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Prevalence of Schistosoma Haematobium Infection in Nigeria: A Retrospective Case Study in Kuje Village, Federal Capital Territory, Nigeria

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Abstract

Background: *In Nigeria, urinary schistosomiasis was considered a public health problem associated only with the rural communities.* ***Objectives:*** *In this study, the prevalence of Schistosoma haematobium infection presenting at Kuje General Hospital and Zionness Medical Centre (newly developed modern estate) were carried out in retrospect to determine whether the distribution S. haematobium infection rate had a particular trend.* ***Methods:*** *The available records of patients referred for urinalysis between 2011 and 2014 were retrospectively reviewed and analysed.* ***Results:*** *Prevalence of S. haematobium infection at Kuje General Hospital (an urban poor community) was analysed to be 13.4% whilst Zionness Medical Centre (a peri-urban settlement) recorded 7.9%. The infection was higher among males (69.7%) than the females (30.3 %) as observed and recorded at both hospitals.* ***Conclusions:*** *It was concluded that the urban poor communities around Kuje General Hospital are seriously affected by S. haematobium infection as compared to Zionness Medical Centre. Agricultural, economics and recreational activities of these communities' members living around the river bank in addition to problem associated with lack of good household water supply might possibly account for the high risk of the infection in the urban poor communities that surround the Kuje General Hospital.*

Keywords: *S. haematobium, Prevalence, Urinalysis, Peri-urban settlement.*

Acronyms

S - *Schistosoma*
FCT - Federal Capital Territory
UTI - Urinary Tract Infection
WHO - World Health Organization

Introduction

Urinary schistosomiasis, a parasitic disease caused by the trematode worm *Schistosoma haematobium* is a very serious environmental health problem in many tropical countries. World-wide, about 200 – 300 million people may be suffering from the disease world-wide[1] and it is currently endemic in Nigeria[2]. Water contact activities and traditional agricultural practices are reported as the factors in the distribution of the disease and its snail vectors[3].

Schistosomiasis, also called bilharzia, is a parasitic disease that causes chronic ill health. Due to lack of information/education or insufficient attention to hygiene, infected persons may contaminate their water supply with faeces or urine. The eggs of the schistosomes in the excreta of an infected person become open on contact with water and release a parasite, named miracidium. To survive, this motile parasitic stage must find a fresh water snail host; miracidium later divides in the host snail, producing thousands of new parasites (cercariae). The cercariae are then released by the snail into the available water. Cercariae can penetrate human skin within a few seconds and continuing their biological cycle once they were able to make their way to the victim's blood vessels. In approximately 30 to 45 days,

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the parasite will then be transformed into a long worm which is either male or female. The female lays 200 to 2000 eggs per day over an average of 5 years, depending on the species[5].

Schistosomiasis is a neglected disease and very few studies have described its epidemiology in the study locality of Kuje Area Council, Abuja, Federal Capital Territory (FCT), Nigeria hence, studies are substantially necessary to understand the epidemiology of these infections in order to implement measures necessary for their control in this region. Similarly, Sokoto has shown a high prevalence rate of schistosomiasis in some areas where study was conducted. In one of the studies conducted in Wurmo District, out of 1,000 urine samples examined, a prevalence of 41% *Schistosoma haematobium* infection was obtained and out of 1,000 stool samples examined only 5% of *Schistosoma mansoni* infection was established[9]. The high infection rate of schistosomiasis in the area was attributed to hugu dam and several tributaries of Goronyo dam in the areas which provided the inhabitants with sources for human water contact related activities such as rice farming and fishing. This prevalence agrees with findings in other parts of Nigeria. The present status of disease in this area may increase if adequate measures are not taken; because when the Goronyo Dam (currently under-utilized) becomes fully operational, the newly constructed canals created new habitat for snail vectors and source of water contact thereby increasing human water contact activities in the area[10, 11]. According to WHO Expert Committee on the control of schistosomiasis, the prevalence rate of schistosomiasis greater than 25% are considered moderate while those below 25% are low; therefore, three schools that constituted study area in Imo state shared high prevalence of schistosoma infection[12]. It is not however surprising that one out of the schools had prevalence rate of 44.9%[12]. Imo showed high prevalence of schistosoma infection ranging from 27.6% and 49%. In Katanga village in Nasarawa state, a high prevalence rate of schistosoma infection of 60% was recorded. The result was similar to the one obtained from Owan-East (Edo State) [15]. Furthermore, high prevalence rate of infection was recorded in studies conducted in Kobang, Anguwan-Rogo, Tudun-wada, Nasarawa-Gwom, Anguwan Rukuba and Kogon-Rissa in Jos. The high prevalence of schistosoma infections in these areas was attributed to untreated ponds and rivers, irrigation, poor environmental sanitation, poor hygienic habit and lack of health education[16]. Similar studies in southern parts of Nigeria revealed results similar to those discussed above. In 2002, a relatively low prevalence rate of schistosoma infection was recorded in some parts of Katsina state. With these analyses, schistosoma infection is well distributed all over Nigeria[17]. The most common method of diagnosis of schistosomiasis in epidemiological surveys carried out in Africa is the identification of eggs in the stool (*S. mansoni)* or in the urine (*S haematobium)* from an infected individual. Drug treatment is still the principal method of the disease control and the drug of choice is praziquantel. Single dose of praziquantel (40 mg/kg) is effective in reducing prevalence and in curtailing the disease[13]. The present study determined the occurrence of *S. haematobium* infections in the Kuje Area council, FCT, Nigeria as well as the risk factors that could be associated with the transmission of urinary schistosomiasis in the region.

Methodology

This retrospective cohort study analysed urine microscopy among suspected Urinary Tract Infection (UTI) patients presenting to the Kuje General Hospital, Federal Capital Territory, Abuja, Nigeria. A survey was conducted with the use of urine samples collected by the hospital Laboratory for microscopic analysis in the detection of *S. heamatobium* eggs. Urine microscopy results of new suspected UTI (Diagnosis) patients and their demographic data comprising age and sex recorded from January 2011 to November 2014 were retrieved from the urine Laboratory register of the Medical Microbiology Department. For all statistical comparisons a *p*-value of <0.05 was considered statistically significant. The study was conducted by reviewing a four (4) year period (January 2011 to November 2014) medical records of patients who reported at the Kuje General Hospital (government owned hospital) and Zionness Medical Centre Kuje (privately managed hospital in the locality) Laboratories in the Kuje Metropolis for urinalysis. Review of medical records of patients with haematuria, number of patients who were positive for *S. haematobium* ova and sex of the patients within the period of study were obtained. Parasitic infection of *S. haematobium* was considered positive when the egg of *S. haematobium* was identified on examination of urine sediments with the aid of a light microscope.

Examination of urine

Urine centrifugation concentration conventional technique was used for the examination. Ten milliliters of urine samples after centrifugation at RCF 500-1000g for 5 minutes each was examined microscopically for the *Schistosoma haematobium* eggs[18].

Ethics approval and trial registration

The trial was approved by the Ethics Committee of the Kuje General Hospital (surrounded by different communities) and Zionness Medical Centre.

Validity of the instruments

Asika (1991) stresses that one very important way of ensuring high quality data is by improving the quality of the measuring instrument which was determined by the instrument‟s validity and reliability. The instrument used in this study was subjected to both face and content validity. For face and content validity the instrument was screened by the public health professionals. Their opinions, criticisms and comments were incorporate into the construction of the final copy of the instrument before data processing and extraction.

Pilot testing

A pilot study was conducted in order to establish the reliability of the instrument. Problems and difficulty arising from the pilot testing were carefully noted to improve upon the final instrument which was use in the analysis of this research.

Reliability of the research instrument

The reliability of the instrument was established by conducting a pilot study. Pilot study can reveal deficiencies in the design of a proposed experiment or procedure and these can then be addressed before time and resources are expended on large scale studies. The reliability was determined using the split half technique.

Data analysis

All data were done using a statistical software called Diagnostic or Screening Test Evaluation 1.0 using OpenEpi (Open Source Epidemiologic Statistics for Public Health, Version 2.3). Frequency tables were produced for all categorical characteristics and were displayed in charts.

Results

Baseline characteristics of the study

Out of a total of 634 patients with symptoms of haematuria at the Kuje General Hospital (376) and Zionness Medical Centre (258) between January 2011 and November 2014 examined, *S. haematobium* ova were detected in the urine samples of 19.8% (126) whilst 80.2% (508) did not have the ova. The overall prevalence of the infection at Kuje General Hospital (surrounded by relatively urban-poor settings) was about two times higher (13.4%) than that of Zionness Medical Centre (7.9%) in a peri-urban settlement. The highest cases of the infection (16.3%) were recorded in 2011 at the Kuje General Hospital while Zionness Medical Centre recorded its highest cases (10.8%) in 2013 (Fig 1).

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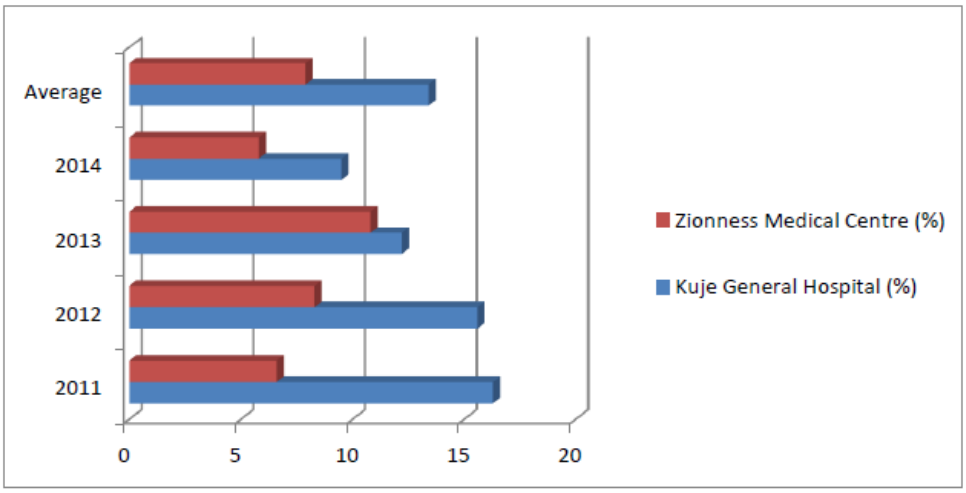

Figure 1. Prevalence of S. haematobium infection reported in two (2) hospitals in Kuje Area Council

Distribution of S. haematobium infections between males and females patients

Male patients constituted a higher proportion (69.7%) of the overall 126 cases of the *S. haematobium* infection recorded in the two hospitals (Fig 2). The number of males reporting the infection was persistently higher than their female counterparts throughout the period of study. The highest prevalence occurred in January (12.6 %) and the minimum was in October (4.7%).

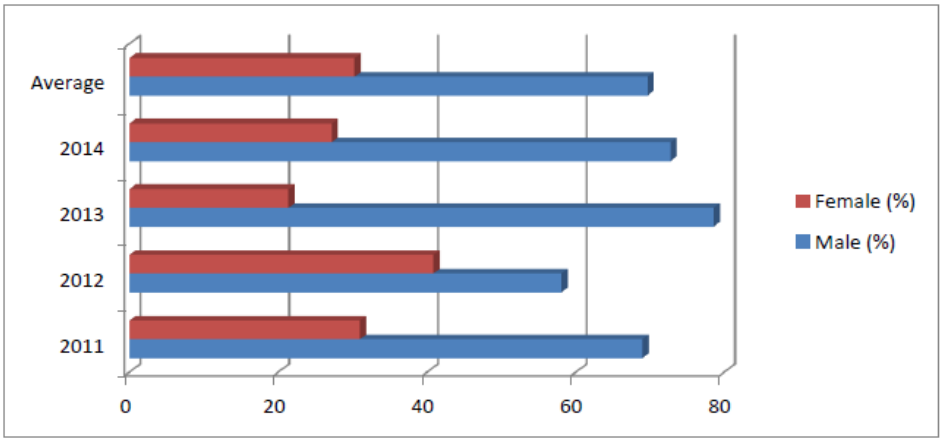

Figure 2. Distribution of S. haematobium infection among male and female patients

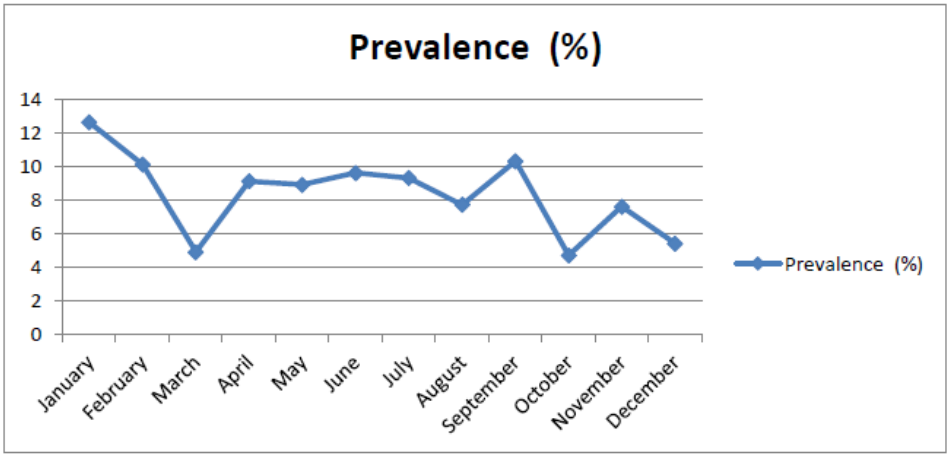

Figure 3. Trend analysis of S. haematobium infection in the two (2) hospitals

Yearly trend of *S. haematobium* infection in the two hospitals

The *S. haematobium* infection was highest (33.6%) in 2011. Relatively high cases were again recorded in 2012 and 2013; the number of cases was however slightly lower (16.3%) in 2014 (Fig 4).

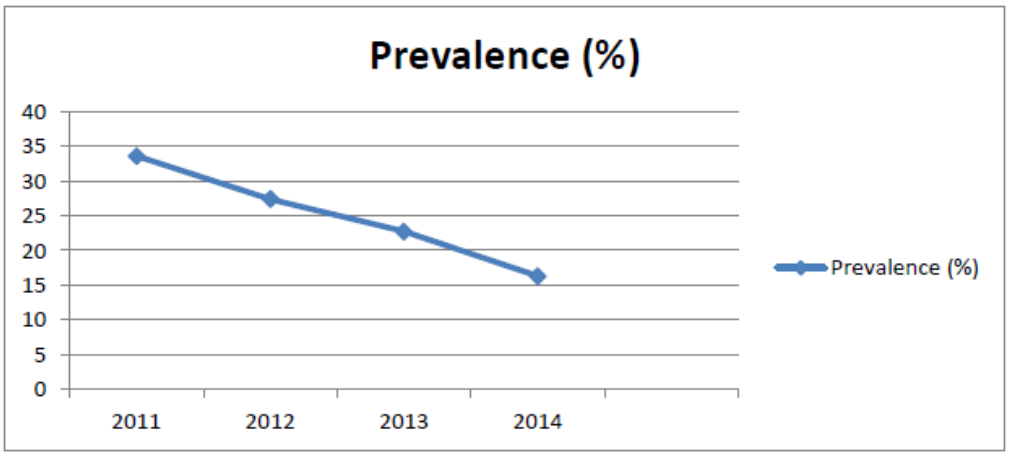

Figure 4. Spatial Distribution of S. haematobium infection

Discussion

Urinary schistosomiasis is of much public health concern especially in developing countries. It imposes extensive economic and health implications on residents living in endemic areas. The prevalence of *S. haematobium* infection recorded during the period of four years (2011 to 2014) in this study was 20.7%. However, prevalence rates reported at Kuje General Hospital and Zionness Medical Centre were 13.4% and 7.9% respectively. The difference in the rates could be due to differences in the number of freshwater bodies infested with the snail intermediate host (Bulinus species) of the parasite as well as the behavioural patterns of the communities. Communities where Kuje General Hospital is located, exhibits characteristic of urban poor settlement and has pockets of rivers used for recreation, farming, washing and fishing activities. These freshwater bodies are known to be infested with the freshwater snails. Zionness Medical Centre, located in Kuje newly developed estate layout area, however recorded much lower cases of the infection. The result of this study is consistent with reports suggesting that proximity of household to infected water bodies is significant in the transmission of S. haematobium infection [19, 20]. Increase contact time of the infested water bodies by people around Kuje Local government area might also have accounted for the high prevalence of the infections in these communities compared with the communities around Zionness Medical Centre[21].There was sexual dimorphism in the prevalence rate of *S. haematobium* infection in both hospitals. This is similar to the report from Katsina which showed that Males in Katsina showed more infection rate than females [24]. The sex specific rate of infection of *Schistosoma haematobium* in one of the Local Government Areas was 15.34% in males and 7.44% in females. This present study has demonstrated that *S. haematobium* in these study sites showed yearly pattern of major decrease with time. This may be due to decrease in survival of the snail intermediate host in favourable environment on yearly basis[19]. Thus, results obtained from both hospitals in this present study shows that the prevalence of *S. haematobium* infection is seasonal. Control programmes based on oral drug delivery have been developed and particularly implemented as a means to control morbidity in endemic areas[26]. Water sanitation, mass chemotherapy of infected people with drugs such as praziquantel and health education to highlight the disease, are some of the preventive measures[26].

The prevalence of S. haematobium infection over the past ten years was 20.7% at both health facilities with Kuje General Hospital recording higher prevalence than Zionness Medical Centre. S. haematobium infection was predominant among males' patients than in females. This gradual reduction in prevalence rate of Schistosoma infection as the year's progresses can be attributed to either high level of awareness and sanitation in the study area. It can also be attributed to insufficient water contact activities by children in the study area or the snail intermediate hosts are not being infected by the miracidia. However, a little change in these factors can cause rapid increase in prevalence rate. The

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consequent of which may cause very low agricultural productivity among the infected population which ultimately may lead to serious food shortage. Therefore, recommendations made would help to achieve free schistosoma infections in years to come. This yearly reduction in prevalence can also be attributed to high level awareness (education) across the various communities, provision of adequate household water, communal laundry and active participation of some international Non-Governmental Organization like The Carter Centre who is working tirelessly to control the disease, in the most schistosomiasis-endemic country in Africa such as Nigeria (Carter Centre, 2008).

Conclusion

It is my conclusion that the prevalence of urinary schistosomiasis is progressively reducing across years around Kuje Local Government Area. Combination of urinary schistosomiasis and bacteuria in any patient is a serious burden economically and health wise, a burden both to the patient, families and the community in general hence the need for future prospective studies of residents in these communities.

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