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Prevalence of Urinary Schistosomiasis among Almajiri Children in Silame, Sokoto State, North-western Nigeria

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Abstract

Urinary schistosomiasis is a severe threat to global health with uncountable morbidities in Africa including Nigeria where control interventions focused on children in public and private schools neglecting Almajiri children. This undermined control interventions as those infected contaminate the environments with infective stages of the parasite. The objective of the study was to identify the prevalence of urinary schistosomiasis amongst Almajiri children in Silame, Sokoto State, North-western Nigeria. This was a cross-sectional descriptive study, socio-demographic data was collected in April 2020 on 206 consented Almajiri children in Silame and their urine samples were examined using the sedimentation method. The study showed a prevalence of 35.4% among the Almajiri children in Silame, Sokoto State, North-western Nigeria. The highest prevalence was found among children within the age range 16-20 years (63.6%) while the lowest prevalence was among those in the age range 6-10 years (24.4%). There was a statistically significant difference in the occurrence of urinary schistosomiasis between the age groups (x^2 = 11.637[a], df =3, p=0.002). Urinary schistosomiasis was prevalent among Almajiri children in the study area and parasite infection was associated with the participant's socio-demographic factors such as age, level of education, and water contact activities. Hence, the National Schistosomiasis Control Programs should incorporate the Almajiri children in the control interventions

Keywords: Schistosoma hematobium infection;Makarantarallo;Almajiri;Silame

INTRODUCTION

Urinary schistosomiasis, also known as Bilharziasis or Urogenital schistosomiasis is a severe threat to global health with uncountable morbidities in Africa countries caused by a digenetic trematode called *Schistosoma hematobium* of the Schistosomatidae family (Mudassiru *et al.*, 2018). The parasite infects over 290.8 million people in the world (GHE, 2016) and caused about 280,000 deaths annually, a mortality figure challenged as a gross under estimate (Molyneux *et al.*, 2016) with over700 million people at risk (WHO, 2016).Generally,schistosomiasis affects people of all ages in low resource settings including Africa (Balla*et al.*, 2010*)* where Nigeria bears the highest morbidities with about 29 million cases predominantly in school-aged children (Mohammed *et al.*, 2018).

In the year 2010, the World Health Organization prioritized schistosomiasis elimination campaigns through mass administration of drugs in endemic areas and targeted 75% morbidity reduction specifically in school-aged children by 2020. Although many countries including few in Africa made concerted efforts and eliminated the disease, it is now certain schistosomiasis eradication was unachievable in Nigeria and this may persist for another decade (Oyetunde *et al.*, 2020).

The national schistosomiasis campaigns by governments and non-governmental organizations in Nigeria always targeted children in public and private schools neglecting the Almajiri children attending Makarantar allo. This among other factors undermined schistosomiasis control effortsin Nigeria as those infected contaminate the environments with the infective stages of the parasite (Mohammed *et al.*, 2015).

Makarantar allo, also known as Tablet or Slate school is derived from two Hausa language words; *Makaranta* (school) and *Allo* (slate) denote a traditional Islamic institution of learning the Holy Koran (Adams *et al.*, 2012). The Non-native learners, the immigrant children encounter enormous challenges and have to fend for themselves under the guidance of a mallam (Islamic scholar) (Mohammed *et al.*, 2015). Some unsettling characteristics ofthe Almajiri include being far from their parents, poor, living in over crowded rooms with poor access to health care servicesand are seen roaming almost every street and corner in the northern parts of Nigeria (Isiaka *et al.*, 2015). People become infected with the cercariae stages of the parasite that penetrate the skin during water contact activities such asfarming, swimming, bathing, fetching water, or herding animals (Yunusa *et al.*, 2016).

In the study area, the Almajiris constitute a majority of very low-skilled workforces (Yusha'u *et al.*, 2013) where Sokoto Rima River Basin Development Authority executed considerable irrigation projects offers favourable environments for the survival of the intermediate host, Bulinus snail, and the causal agent of Bilharziasis, *Schistosoma hematobium* with little concern on the people's health's (Mudassiru *et al.*, 2018).

Therefore, this study is designed to evaluatethe prevalence of urinary schistosomiasis and its association with some sociodemographic factors among Almajiri children in Silame, Sokoto State, North-western Nigeria.

MATERIALS AND METHODS

Ethical consideration

This study was approved by the Primary Healthcare Agency, Silame, Sokoto, Nigeria,and Silame Local Government Council (SLM/MOH/PHC/038/VOL.I.). Participants who were positive for the parasite were treated with praziquantel (600mg; Biltricide, Bayer, Leverkusen, Germany).

Study setting and population

The study was conducted in twoIslamic Schools, Gandu and Umaru Islamiya was selected by random sampling in Silame where epidemiological data on urinary schistosomiasis is scarce. Silame is the headquarter of the Local Government with an area mass of 790 Km^2on Sokoto river located in the Sudan Savannah zone at the extreme Northwest, Nigeria between longitude 13^02^1N and latitude 4^051^1E with apopulation of104,378 people (NPC, 2006). Indigenous inhabitants are the Hausas and Fulani while other ethnic collections include Igbo, Yoruba, Ebira, Igala, and the Buxus from the Niger Republic with a growing number of Quranic Schools (SESP, 2010). Nonetheless, Silamepeople are very poor and dependent onthe Sokoto River for fishing, irrigation farming (Fadama in the Hausa language) fit for a variety of crops(Yusha'u*et al.*, 2013).

Study Design and Subject Socio-demographicCharacteristics

A cross-sectional descriptive study was conducted on206 Almajiri children at theGandu and Alhaji Umaru Islamiya in the Silame, Sokoto State, Nigeria, in April 2020. The sample size was estimated at 200 as described (Mohammed *et al.*, 2018). A set of pretested, structured questionnaires on the Almajiri children such as age, religion, level of education, and father's occupation was used to determine the socio-demographic characteristics and schistosomiasis-related exposure.

Parasitological assessment

Urine samples were collected between 10:00 AM and 2:00 PM in labeled-leak-proof universal sample containers and placed in black polyethylene bags to prevent the eggs from hatching into miracidia and then transported to the General Hospital Silame, Microbiology Laboratory for processing.The sedimentation method was used for the urine examination for the presence or absence of *Schistosoma haematobium* eggs. Seven milliliters of urine sample was transferred into a centrifuge tube and centrifuged at 1,000×g for 5 minutes, the supernatant was decanted, and the residues were examined under X10 and X40 objectives using Olympus, USA (Albadawi *et al.*, 2018).

Some Socio demographic characteristics of the eligible Almajiris

Socio-demographic information of the participant's name, age, sex, religion, area of residence, level of education, and father's occupations were obtained using a structured questionnaire that could be answered by a yes or no response with few are open-ended questions.

Statistical analysis

The data obtained were analyzed using Statistical Package for Social Sciences Software (SPSSInc., Chicago, IL, USA) version 25.0.A descriptive and inferential analysis was determined at p≤0.05 level of significance.

RESULTS

Prevalence of *Schistosoma hematobium* among Almajiri Children in Silame, Sokoto State, North-western Nigeria

The study showed a prevalence of 35.4% (73/206) among the Almajiri children in Silame, Sokoto State, North-western Nigeria. Considering the high morbidities of the parasite, a prevalence of 35.4% is a public health concern (p = 0.002). (Fig.1).

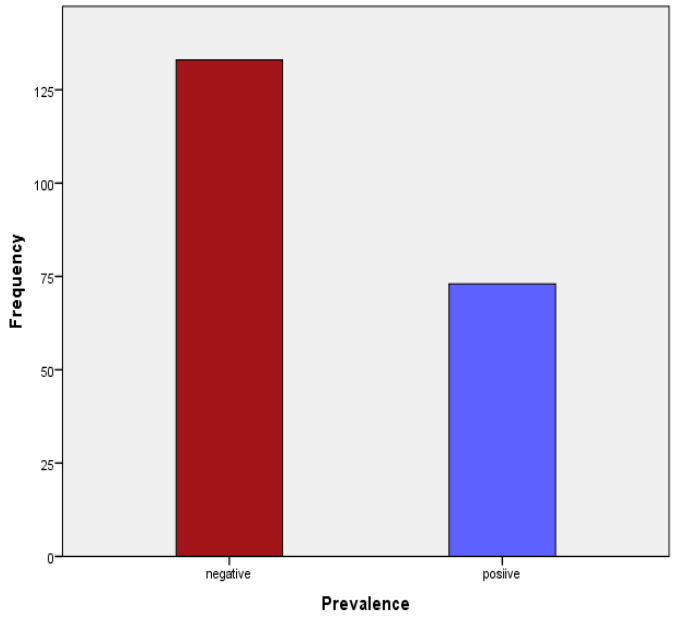

Fig. 1: Prevalence of *Schistosoma hematobium* among Almajiri Children in Silame, Sokoto State, North-western Nigeria.

Table 1: Distribution of *Schistosoma hematobium* based on the study sites

Regarding the study-based sites in Silame; Gandu and Umaru Islamiya, where epidemiological data on urinary schistosomiasis are scarce, the highest prevalence was recorded in UmaruIslamiya (36.9%) while the least prevalence was recorded in Gandu Islamiya (32.9%). However, there was no statistically significant difference in the occurrence of urinary schistosomiasis between the two study-based locations (x^2=.340[a], p=.560).

Study sites	Number examined	Number infected	Prevalence (%)	Statistics
Gandu Islamiya	76	25	32.9	x^2=.340[a], p=.560
Umaru Islamiya	130	48	36.9	
Total	206	73	35.4	

Socio-demographic characteristics of the Almajiri children

In relation to age, the highest prevalence was found among children within the age range 16-20 years (63.6%,7/11), while the lowest prevalence was among those in the age range 6-10 years (24.4%, 20/82) (Fig. 2). There was a statistically significant difference in the occurrence of urinary schistosomiasis among the age groups (x^2= 11.637[a], df =3, p=0.002). However, no statistically significant difference was observed in the study-based locations (x^2=.340[a], p=.560) and the participant's fathers' occupations (x^2 =.567[a], p=.753) (Table 2).

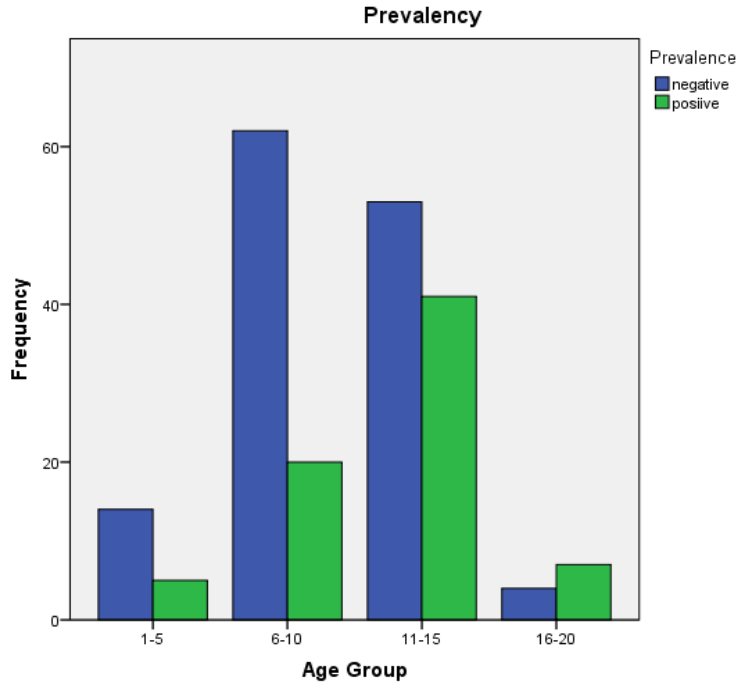

Fig. 2: Age distribution of *Schistosoma hematobium* among Almajiri Children in Silame, Sokoto State, North-western Nigeria.

Table 2: Some Socio-demographic Characteristics of the Almajiri children

Variables	Frequency	Percentage (%)	
Age group (years)			
1-5	19	26.3	x^2= 11.637[a], *p*=0.002
6-10	82	24.4	
11-15	94	43.6	
16-20	**11**	**63.4**	
Gender			
Male	**206**	**100**	
Education			
Islamic	**206**	**100**	
Primary	-		
Secondary	-		
Graduate	-		
None	-		
Nature of residence			
Rural	**206**	**100**	
Location			
Gandu Islamiya	**76**	**37**	x^2=.340[a], *p*=.560
Alhaji Umaru Islamiya	**130**	**63**	
Father's occupation			
Crop farmers	**125**	**60.6**	x^2 =.567[a], *p*=.753
Traders	**58**	**28.2**	
Nomadic farmers	**23**	**11.3**	
Toilet System			
Bush	**206**	**100**	

DISCUSSION

The prevalence of urinary schistosomiasis among Almajiri pupils in Silame was 35.4% (73/206) (Fig. 1). This figure corroborates the pooled 34.7% prevalence of urinary schistosomiasis in Nigeria (Abdulkadira *et al.*, 2017). Considering the high morbidities of the parasite, a prevalence of 35.4% is a public health concern and echoes the low socio-economic and educational backgrounds of the study population (ICESC, 2016). Our result is consistent with other moderate prevalence of 33.5% in Wammako, Sokoto State, North-western Nigeria, 32.3% in Goronyo, Sokoto State, North-western Nigeria (Umar *et al.*, 2008), 34.1% in Enugu State, South-eastern Nigeria (Okechukwu *et al.*, 2014), 34.2% in Mayo-Belwa, Maiduguri, North-eastern Nigeria (Balla *et al.*, 2015), and 37.7% in Wurno, Sokoto State, North-western Nigeria (Bello *et al.*, 2014).

However, other studies among Almajirs such as Balla *et al.* (2010) and Balla *et al.* (2012) reported higher prevalences of 74.0% in Gusau, Zamfara State, North-western Nigeria, and 75% in Gwanje, BornoState, North-eastern Nigeria respectively. Frequent water contact activities in snail-infested rivers, poor level of literacy, and haphazard disposal of human sewage, and dearth of basic amenities are factors associated with urinary schistosomiasis. Lack of water supply and contamination of the few available water sources were attributed to the endemicity of urinary schistosomiasis among the Almajiri children.Besides, Almajiri children are always excluded inthe mass drug intervention for schistosomiasis in Nigeria which continues to contaminate the environments with the infective stage of the parasite (Mohammed *et al.*, 2015).

The age distribution of schistosomiasis in the study area showed a rise in prevalence with the participant's age. The infection rises from 24.4% in the age range 6-10 years to a peak of 63.6% in the age range 16-20 years. There was a statistically significant difference in the occurrence ofurinary schistosomiasis among the age groups (x^2= 11.637[a], df =3, p=0.002)(Fig. 2). The age pattern of prevalence in the present study is consistent with previous studies that reported peak prevalence in the adolescence of the age group 16-18 years in Ondo state, West-south Nigeria (Akinneye *et al.*, 2018), 11-20 years in Kano state, North-central Nigeria (Dawaki *et al.*, 2016), and10-19 years in Gusau, Zamfara State, North-western Nigeria (Yandoma *et al.*, 2019). Adolescence and young adults between ages 16-20 years have a higher tendency to be engaged in water contact activities such as swimming, bathing, and farming than younger aged groups (Mudassiru *et al.*, 2018). However, Awosolu *et al.*(2020) reported contrary to the present study and the difference could be attributed to the environmental settings, religious, and cultural practices with regards to water use (Ezeh *et al.*, 2019).

CONCLUSION

Urinary schistosomiasis was prevalent among Almajiri children in Silame, Sokoto State, North-western Nigeria. Almajiri children within the age range 16-20 years had the highest infection while the lowest prevalence was among those in the age range 6-10 years. The difference in the occurrence of urinary schistosomiasis among the age groups was statistically significant (p=0.002).

RECOMMENDATIONS

Based on the study, there is a need to incorporate Almajiri children in the National Schistosomiasis Campaigns organized by the governments and non-governmental organizations in Nigeria for appropriate intervention to combat the disease transmission.

We recommended research priority in areas of neglect and advocated for molecular techniques to increase the sensitivity of parasites.

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