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RE-ASSESSMENT OF THE PREVALENCE OF URINARY SCHISTOSOMIASIS IN AMAGUNZE, NKANU EAST LOCAL GOVERNMENT AREA OF ENUGU STATE

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ABSTRACT

A total of 400 urine samples were collected among primary school pupils in Amagunze in Nkanu-East Local Government Area of Enugu State between April - July, 2010 in order to re-assess the prevalence of urinary schistosomiaisis. The urine samples were examined macroscopically for the presence of blood, tested for micro-haematuria using reagent strips and examined microscopically for the of ova of *Schistosoma haematobium*. Out of 387 pupils that participated in the study 22 were positive for urinary schistosomiaisis accounting for a prevalence rate of 5.7%. Seventy (4.4%) male children were infected as against 5 (1.3%) females. The prevalence of the infection was 11 (2.8%), 7 (1.8) and 4 (1.0) among children between 11 – 13 years, 8 – 10 years and 5 – 7 years respectively. Similar increasing trend in prevalence was observed among males (1.0%, 1.3%, and 2.1%) and females (0%, 0.5%, and 0.8%) from the lowest to the highest (5 – 7 years, 8 – 10 years, and 11 – 13 years) age group respectively. The result showed that urinary schistosomiaisis is still an issue in the area, however not as huge as was reported in 1989. Health education on mode of transmission of the disease, symptoms and prevention should be intensified, while further research should be conducted to identify water bodies and intermediate snail species supporting infective stage of the parasite for evidence-based control strategy by relevant stakeholders.

KEYWORDS: Prevalence, Urinary Schistosomiasis, Amagunze.

INTRODUCTION

Schistosomiasis otherwise called Schisto, Bilharzia, or Snail Fever, is an acute and chronic parasitic disease caused by blood flukes (trematode worms) of the genus *Schistosoma* (CDC, 2011). It is still one of the major public health problems facing humanity, with severe social and economic consequences (WHO, 2003; Ethiopian Health and Nutritional Research Institution, 2012).

Estimates show that about 200 million of people world-wide are infected by schistosomiasis and at least 218 million people who are at risk of the infection required preventive treatment in 2011 (WHO, 2011 and CDC, 2011). Schistosomiasis transmission has been reported from 78 countries, with only 52 endemic countries with moderate-to-high transmission requiring preventive-chemotherapy for Schistosomiasis (WHO, 2011).

In sub-Saharan Africa, Nigeria has the largest number of disability-adjusted life years (DALY) lost to Schistosomiasis. Schistosomiasis ranks second after malaria as the most common parasitic disease (Deribew *et. al*., 2013), and are the most deadly NTD, killing an estimated 280,000 people each year in the African region alone (CDC, 2011).

There are 2 major forms of schistosomiaisis – intestinal and urogenital – caused by 5 main species of blood fluke. The species including *Schistosoma mansoni, S. japonicum, S. intercalatum S. mekongi* (Causative agents of intestinal Schistosomiasis) and *S. haematobium* (the causative agen of urogenital Schistosomiasis) (Njom, 2007). The most common of all these are *Schistosoma haematobium* and *Schistoma mansoni* which are more prevalent in African countries. Schistosomiasis can be divided into Intestinal Schistosomiasis caused by four species namely; *S. japonicurn, S. intercalatum, S. mansoni* and *S. mekongi* and urinary schistosomiasis caused by *Schisiosoma haematobium* specie (WHO, 2003). Case definition of schistosomiasis is at least one *S. haematobium* egg on microscopic examination of urine.

Transmission occurs when people suffering from schistosomiaisis contaminate freshwater sources with their excreta containing parasite eggs, which hatch in water (Njom, 2007). People become infected when larval forms of the parasite – released by freshwater snails – penetrate the skin during contact with infested water (Abolarinwa, 1999). In the body, the larvae develop into adult schistosomes which live in the blood vessels where the females release eggs (Ozumba *et. al.*, 1989). Some of the eggs are passed out of the body in the urine to continue the parasite's lifecycle. Others become trapped in body tissues, causing immune

reactions and progressive damage to organs (Okeke and Ubachukwu, 2013). Intensities of *S. haematobium* infection was categorized as light (<50eggs/10ml urine) and heavy (≥50 eggs/10ml urine) infections. Infected children were given 40 mg/kg praziquantel (Okeke and Ubachukwu, 2013).

Schistosomiasis is prevalent in tropical and subtropical areas, especially in poor communities without access to safe drinking water and adequate sanitation (Cowpers, 1971). It is estimated that at least 90% of those requiring treatment for schistosomiaisis live in Africa (CDC, 2011). Schistosomiasis mostly affects poor and rural communities, particularly agricultural and fishing populations. Women doing domestic chores in infested water, such as washing clothes, are also at risk. Inadequate hygiene and contact with infected water make children especially vulnerable to infection (Abolarinwa, 1999).

Schistosomiasis is diagnosed through the detection of parasite eggs in stool or urine specimens. Antibodies and/or antigens detected in blood or urine samples are also indications of infection (WHO, 1991; Gryseels, *et. al.*, 2006; Ayele *et. al.*, 2008, and Jemaneh *et. al.*, 1994).

The control of Schistosomiasis is based on large-scale treatment of at-risk population groups, access to safe water, improved sanitation, hygiene education, and snail control (Ngele & Okoye, 2013). The WHO strategy for Schistosomiasis control focuses on reducing disease through periodic, targeted treatment with praziquantel through the large-scale treatment (preventive chemotherapy) of affected populations (WHO, 2006). It involves regular treatment of all at-risk groups (WHO, 2011).

Urinary Schistosomiasis is endemic in several lowland areas in developing countries and rural communities and Amagunze in Nkanu-East Local Government Area of Enugu State has such topography and a prevalence rate of 79% in 1989 (Ozumba *et. al.*, 1989). This study is aimed to re-assess the prevalence of urinary Schistosomiasis among Primary School children in Amagunze. The objectives of the study are:

i. To determine the prevalence of urinary Schistosomiasis in Amagunze
ii. To determine the sex and age distribution of urinary Schistosomiasis in Amagunze.

MATERIALS AND METHODS

Study Area

Amagunze is a town in Nkanu East Local Government Area of Enugu State of Nigeria. Amagunze is the Local Government Headquarter of Nkanu East. According to the Geographical map of Nigeria, Amagunze lies on latitude 6^{o}N and longitude 8 ^{o}E and is bounded in the North by Oruku, Amechi Idodo and Iyono; in the east by Ezaa in Ebonyi State; in south by Nara and Ihuokpara and in the west by Akpugo and Akpawfu. The town has nine villages. The villages are Ukwukani, Osu, Onyicha Amegu, Enuvu-uno, Aniyi, Umuokpara, Okeani, Umuneve, and Enuve-egu. Amagunze is a rural area with an estimated population of about 9,000. The major occupation of the residents of the area is farming, palm wine tapping, hunting and trading. The area is swampy especially in rainy seasons and stream constitutes the major source of water supply especially during the dry season.

Study design

The study is cross-sectional conducted from January to March, 2010 in Amagunze, Nkanu-East Local Government Area Government of Enugu State.

Study population/Sampling method

Primary school children were studied. School children were randomly selected from 3 out of the 7 primary schools in Amagunze (school names withheld in compliance with ethical issues on confidentiality and anonymity) and only those 5-13years (prevailing primary school age) who were willing to participate were recruited into the study.

Ethical issues

Ethical permission was obtained from the Enugu State Educational Board. Informed consent was obtained from parent or guardian of school children before sample collection. School children were randomly selected and only those 5-13years were recruited into the study. School children within this age group who declined after selection were excluded. Infected children were given 40 mg/kg praziquantel.

Sample size/ Sample collection method

Three hundred and eight seven (387) pupils were selected randomly. Urine samples were collected from the pupils in well labeled, clean, wide mouthed universal containers with screw caps. Urine sample collection was conducted between 10:00am and 12:00 noon and immediately moved to Medical Microbiology laboratory of the Department of Medical

Microbiology, College of Medicine, Enugu State University of Science & Technology, Parklane GRA, Enugu where they were analyzed.

Sample analysis

Urine samples were gently mixed and 10 ml dispensed into a test tube using disposable syringe. The test tube was centrifuged at 2000 rpm for 5 minutes. The supernatant was carefully decanted, the sediment placed on a glass slide and examined under the microscope using x10 objective lens to focus and x40 objective lens to view the egg of *S. haematobium*. Cases of schistosomiaisis were defined as children with at least one *S. haematobium* egg on microscopic examination of urine. Positive cases on microscopy were subjected to haematouria test to determined the presence of blood in urine using reagent strips (Medi-test Combi-9, manufactured by Macherey-Nagel, Duren, Germany).

RESULTS

Out of 387 pupils that participated in the study, 211 (54.5%) were males, while 176 (45.5%) were females. Children 5-7years of age were 89 (23.0%) while those 8-10 and 11-13years were 147 (38.0%) and 151 (39.0%) respectively. Twenty-two children had Schistosomiaisis giving an overall prevalence of 5.7% with males contributing 4.4% and females 1.3% as presented in table 1.

Haematuria test on the 22 positive urine detected blood in the all the sample.

Table 1: Sex distribution

	Positive (%)	Number (%)	Negative (%)
Male	211(54.5)	17 (4.4)	194 (50.1)
Female	176 (45.5)	5 (1.3)	171 (44.2)
Total	387 (100)	22 (5.7)	365 (94.3)

Four out of 89 children aged 5 – 7 years had least prevalence (1.0%) of urinary schistosomiaisis, followed by those aged 8 – 10 years, 11 – 13 years with 1.8% and 2.8% prevalence respectively. The result of age distribution of schistosomiaisis in the area among primary school children is presented in table 2.

Table 2: Age distribution.

Age group (yrs)	Number (%)	Positive (%)	Negative (%)
5 – 7	89 (23.0)	4 (1.0)	85 (22.0)
8 – 10	147 (38.0)	7 (1.8)	140 (36.2)
11 – 13	151 (39.0)	11 (2.8)	140 (36.2)
Total	387 (100)	22 (5.7)	365 (94.3)

Disaggregating infection based on sex (see table 3), prevalence was highest among male children between 11 – 13 years of age, followed by those in the age group 8 – 10 years and 5 – 7 years with 1.3% and 1.0% prevalence rate respectively.

Table 3: Age distribution of males with the infection.

Age group	Number of Males(%)	Number Positive (%)	Number Negative (%)
5 – 7	58 (15.0)	4(1.0)	54 (14.0)
8 – 10	64 (16.5)	5(1.3)	59(15.2)
11 – 13	89 (23.0)	8(2.1)	81(21.0)
Total	211 (54.5)	17(4.4)	194 (50.1)

The same trend of increasing prevalence with increase in age was observed among females. Prevalence increased from 0%, to 0.5% and 0.8% as the age group increased from 5 – 7 years to 8 – 10 years and 11 – 13 years (See table 4).

Table 4: Age distribution of females with the infection.

Age group	Number of Females(%)	Number Positive (%)	Number Negative (%)
5 – 7	31 (8.0)	0(0)	31 (8.0)
8 – 10	83 (21.4)	2(0.5)	81 (22.0)
11 – 13	62 (16.0)	3(0.8)	59(15.2)
Total	176 (45.5)	5(1.3)	171 (44.2)

Table 5 is the summary of the result of the study at a glimpse.

Table 5: Summary of the prevalence of Urinary Schistosomiaisis in Amagunze, Nkanu-East Local Government Area.

	No of Males (%)		No of Female (%)		Total (%)	
	+ve (%)	–ve (%)	+ve (%)	–ve (%)	+ve (%)	–ve (%)
5 – 7	4 (1.0)	54 (14.0)	0 (0)	31 (8.0)	4 (1.0)	85 (22.0)
8 – 10	5 (1.3)	59 (15.2)	2 (0.5)	81 (22.0)	7 (1.8)	140 (36.2)
11 – 13	8 (2.1)	81 (21.0)	3 (0.8)	59 (15.2)	11 (2.8)	140 (36.2)
Total	17 (4.4)	194 (50.1)	5 (1.3)	171 (44.2)	22 (5.7)	365 (94.3)

Key:

+ve: Positive

-ve: Negative

DISCUSSION

Out of 387 pupils that participated in the study 22 were positive for urinary schistosomiaisis accounting for a prevalence rate of 5.7%. This finding contradicts that by Ozumba *et. al.* (1989) and Ngele & Okoye (2013) in Endemicity, focality and seasonality of transmission of

human schistosomiasis in Amagunze, Eastern Nigeria and Prevalence of Schistosomiaisis infection among primary school pupils in Awgu, Enugu State in which prevalence rates of 79% and 44.8% were reported among school boys aged 5 – 12 years and children between 12 – 14 years respectively. According to Okeke and Ubachukwu (2013) in a study carried out in 2013 to estimate urinary schistosomiaisis in Urban and semi-urban communities in South-Eastern Nigeria, 4.6% prevalence was reported, concurring with the finding in this study. The high prevalence of 79% by Ozumba *et. al.* (1989) could be attributed to poor sanitary condition and inappropriate knowledge about urinary schistosomiaisis that existed then when compared with what obtains currently.

Blood was detected in the all the 22 urine samples positive for urinary schistosomiaisis via haematuria test. This finding agrees with the prevalence of micro-haematuria (6.2%, n = 20) which was higher than the prevalence of *S. haematobium* infection determined by microscopy in a study in which all the participants were subjected to haematuria (Okeke and Ubachukwu, 2013). By implication, in addition to children with the egg of Schistosoma haematobium in their urine, there were others in whose urine were egg (s) not seen on microscopy that had blood in their urine. Since, there are a number of physiological and pathological conditions that could lead to blood in urine, microscopy remains the gold standard in the diagnosis of urinary schistosomiaisis.

Age distribution of the infection showed that seventy (4.4%) males were infected against 5 (1.3%) females. This finding is in consonance with that reported by Okeke and Ubachukwu (2013) in which Males had insignificantly higher prevalence and intensity of *S. haematobium* infection than females.

In this study, urinary schistosomiaisis was 11 (2.8%), 7 (1.8) and 4 (1.0) among children between 11 – 13 years, 8 – 10 years and 5 – 7 years respectively. There was increasing prevalence of urinary schistosomiaisis with increase in age group. Concurring with this finding, children between 3 - 5 years recorded 9.68% prevalence, while those between 12 – 14 years recorded 14.8% (Ngele & Okoye, 2013). This followed the increasing trend from 1.0% among children between 5 – 7 years of age and 2.8% among those between 11 – 13 years in this study. Conversely, the magnitude of the infection at each age group according to Ngele & Okoye (2013) was higher than what was reported here.

The same increasing trend in prevalence was observed among males (1.0%, 1.3%, and 2.1%) and females (0%, 0.5%, and 0.8%) from the lower to the highest (5 – 7, 8 – 10, and 11 – 13) age group respectively. Similar observation was reported by Abolarinwa (1999). The higher prevalence of urinary schistosomiaisis among the males when compared with the females may be attributed to cultural issues which have minimal restriction on males and expose them early in life to farming, hunting and other activities that predispose them more to the infection, as well as adventurous and explorative attitude exhibited by males at the early stage of life.

CONCLUSION

This study showed that urinary schistosomiaisis is still an issue in Amagunze among primary school children. However the prevalence was not as large as that reported in 1989, showing reduction in the burden from 76% in 1989 to 5.7% in 2013. Health education should be intensified to demystify the disease and create awareness on the mode of transmission, symptoms and prevention of urinary schistosomiaisis in order to eradicate the disease. Further research should be conducted to identify water bodies and intermediate snail species supporting infective stage of *Schistosoma haematobium* for evidence-based control strategy by relevant stakeholders.

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