Journal of Infection and Public Health xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Journal of Infection and Public Health

journal homepage: http://www.elsevier.com/locate/jiph

# Urinary schistosomiasis in school aged children of two rural endemic communities in Edo State, Nigeria

Rukeme M. Noriode[a], Emmanuel T. Idowu[a,*], Olubunmi A. Otubanjo[a], Margaret A. Mafe[b]

[a] Parasitology Unit, Department of Zoology, Faculty of Science, University of Lagos, Akoka, Lagos State, Nigeria
[b] Public Health Division, Nigerian Institute of Medical Research, Yaba, Lagos State, Nigeria

ARTICLE INFO

*Article history:*
Received 16 June 2017
Received in revised form 8 August 2017
Accepted 9 September 2017

*Keywords:*
Urinary schistosomiasis
Prevalence
Intensity
School aged children
Rural communities

ABSTRACT

*Background:* Urinary schistosomiasis is endemic in many rural communities of Nigeria and school aged children are mostly affected. A cross-sectional study was carried out to assess the prevalence and intensity of urinary schistosomiasis infection among 251 school aged children in two communities of Ovia South West LGA of Edo State, Nigeria, as well as their knowledge on the control/elimination measures.
*Methods:* Urine samples were collected and examined by microscopy using filtration technique. In addition, a questionnaire survey was conducted among school-aged children and health care providers, probing their knowledge, attitude and practices on on-going control activities.
*Results:* The prevalence of urinary schistosomiasis among the school-aged children was 65.3%. The prevalence was generally higher among females (68.8%) and children in the age groups 10–14 (69.9%). The intensity of infection ranged from 1 to 5044 (mean = 449.8) eggs/10 ml of urine with a higher proportion having heavy infections (76.8%, $P < 0.05$). Water contact was attested by 123 (49.0%) of the children; of these 123, 74 (60.1%) were infected. The children's knowledge on urinary schistosomiasis was deficient.
*Conclusion:* The high prevalences reported in these communities require integrated approach to control which essentially should incorporate the provision of safe water supply and sanitary facilities, and health education in addition to the annual mass praziquantel distribution, to reduce transmission.


## Introduction

Human schistosomiasis is caused by five species of the digenetic parasitic blood flukes, *Schistosoma,* of which *Schistosoma haematobium*, *Schistosoma mansoni* and *Schistosoma japonicum* are the most endemic, causing severe morbidity and mortality in many rural communities. The disease is the second most endemic parasitic disease of epidemiological concern and has been reported from 76 countries of the tropical and sub-tropical world, out of which 52 are endemic [1]. Over 200 million people are infected globally and a reported 800 million are at risk of infection, 90% of them being in the African region [2].

Schistosomiasis is manifested as either intestinal or urinary disease in the gastro-intestinal or genito-urinary tract, respectively. *S. haematobium*, the sole cause of urinary schistosomiasis, is responsible for two-thirds of the disease cases globally, being endemic in Africa and the eastern Mediterranean [2,3]. The disease is characterised typically by bloody urine known as haematuria. People living in poor rural areas are mostly infected; the lack of safe water sources and sanitary facilities resulting in dependency on contaminated water bodies are major factors associated with the disease transmission. Children of school-age are reported to have highest prevalence and intensity of the infection [1].

Nigeria is reported to be the most endemic country for schistosomiasis globally, with about 29 million infected people and 101 million people at risk of infection [4–7]. *S. haematobium* is one of the endemic species in the country and it is the most widespread, occurring mostly in the southern parts of Nigeria [8,9]. It has been widely reported in Nigeria that morbidity and mortality due to schistosomiasis is highest among children of school age (5–6 years) and this is of public health importance [8,10–13].

The people's poor knowledge, attitude and practices (KAP) on the disease and its control measures influence transmission in the communities. Over the years, epidemiological studies on schistoso-

* Corresponding author.
*E-mail addresses:* norioderukeme@gmail.com (R.M. Noriode), etidowu@yahoo.com, eidowu@unilag.edu.ng, etidowu@gmail.com (E.T. Idowu), adetoro2001@yahoo.com (O.A. Otubanjo), margmafe@yahoo.co.uk (M.A. Mafe).

http://dx.doi.org/10.1016/j.jiph.2017.09.012
1876-0341/

miasis have employed questionnaire administration for collecting data on people's knowledge, attitude and practices on the disease, in order to determine gaps to be addressed by control programme [8].

Edo State is endemic for urinary schistosomiasis, and haematuria has been reported from people of endemic rural areas [14,16]. Prevalence rates reported for some foci show that school aged children have the highest prevalence of infection [10,14,16–19]. It is these school aged children (5–14 years) who are targeted in preventive mass chemotherapy.

Although the disease has been reported nationwide, there is continuous need for surveys on its endemicity status as a measure of the impact of the control/elimination programme, geared towards achieving the 2020 global target of eliminating it as a public health problem. This study was carried out to assess the prevalence and intensity of urinary schistosomiasis infection among school aged children in two communities of Ovia South West LGA of Edo State, Nigeria, as well as their knowledge on the control/elimination measures.

## Materials and methods

The study was carried out in Siluko and Silas Camp communities of Ovia south west Local Government Area (LGA) of Edo State, located in the South–South area of Nigeria. Siluko is situated at 6.54° North latitude and 5.16° East longitude with 51 m elevation above the sea level; it is the last community along the Iguobazuwa-Umaza-Siluko road just beside a portion of the Ovia River while Silas Camp (also called inner Ugbogui) community is a very remote and small settlement of immigrant residents, lying beside a small portion of the Ovia River in the forest of Ugbogui community, off the Shagamu-Benin express way. The communities are both intertribal but majority are Binis. The main occupations of the people are farming, fishing, palm oil production, logging of wood and, trading.

The two communities, Sikulo and Silas Camp were purposively selected based on previous reports of haematuria among their community members. The communities have no borehole or pipeborne water and the residents rely on the Ovia River as their major source of water supply; rain water is also harvested and stored during rainy seasons. The Ovia river is a major river that originates in Ovia south east LGA, flowing through many towns and villages in the two Ovia LGAs and empting into the gulf of Benin. It is the major source of water supply for most people in villages around it. Sanitary facilities are also deficient in the communities with community members resorting to nearby bushes, farms, pit toilets and the river for defecation and urination.

### *Advocacy*

Advocacy visits were paid to the State and Local Government Neglected Tropical Disease coordinators (NTD) of the State Ministry of Health, to inform them of the study and obtain consent. Prior to the collection of specimens and data, community leaders and health care providers were contacted, assembled and briefed on the disease and details of the study, as a prelude to obtaining their consent and support. The community members were also informed and mobilized for the study by the health care providers and LGA NTD coordinator.

### *Sample size and selection*

The World Health Organisation guideline on survey of schistosomiasis and soil transmitted helminth infections, was adopted [20]. The guideline recommends that when an epidemiological survey is organized to assess prevalence and intensity of infection (which are the indicators for monitoring progress made towards achieving morbidity control), a sample size of 200–250 school aged children is adequate. Children within the age range of 5–16 years, who had not received any anti-helminth treatment within the last 6 months, were recruited from the communities for the study. A total of 251 children (150 from Siluko and 101 from Silas Camp, due to population differences) out of a targeted 258 (that were initially recruited for the study), consented and participated, giving a response rate of 97.3%.

### *Sample collection and examination*

Mid-stream urine samples (20 ml) were collected in clean, labeled, plastic screw-capped 20 ml universal containers, within the hours of 10 a.m.–2 p.m., the peak period for shedding of eggs by schistosomes. All samples were examined parasitologically, by filtration technique [21]. One to 2 drops of eosin stain was added to each urine sample which was shaken and from which a 10 ml aliquot was drawn and filtered through Whatman filter paper. A 20 ml aliquot of 10% Lugol's iodine was flushed through and syringe full of air was later flushed through to flush out excess fluid from the filter paper. The filter paper was gently removed with a pair of forceps, placed on a drop of super saturated ninhydrin stain on a glass slide to make the eggs easily visible during examination, and air dried at room temperature. *S. haematobium* eggs were identified with their characteristic terminal spines, on microscopic examination with ×40 and ×100 magnifications; the number of eggs on the entire filter paper was counted and recorded as number of eggs in 10 ml of urine (eggs/10 ml of urine).

### *Questionnaire*

Semi-structured questionnaires designed to elicit information on water contact and control activities in the community were used to collect data from the 251 school children examined and community health care providers to assess the impacts of national control interventions in these health care providers (4 from Siluko and 1 from Silas Camp) who worked in the communities. The questionnaires for the children probed into their demographic details and water contact activities while that of health care providers probed into their knowledge of diseases affecting the community members, treatment interventions given in the community, measures for preventing infection with schistosomiasis and challenges that impede control/elimination efforts.

### *Ethics statement*

Ethical approval was obtained for the research protocol from the Institutional Review Board of the Nigerian Institute of Medical Research (NIMR-IRB), Yaba, Lagos, with reference number IRB/17/006.

### *Consent*

Written informed consent was obtained from community heads and parents before sample and data collection.

### *Data analysis*

The results obtained were subjected to statistical analysis using SPSS package. The raw data obtained were sorted, coded and entered into MS Excel software, cleaned and analysed. Descriptive statistics were used to calculate the prevalence and intensity of urinary schistosomiasis. Crosstabs and Pearson Chi-square test was used to assess the associations and differences between the data on demographic characteristics and the results from specimen examinations. The prevalence and intensity of infection for the two