu Primary School had a higher number of infectious pupils followed by Gudindi Primary School. The total prevalence in Faskari Local Government was 90(45%) while that of Funtua was 70(35%).
The data depicting the prevalence of urinary schistosomiasis among the study population according to gender was presented in Table 2. A total of 300 male children and 196 female children formed the participant of the present research. Of these, 36.7% of male children had *Schistosoma haematobium* infection whereas female children had 25.5% prevalence.
Table 3 shows the prevalence of *S. haematobium* infection in the study population according to the age of the participants. There was no statistically significant difference in the distribution of *S. haematobium* infection among the study population. Risk factors for *Schistosoma haematobium* infection prevalence was presented in Table 4. From the table, main factors that account for the increased prevalence of the disease were the parents' occupation, source of drinking water and water activities.

Table 1: **Prevalence Schistosomiasis among primary school children in the study area**

Name of school	No Examined	No. Positive No. (%)	$\times^2$
Faskari Mod. Pri. Sch.	62	30 (48.3)	
Alh. Yahaya mod. Pri. Sch.	62	15 (20.2)	
Pilot. Pri. Sch.	62	25 (40.3)	0.16
Dutsen Idi Pri. Sch.	62	20 (32.3)	
New Extension Pri. Sch.	62	18 (29.0)	
Aya Pri. Sch.	62	14 (22.5)	
Gudindi Pri. Sch.	62	16 (25.8)	
Shehu Pri. Sch.	62	22 (35.4)	
Total	496	160 (32.2)	

Table 2: Prevalence of schistosomiasis infection according to gender

Male		Female		X^2 (P-value)
N.E	N.P(%)	N.E	NP (%)	
38	20(6.7)	24	9(4.5)	
38	17(5.7)	24	6(3.0)	
38	15(5.0)	24	7(3.5)	1.971(0.961)
38	13(4.3)	24	5(2.5)	
37	11(3.7)	24	8(4.0)	
37	13(4.3)	24	5(2.5)	
37	11(3.7)	24	4(2.0)	
37	10(3.3)	24	6(3.0)	
Total 300	**110(36.7)**	**196**	**50(25.3)**	

Table 3: Prevalence of schistosomiasis with respect to age in the study area

5-9 years		10-12 years		X^2 (P-value)
NE	NP (%)	NE	NP (%)	
62	20(8.0)	62	27(10.9)	
62	18(7.2)	62	19(7.7)	0.493(0.920)
62	18(7.2)	62	24(9.7)	
62	14(5.6)	62	20(8.0)	
Total 248	**70(28.1)**	**248**	**90 (36.3)**	

Table 4: Risk factors of schistosomiasis in the study area

Factor	Positive	Odds ratio(OR)	P-Value
Parents' occupation			
Farmers	35	2.800	**8.332e-03**
Civil servant	10		
Water activities			
Bathing	25	3.869	**1.570e-03**
Washing	10		
Water supply			
Well	30	0.450	**6.608e-02**
Pond	20		
Environmental Sanitation			
Open Defecation	20	1.750	**4.296e-01**
Poor Sanitation	10		
Total	**160**	**8.869**	

Discussion

Schistosomiasis remains a public health concern in various countries contributing to morbidity and mortality burden especially in sub Saharan Africa (Abbas *et al.,* 2023) and schools age children are among the high risk of group for infections of *S. haematobium.* The results of the present study found that children of the study areas are at increased risk of infection from *S. hematobium* (Table 1). This may be due to the fact that population living in the areas is dependent on local water bodies for their everyday water supply, from where they get infected. Visiting such water bodies could be the main reason of high prevalence of the disease. The results of this research agree with the findings from study of Abbas *et al*., (2023) who found a high prevalence of urinary schistosomiasis among primary school pupils of Kurfi Local Government Area of Katsina state. It also agree with report of studies by Bashir,*et al.,* (2022*),* Auta, *(et al.,* (2022); Orpin *et al.,* (2022) . It is important at this point to note that the study areas provide natural water source and also serve as meeting point for the schistosoma. These ensure that people continue to be infected since no any intervention strategies have been carried out in the study areas. However, the variability found in the prevalence of infection among schools examined could be attributed to the differences in the use or dependence of people living in the study area on wells, dams, pond, bore-hole as their water sources where they get infection of the diseases (Nmorsi *et al.,* 2015). This observation is in line of with findings of Nmorsi *et al.,* (2015).

The age specific prevalence showed that children of age 10-12 years had the highest prevalence (36.2%). Based on the present study, children of this age category (senior primary school pupil) is the population most commonly found to have a prolonged water contact behavior like swimming and farming, in water bodies which are likely to be infected with snail. The present study agrees with the findings of Bashir *et al.,* (2022) who found a higher prevalence of schistosoma infection among children aged 10-12 years category than those of age category below. It is also in line with studies reported by Nse *et al.* (2020) in Ikwo and Ohaukwu communities of Ebonyi State; Imrana *et al.* (2019) in Wamako Local Government Sokoto State; Ladan *et al.,* (2011) Gusau Local Government Area Zamfara State, Mohammed *et al.* (2018) Kwalkwalawa area of Sokoto State.

In relation to sex of the study participants, the high infection rate observed in males than in female children may be attributed to the enrolment of the Almajiri into the schools. This is in line with the observation made by Bello *et al.* (2003); Agi and Okafor, (2005). It may be due to high migration rate of people from villages to towns of the two local government areas as a result of banditry disaster.

The prevalence of infection by social status or occupation of children parents showed that farmers have the highest prevalence (35.0%) in the study areas. This was attributed to their nature of the occupation that brings them into frequent contact with infested water. Farmers are usually in frequent contact with water bodies during fishing, farming, washing their farm products, bathing and drinking or washing their bodies after a hard day's work. People's frequently visit this water for drinking, bathing, swimming, washing (Mohammed *et al.* 2018). Prevalence of the infection by water contact has been reported by authors including Adamu *et al.* (2001); Bello *et al*. (2003); Pukuma and Musa (2007). This study has indicated that high prevalence rate of the infection occurs in those with water activities such as bathing. The rest of water activities had low prevalence which are washing, bathing and others, for parents occupation yielded an odds ratio of 2.800, indicating that the odds of a positive outcome among individuals with parents in forming occupations are approximately 2.8 times higher than those with parent in other occupations. The P-value of 8.332e-03 suggests that this association is statistically significant, providing evidence against the null hypothesis of no association. The finding in this study also shows that the prevalence of urinary schistosomiasis among children whose parents are farmers are higher when compared to children of civil servants. This is explainable in the context of the fact that the children of farmers are likely to have more exposure to the disease and could not have been educated on the preventive measures of the disease. Swimming in infected pools of water and streams/rivers could have been the major source of infection

among children whose parents are non-farmers (Hotez and Femwick 2009).

The data collected from this study identified bathing, as the activity most related to the risk of infection; this activity exposes the entire surface of the body to the water. Similar studies in Nigeria reported that swimming during hot days and fishing were the most related activity to the risk of infection among school-age children (Yunusa *et al.,* 2016). Also, studies in other African countries, Gambia (WHO, 2002), Uganda (WHO, 2002) and Côte d'Ivoire (WHO, 2002) stated that the potential risk of schistosome infection from water contact shows that, the younger age groups were at relatively high risk. The disparity between different communities as regards prevalence and intensity could be related to how long streams and ponds could support transmission before drying up in the dry season. This is because streams and ponds that last longer encourage more transmission with their attendant prevalence and intensity (Bello *et al.,* 2003).

In this study, the risk factors that may increase the likelihood of exposure and transmission identified were young population under 15 years old because of their interaction with unsafe water and lack of immunity against schistosomiasis, rural population without adequate health infrastructure, people living in extreme poverty, adult literacy rates, number of physicians and people with no access to clean water. The adult literacy rate was significantly associated with the prevalence of infection, prevalent in impoverished and often vulnerable people living in conditions that favour transmission, without proper access to health care or prevention measures. The occurrence is particularly linked to agricultural and water development schemes which paradoxically, by improving water access also increase the habitat of snails, thus extending the areas where schistosomiasis is found (Amadu *et al.,* 2001).

However, from this result statistical analysis shows that there is no significant relationship between the sources of water for washing and *Schistosoma haematobium* infection among the Primary schools in the study area. There is also no statistical association between the source of water for bathing and the infection of urinary schistosomiasis among the students in the study area majority of the respondents did not know the causes of the disease. This indicates a lack of health education among the participants. These findings demonstrated that the majority of the respondents know about schistosomiasis but do not know or understand the transmission route. This may explain the misunderstandings and different views about causes, transmission, reservoir, and symptoms of the diseases among participants. However, other respondents had associated the disease transmission with contact with an infected person and water but did not specify or understand that it is through infected water which is noted by previous studies (Dawet *et al*., 2012).

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Furthermore, majority of the respondents had mentioned heamaturia and urethral pain while few couldn't associate the infection with any symptoms. Likewise, majority of the respondents had no idea about the reservoir of the disease. This may likely due to the respondent's lacks basic health education about the infection. However, most of the respondents had no prior knowledge about sources of infection and mode of transmission. This may also indicate lack of health education among the participants. However, most of the respondents had associated the ways through which the disease is transmitted with contact with infected water. This finding is in agreement with a previous study from Shaleku *et al.,* (2012) in which most of the respondents had mentioned contact with infected person.

CONCLUSION

There is high prevalence of schistosomiasis among the study population in the study areas with Faskari Model Primary School having higher prevalence of the infection. Male children had a higher prevalence of the disease compared to female children, and children of farmers have a higher tendency to develop schistosoma infection than those of parents with a different occupation in the study areas. Children from families using Dams and wells as source of drinking water were more prone to develop schistosoma infection.

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