

Prevalence of Bilharziasis Among Children of School Age in Kano Irrigation Communities, Nigeria

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Bilharziasis is one of the parasitic diseases of public health importance affecting millions of people worldwide; more than 75% live in sub-Sahara Africa. This study was carried out in selected primary schools in eight irrigation rural communities from four local government areas of Kano State among 960 pupils within the age range of 5 – 16 years who are fully consenting to participate in the research throughout the study period. About 10ml of clean catch, midstream urine samples were collected from the subjects themselves in suitable universal containers. Samples were immediately transported in a cold box for the laboratory investigations within 3 hours of collection. Urinalysis was carried out using test strips (Combi 10 DFI Co. Ltd, Korea) for each sample particularly to detect the presence of blood, nitrites, protein and leucocytes which are important makers for Bilharziasis. Urine Samples were analyzed by Centrifugation and Microscopic techniques. Of the 960 subjects examined, 554 were males while 406 were females. Three hundred and six (306) (31.88%) male pupils and 112 (11.60%) females were found to be infected with *S.haematobium* with the overall prevalence rate being 43.55%. With regard to age, the highest prevalence of (40.10%) was found among 11-13 years age group while the lowest prevalence of (5.21%) was found among 14-16 years age group. The intensity of bilharziasis was also ascertained in the study area, high infection was observed in 5.52% urine samples, the highest being in Kadawa Chiki (1.77%), whereas Shidar had the lowest (0.10%). The Occurrence of Bilharziasis in relation to urinalysis tests for blood across study schools indicates more infections in urine with blood (354) (36.88%) than without blood (35) (3.65%). The study area was considered as an endemic area for bilharziasis.

Key words: Bilharziasis, Infection, Intensity, Prevalence, Urinalysis.

INTRODUCTION

Human schistosomiasis, also known as bilharziasis due to *Schistosoma haematobium*, is widespread ranking second to malaria in terms of socioeconomic and public health significance in tropical and sub-tropical areas. It is the most prevalent of the water borne diseases, with a very great risk to the health of rural populations (Hunters et al., 1976; Biu et al 2009). Schistosomiasis is common worldwide, causing 56% of known cases of calcifications in the bladder known as bladder stone. The disease affects more than 200 million people worldwide (8% of the world population) and as many as 500-600 million people have been exposed to schistosomiasis of all

kinds, being more common in Africa, Asia and South America (Robert et al., 2002).

Bilharziasis is a chronic, debilitating trematode infection, which reduces productivity and affects the development of especially children. It becomes apparently difficult to determine morbidity and mortality due to its insidious nature. Bathing or wading in infected water results to the disease (Peter and Warren, 1990). In 50% of cases it is characterized with hematuria, inflammation of the bladder, increased micturation, reduced bladder capacity and complications of the lungs sometimes leading to death (Cheever, 1998). The urethral

lumen becomes greatly closed, penis or scrotum may develop obstruction and fistula may tear through the skin (Cheever, 1998).

S.haematobium is a parasite that pairs in the blood vessels of the liver before migrating to the veins surrounding the bladder (vesical plexus) (Cheesbrough, 2004). The disease constitutes a major public health problem in the African continent (Chistsulo, 2000) and in some tropical and sub – tropical regions of the world (Michaud et al., 2003). Although infection with *schistosomes* does not always result in clinical disease, many infections are asymptomatic, *S. haematobium* however, could cause, dysuria, nutritional deficiencies, lesion of the bladder, kidney failure and elevated risk of bladder cancer and growth retardation in children (Saathoff et al., 2004).

Like many other diseases, schistosomiasis results largely from human behaviors principally water use practice and indiscriminate urination in the available water bodies, including failure to take advantage of available screening services or to comply with medical treatment (WHO, 1998); risk factors, therefore includes frequent use of contaminated water bodies for agricultural or other activities, indiscriminate urination in the water which results to its contamination. Other factors include: extreme poverty, the unawareness of the risk factors, inadequate public health facilities plus the unsanitary conditions in which millions lead their daily lives, especially in the rural areas of developing tropical countries (Michaud et al., 2003) and (WHO, 2002). Bilharziasis is one of the most important diseases and is evident in about 75% of tropical developing countries (WHO, 1999); schools and residents in rural and irrigated Agricultural areas are estimated to be infected while between 500-600 million people are at risk (Rollinson, 1999).

Accordingly, the estimate for morbidity and mortality in affected populations are high with school age children presenting with highest prevalence and intensity of infection (WHO, 2002) and (Okoli and Odaibo, 1999). Urinary schistosomiasis affect 66 Million children throughout 76 countries and in some villages in Africa over 90% of the children are infected (Okoli and Odaibo, 1999). Approximately, 22 Million Nigerians including 16 million children need to be treated for schistosomiasis, making the country one of the most endemic in the world (The Carter Center, 2008)

The WHO estimated that schistosomiasis and soil transmitted helminths represent more than 40% of the global disease burden caused by all tropical diseases, excluding malaria. Of the world's 207 million estimated cases of schistosomiasis, 93% occur in South-South Asia and the United Republic of Tanzania is the second country that has the highest burden of schistosomiasis in the region, Nigeria being the first (Peter and Warren, 1990; Cheever, 1988). Two major schistosome species are prevalent in the region, *Schistosoma mansoni* and *Schistosoma haematobium* causing intestinal and urogenital schistosomiasis, respectively (Peter and Warren, 1990; Cheever, 1988). In Tanzania, numerous surveys have been conducted in the past and more recently to describe the epidemiology, transmission (malacology). Clinical trials of anti-schistosomes and control efforts against schistosomiasis have been carried out. However, this information is very limited in the public domain where they can be easily accessed by public health intervention managers and policy makers. Availability of this information will not only help with implementation of control programs, but also will serve to guide control activities in areas with the greatest needs and allocation of resources such as drugs. In Attempts to cover that gap, the present article, reviews the epidemiology,

transmission dynamics, past and current control approaches and the progress Tanzania has made to control the disease. Clinical features and treatments are discussed. Our review supports the need to reverse the current control approach based on preventive chemotherapy, to an integrated multidisciplinary control approach.

Although, urinary Bilharziasis is endemic in Nigeria, it is usually a neglected common parasitic disease of childhood (Adewumi et al., 1991, Bello and Edingbola, 1992), hence the need to conduct this research in order to ascertain the prevalence and the intensity of the disease in the study area.

MATERIALS AND METHODS

Study Area

This study was carried out in selected primary schools in eight (8) irrigation, rural communities from four (4) local government areas of Kano State viz; Kura, Garun Malam, Dambatta and Makoda Local Government Areas, where the parents carry their children to the farms must often and the children also go to the ponds to wash and bath.

Study Population

The study was carried out among 960 pupils within the age range of 5 – 16 years who are fully consenting to participate in the research throughout the study period.

Ethical Consideration

Authorization and consent for participation was sort from the State Universal Basic Education Boards (SUBEB) subsections of each local government in the study areas. Biodata of the subjects were collected through questionnaires.

Study Design

Subjects were selected at random, an experimental cross sectional survey was carried out among primary school children to determine and compare the prevalence rates and intensity of the disease throughout the year.

Inclusion Criteria

- Primary school children 5 to 16 years of age
- Children who are fully consenting to participate
- Children whose last micturation was up to two hours.

Exclusion Criteria

- Pupils less than 5 years of age
- Pupils that did not fill the consent form
- Known carrier of the disease

Samples Collection and Handling

About 10ml clean catch, midstream urine samples were collected from subjects themselves in suitable universal containers. Samples were then immediately transported to the laboratory in a cold box for the laboratory investigations. They were then processed within 3 hours of collection as demonstrated by the WHO, (2003) and Cheesbrough, (2000).

PARASITOLOGICAL ANALYSIS

Urine sedimentation and Microscopy

Samples were analyzed by urine sedimentation using centrifugation technique as described by Cheesbrough, (2004). Few drops of saponin solution were added to each 10ml urine sample contained in a centrifuge tube to lyse the red blood cells and enhance clarity in microscopy. It was then centrifuged at 3000rpm for 5minuts in order to sediment eggs of the schistosomes. The supernatant fluid was discarded and all the sediment transferred to a slide and covered with a cover glass. The entire sediment was examined microscopically using the X10 and then X40 objectives. Terminal spines and eggs were counted for each positive sample and reported as the number/10ml of urine. Intensity was reported as the number of ova/10ml of urine and the result was expressed as light (<50ova/10ml of urine), medium (=50ova/10ml of urine) and heavy (>50ova/10ml of urine).

Urinalysis

Urine test strips (Combi 10 DFI Co. Ltd, Korea) was used for each sample particularly to detect the presence of blood, nitrites, protein and leucocytes which are important markers in Bilharziasis. The test strips were dipped to the "Max" mark into the urine samples, the presence of blood and protein, leucocytes and nitrites were noted by a change of color in the test area as done by Cheesbrough, 2004.

RESULTS

Of the 960 subjects examined, 554 were males while 406 were females. Three hundred and six (306) (31.88%) male pupils and 112 (11.60%) females were found to be infected with *S.haematobium* with the overall prevalence rate being 43.55% (Table 1).

DISCUSSIONS

Schistosomiasis constitutes a major public health problem in the African continent and in some tropical and sub – tropical regions of the world including Nigeria. It is one of the most important diseases and is evident in about 75 tropical developing countries (WHO, 1999), schools and residents in rural and irrigated Agricultural areas are estimated to be infected while between 500-600 million people are at risk. In this study, 960 subjects were examined, of which 554 (57.71%) were males and 406 (42.29%) were females. Three hundred and six (306) (31.88%) male pupils and 112 (11.6%) females were found to be infected with *S.haematobium* with the overall prevalence rate being 43.55% (Table 1). This result contradicted that obtained by Amaxigo et al., (2001) who recorded no significant difference between bilharziasis and sex, but agrees with that of Adeyeba and Ojeaga, (2002). The result of the finding is lower than that of Bala et al., 2012 (74.00%) in Alabarma, which could be due to inadequacy of health facilities there. It is higher than that of Rineet al., (2013)

who recorded 25.00% prevalence in N'Djamena, Chad and Nmorsi et al., 2007 (31.2%). It is equally higher than 14.8% prevalence found in Maiduguri, North-eastern Nigeria as affirmed by Musa et al., (2010) and that of Arioet al., (2004) in Ekiti State Nigeria (24.40%). The thesis of Dennis et al., (2013) has revealed an overall prevalence of 20.60% when analyzing the prevalence of *S. haematobium* in

Anambra, Nigeria, which may be due to regional variations, differences in cultural activities and other socioeconomic factors.

The age related percentage prevalence of Bilharziasis among school children was also established. The highest prevalence of (40.10%) was found among the 11-13years age group while the lowest prevalence of (5.21%) was found among the 14-16 years age group. The results agree with that of Adeyeba and Ojeaga, (2002) who recorded no linear relationship between age progression and infection rates and even reported pupils 16 years and above, to have the least infection rate and 10-12 years age bracket, the highest rate of infection. It also agrees with the finding of Musa et al., (2010) who found out that children between 12- 15 years were prone to bilharziasis. Dennis et al, in 2013 analyzed the prevalence rate to be high in pupils that are 1-20 year age (21.60%) and as low as 6.70% in 51-60 years age groups. The finding also agrees with that of Humphrey et al.,(2012) who come up with the highest prevalence of 21.00% in pupils 6-19 years of age and that of Ahmad et al., 2014 that found out age group 11-14 to have the highest prevalence (19.50%) in their study. Mu'azu (2008), Abdullahi et al., 2009 and Bichi et al., (2003) also reported similar pattern of *Schistosoma* infection with teenagers having the highest peak level due to their active participation in various water contact activities in contaminated waters. Statistical analysis according to this study indicates that *S. haematobium* infection is age related.

The intensity of Bilharziasis with respect to schools is indicated in table 3. From the overall intensity rate, 246 (25.63%) of the pupil had low (L+) infection (<50 ova/10mls), medium parasite count (M++) (50 ova/10ml) had only 119 (12.40%) while high (H+++) infection (>50 ova/10mls) was observed in 53 (5.52%) of the subjects. Among the L+, KosawaBigau had the highest incidence (60) (6.25%) whereas Shidar had the lowest (1) (0.10%); with regards to M++, KadawaCiki had the highest incidence (30) (0.31%) and Batta was found to have the lowest (4) (0.42%) with Shidar having zero incidence. Subjects with H+++ constitutes the highest parasite count, among them, Kadawa Ciki had the incidence of 17 (1.77%) intensity, whereas Batta had the lowest (1) (0.10%) with zero incidence for Shidar, The overall intensity rate shows that KosawaBigau was found to be highest with 89 (9.27%) incidence and Shidar had only one (0.10%), which constitutes the lowest. This can be compared with the highest intensity found by Nmorsiet al., (2005) that shows high intensity to be 19.60% and lower one being 11.60%, which could be attributed to the fact that the prevalence rate found in this study (43.55%) is higher than 31.20% of their study which could be due to differences in geographical location, occupation, recreation, domestic and socio-cultural activities as affirmed by Ukoli (1990).

Table 1: Gender related prevalence of Bilhaziasis among school children

Gender	No. Examined	No. Positive	% prevalence
Male	554	306	31.88
Female	406	112	11.67
Total	960	418	43.55

Table 2 demonstrates age related percentage prevalence of Bilhaziasis among school children. The highest prevalence of (40.10%) was found among the 11-13years age group in the dry season while the lowest prevalence of (5.21%) was found among the 14-16 years age group.

Table 2: Age related percentage prevalence of Bilharziasis among school children

Age Group	Number Examined (%)	No. Infected (%)
5-7	197(20.52)	54(5.63)
8-10	328(34.17)	113(11.77)
11-13	385(40.10)	222(23.13)
14-16	50(5.21)	29(3.02)
Total	960(100.00)	418(43.55)

Table 3 indicates the intensity of Bilhaziasis with respect to schools, 246 of the 418 infected pupils had low (L+) infection (<50ova/10mls), medium parasite count (M++) (50ova/10ml) had only 119 while high (H+++) infection (>50 ova/10mls) was observed in 53 urine samples. The highest intensity was observed in Kadawa Chiki (17), whereas Shidar had the lowest (1).

Table 3: The intensity of Bilharziasis among schools in the study area

Primary Schools	Rate of Intensity (%)			Total
	L+	M++	H+++	
Batta	9(0.94)	4(0.42)	1(0.10)	14(1.46)
Shidar	1(0.10)	0(0.00)	0(0.00)	1(0.10)
KadawaChiki	36(3.75)	30(3.13)	17(1.77)	83(8.65)
KadawaYantomo	28(2.92)	25(2.60)	7(0.73)	60(6.25)
Kura Special	50(5.21)	19(1.98)	7(0.73)	76(7.91)
KosawaBigau	60(6.25)	16(1.67)	13(1.35)	89(9.27)
Kantudu	41(4.27)	16(1.67)	3(0.31)	60(6.25)
Danmarke II	21(2.19)	9(0.94)	5(0.52)	35(3.65)
Total	246(25.63)	119(12.40)	53(5.52)	418(43.55)

The intensity of Bilharziasis in relation to urinalysis tests for blood across study schools is shown on table 4. More infections were observed in samples with blood (354) (36.88%) than those without blood (35) (3.65%).

Table 4: Intensity of *S. haematobium* in relation to urinalysis tests for the detection of blood across study schools

Primary School	Blood	Blood without <i>S.haematobium</i>	<i>S.haematobium</i> without blood	Blood with <i>S.haematobium</i>	Prevalence of <i>S.haematobium</i>
Batta	14(1.46%)	1(0.10%)	1(0.10%)	13(1.35%)	14(1.46%)
Kadawa Chiki	77(8.02%)	6(0.63%)	15(1.56%)	71(7.40%)	86(8.96%)
Kadawa Yantomo	68(7.08%)	10(1.04%)	6(0.63%)	58(6.04%)	60(6.25%)
Kura Special	67(6.98%)	6(0.63%)	22(2.29%)	61(6.35%)	76(7.92%)
Kosawa jBigau	89(7.27%)	1(0.10%)	12(1.25%)	78(8.13%)	80(8.33%)
Kantudu	61(6.35%)	5(0.52%)	1(0.10%)	56(5.83%)	60(6.25%)
Dan market II	21(2.89%)	5(0.52%)	8(0.83%)	16(1.67%)	35(3.65%)
Total (%)	399(41.56)	35(3.65)	65(6.77)	354(36.88)	418(43.55)

The occurrence of Bilharziasis in relation to urinalysis tests for blood across the study population shows that more infections occur with blood (36.88%) than without blood (3.65%). This result agrees with so many previous workers such as Nmorsi (2007) and Ivoke et al., (2014) that shows both males (20.70%)

and females (7.60%) to have infections with concurrent haemturia being higher than those without.

CONCLUSION AND RECOMMENDATION

The findings of this research revealed that the study area was found to be endemic for schistosomiasis as the overall prevalence rate (43.55%) was considered to be high; hence it is recommended that Non Governmental Organizations and all arms of government should contribute immensely towards the eradication of the disease.

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