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Epidemiological Assessment of Vesical Schistosomiasis in Bende Local Government Area of Abia State, Nigeria

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ABSTRACT A survey was carried out between January and July 2002 to determine the prevalence of vesical schistosomiasis in Bende Local government area of Abia State. A total of 2406 persons in eleven communities aged between 6 and 60 years were examined. Prevalence rates in the eleven communities ranged between 25.5% and 52.3% with an overall prevalence of 41.5%. More males (42.6%) than females (39.4%) were infected in all the age groups, and high rate of haematuria (78.2%) was observed among the infected subjects. Infection prevalence was significantly higher (65.3%) among those in the age group of 11 – 20 years ($P < 0.05$) than those above 60 years. More than 70% of those infected excreted above 50 eggs/10ml urine. Malacological studies conducted along water bodies in the study area indicated that infection was localised. Bulinus globosus is implicated as the potential disease intermediate host. @JASEM

Schistosomiasis is a water-associated disease caused by the digenetic trematode of the genus *Schistosoma*. It constitutes one of the most important parasitic diseases of man (Adeoye and Akabogu 1996), and is second only to malaria in its socio-economic and public health implications (Anosike et al 2002). Vesical schistosomiasis (caused by *Schistosoma haematobium*) alone constitutes a major public health problem in 44 African countries (WHO 1995) and is endemic in Nigeria. About 200 million people in some 74 countries are infected world wide; and at least another 600 million are at risk of infection (WHO 1995). An estimated 120 million suffer severe consequences of the infection with an estimated annual mortality rate of about 20,000 world wide (WHO 1998). An estimated 30 million Nigerians need to be treated annually for the disease (Anosike et al 2003). In most endemic areas, the highest intensities of infection are found in children between 5 and 15 years of age (WHO 1998). The planorbid snail *Bulinus* is the intermediate host in the transmission of vesical schistosomiasis. The distribution of the disease is focal and its effects are more felt in the rural areas of the tropics where the population uses natural fresh water habitats for their domestic water supply and or agricultural production. Hence the disease transmission therefore is contingent on the presence of infected water, the primary snail host and contact with human population. Apart from the earlier studies of Nduka *et al* (1995) and Anosike *et al* (2000, 2001), in parts of Abia State, information on the disease and its snail vector in Bende area of Abia State is fragmentary. The present study therefore is an epidemiological assessment of the disease among the people of Bende local government area, South Eastern Nigeria.

MATERIAL AND METHODS

The study area: The area of coverage is Bende local government area of Abia State, South Eastern Nigeria with a population of about 176,565 people based on the 1991 population census; and it is located in the northern part of Abia State. Abia State occupies the area lying between coordinates 6°5' and 4°50'N and between 7°08' and 8°00'E. The vegetation is typical of southern rain forest zone and there are two distinct seasons; the wet season lasting from April to September and the dry season beginning in October through March. Anosike *et al* (2001) gave the range of annual rainfall in Bende area to be between 200 and 250cm and the mean annual temperature to be 27°C – 35°C. The major occupation of the people of the area is farming, and rice farming is predominant. Other crops produced include cassava, maize, and beans. The area is essentially a rural setting and in all the communities surveyed, there were no pipe-borne water. The main sources of water for domestic and agricultural use are streams and ponds; and the streams are surrounded by rice farms and weeds that aid in the breeding of the snail intermediate hosts of schistosome. Eleven villages were randomly selected for the survey; and they are Ogboko, Isiegbu, Eziaja, Ofiavu, Obuofia, Umuolazi, Ndiagbo, Ebem, Eluama, Umuokebe and Ndianya.

Epidemiological survey: A survey of vesical schistosomiasis was carried out from January to July 2002 in the eleven villages listed above in Bende

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local government area of Abia State. Urine samples were collected from individuals randomly selected on a house to house basis. Only individuals from six years and above were examined. A 25ml wide mouth, screw-cap, plastic urine container was given to each individual participating in the study, and their names, age, sex and occupation were recorded. They were properly instructed to provide mid-stream urine samples between 10am and 12 noon which corresponds to the period of peak urinary egg excretion. Specimen bottles were retired with the help of field assistants. These were sent to our central laboratory within three hours of collection, where each specimen was processed as described by Anosike *et al* (1998). 10ml of urine was transferred into a centrifuge tube using a sterile disposable syringe. This was centrifuged for five minutes at 5000rpm. The supernatant was discarded while the deposit was resuspended by tapping the tube, poured into a petri-dish and examined for terminal spinned eggs of *S. haematobium* using a binocular microscope. The eggs were also counted and recorded. After this, the sediment was diluted with 10ml of tap water, and left under light source for 30 minutes and examined for miracidia as described by Anosike *et al* (2003). Reagent strips (Medi-test combi -9) were used to test for haematuria and urinary blood recorded variously as positive or negative using the plus (+) and minus (–) notations as the case may be. Again, snail samples were collected from the various local fresh water habitats in the study area using a long handled scoop not. These were packed in moist leafy vegetation, put in labelled plastic bags and transported to the laboratory where they were washed, counted, identified, (using reference specimens from the Danish Bilharziasis Laboratory Charlothenlund, Denmark) and examined for cercerial shedding after the method of Anosike *et al* (2002).

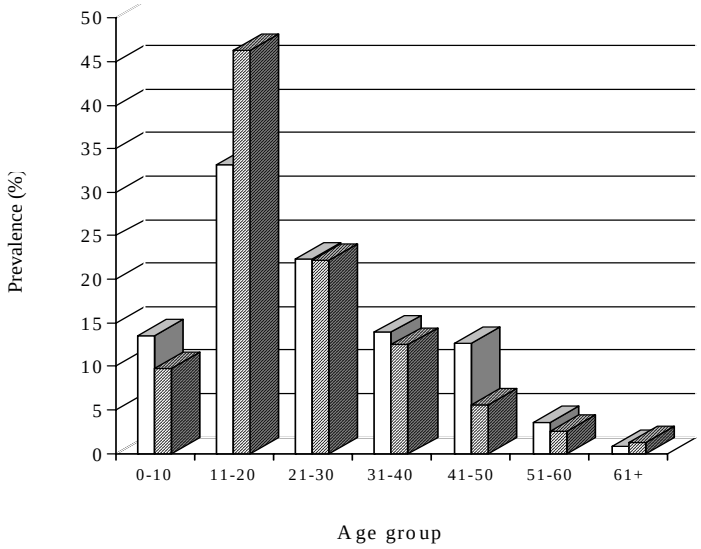

Fig 1. Age-related haematuria in vesical schistosomiasis in Bende Local Government Area

RESULTS

Of the 2,406 persons examined, 998 (41.5%) had *S. haematobium* infection (Table 1). The infection was recorded in all the eleven villages sampled with Isiegbu (52.3%) and Unuokebe (45.0%) having the highest prevalence rates. Prevalence rate showed a significant difference between the eleven villages ($P < 0.05$). Sex and age prevalence data are summarised in Table 2. Of the 2,406 persons examined (1544 males and 862 females), 658 (42.6%) males and 340 (39.4%) females were infected. Chi-square analysis however, did not reveal any significance in the observed higher infection rate in males ($P > 0.05$). Infection prevalence was highest in the age group of 11 – 20 years, (64.6%) decreasing gradually with advancing age and occurred lowest in the 61 years and above (24.4%). Analysis of data (2 – way Anova) showed infection rates among the various age groups to differ widely ($P < 0.05$). Among the male population, the mean egg count/10ml volume of urine sample increased with increase in age up to the 31-40 years age group and with those in the 11-20 age bracket shows the highest value (88.4%). Statistical analysis showed that intensity was independent of sex in this study. On the whole, 424 (42.5%) of the infected persons had light infection excreting between 1 –100 eggs/10ml urine and about 20 (2.0%) had heavy infection excreting > 500 eggs/10ml urine

(Table 3). Observations showed that more males haboured more eggs than their female counterparts. Figure 1 illustrates the age-related haematuria in *S. haematobium* infection in the study area. Four hundred and eighty (480) were both positive for *S. haematobium* ova and haematuria, whereas, 518 persons were only positive for *S. haematobium* ova without haematuria. Haematuria was highest among those in their second decade of life. With respect to occupation, infection rate was highest among farmers (55.6%) and students compared to other occupational groups while the least (23.0%) was recorded among the applicants (Table 4). Data on the snail types collected from the fresh water habitats in the area are illustrated in table 5. Of the 396 snails collected, 302 were *Bulinus globosus* with 94 (31.1%) of them being infected with schistosome parasite. *Biomphalaria pfeifferi* collected was 74 out of which none was infected. The other species showed zero infection with schitosome parasites.

Table 1: Overall prevalence of *s. Haematobium* infection in the study area

	Males		Females		
VILLAGE	No Exam	No info (%)	No Exam	No info (%)	. % Total
Ezeraobu	119	40 (33.6)	90	20 (22.2)	209 (28.7)
Ime Agba	106	32 (30.2)	100	24 (23.0)	206 (27.2)
Ifeamudara	120	28 (23.3)	74	38 (51.4)	194 (34.0)
Ikoroamaedo	110	34 (30.9)	92	20 (21.67	202 (26.7)
Isiugwu	121	66 (54.5)	102	22 (21.6)	223 (39.5)
Ogbu	124	40 (32.3)	96	15 (15.6)	220 (25.0)
Amafia	122	41 (33.6)	82	13 (15.9)	204 (26.6)
Ndiawa	120	48 (40.0)	88	18 (20.5)	208 (31.7)
Amangwu	122	46 (37.7)	107	23 (21.5)	229 (30.1)
Ugwu Afia	104	28 (26.9)	113	40 (35.4)	217 (31.3)
Total	1168	403 (34.5)	944	233 (24.7)	2112 (30.1)

Table 2: Age and sex-related intensity (Mean egg/10ml urine) OF *S. haematobium* infection in the study area

Age Group	Males			Females			
No. Exam.	No Inf	.(%)	Mean egg/10ml urine / (%)	No. Exam	No Inf. (%)	Mean egg/10ml urine	Total
0 - 10	118	52 (44.1)	62.0	114	20(17.5)	58.6	232 (31.0)
11 - 20	317	180 (56.8)	68.4	341	138(40.5)	59.8	658 (48.3)
21 - 30	307	80 (26.1)	56.4	260	56(21.5)	47.4	567 (24.0)
31 - 40	232	40 (17.2)	24.2	140	12(8.6)	20.8	372(13.9)
41 - 50	104	30 (28.8)	31.3	64	4(6.3)	27.5	168 (20.2)
51 - 60	70	15 (21.4)	20.1	20	2(10.0)	16.7	90 (18.9)
61 +	20	6 (30.0)	13.6	5	1(20.0)	14.2	25 (28.0)
Total	1168	403 (34.5)		944	233(24.7)		2112 (30.1)

DISCUSSION

Vesical schistosomiasis is a major health problem in developing countries especially the rural communities. The findings in this study therefore showed that this disease is endemic in Abia State. Again the high prevalence level of this disease recorded herein is consistent with findings from previous works in the same geographical area and some other endemic parts of Nigeria (Nduka *et al* 1995, Agi 1995; Anosike *et al* 2003). Overall prevalence of 41.5% as recorded in this study is high enough to attract the attention of the state health authorities especially in the area of provision of safe drinking water as the people of the area depend on streams and ponds for domestic and agricultural purposes. Again farming (especially rice farming) is the predominant occupation and the people are seen spending long hours in rice swamps. Modern irrigation techniques can be introduced by government. This has the potential of reducing long hours of contact with contaminated water bodies thereby reducing the spread of the disease. There is noticeable disparity in infection prevalence among the various villages studied. This disparity can be attributed to varying degrees of exposure to disease transmission, ecological conditions favourable to the survival of the intermediate host, location of the village, occupation of the people and poor sanitary condition of the available water bodies. For example, in Isiegbu village where the highest prevalence rate of

52.3% was recorded, it was observed that the entire village has only one stream as the only source of water supply for both domestic and agricultural purposes. Activities such as bathing, washing, collection of water for domestic use, and even recreation for children all centre around this singular water source. As a result, people spend more time in contact with water in this habitat and this favours the transmission of the disease as the contamination of the water is encouraged just as the various tributaries of this stream irrigate the numerous rice farms that abound in the village.

Table 3: Sex-related egg count in *S. haematobium* infection in the study area

EGG COUNT	MALE (%)	FEMALE (%)	TOTAL
1 – 100	308 (46.8)	116 (34.1)	424 (42.5)
101 – 200	116 (17.6)	78 (22.9)	194 (19.4)
201 – 300	104 (15.8)	54 (15.9)	158 (15.8)
301 – 400	88 (13.4)	46 (13.5)	134 (13.4)
401 – 500	30 (4.6)	38 (11.2)	68 (6.8)
500 +	12 (1.8)	8 (2.4)	20 (2.0)

The prevalence of vesical schistosomiasis as noticed in this study is age-dependent, hence the younger people of both sexes have higher infection prevalence, showing an upsurge in infection rate in those between 0 and 20 years, reducing to lower levels with increase in age. This observation is in line with those of Anosike *et al* (1998) in Plateau State and Ahmed *et al* (1996) in White Nile Province, Sudan. The age group 11 – 20 years had the highest prevalence while those above 60 years had least, indicating that transmission rate in children is high. Studies have shown that children are the most infected group of people in endemic areas (Anosike *et al* 2002), thus contributing significantly to the potential contamination of the aquatic environment. The first two decades of life is the age of active life, hence increased human activity increases the predisposition of people in this age group to infection especially through increased water contact and related activities. Again this age group constitutes a high proportion of the population. The onset of infection noticed in both sexes in the 0 –10 years age group could be due to early exposure to contaminated ponds, streams and rice farm/swamps as mothers in these farming communities usually go to the farms with their little ones and often bathe the infants in infected ponds. Therefore, for any attempt at treatment and control of the disease in the area, priority attention should be given to people in their first two decade of life as earlier proposed (Anosike *et al* 2003). On the other hand, the observed drop in prevalence in the older age groups could be due to either a decreasing transmission rate or reduced survival of worms already in the host. This could also be due to concomitant immunity. Gender-dependent pattern of infection may be related to some socio-cultural factors that may determine the degree of exposure. Thus the apparent male bias in prevalence may not be unconnected with the predominant male participation in the swamp rice-farming occupation of the people. Intensity studies showed that majority of people examined in this study have light to moderate infection. Only 2% of the study population were excreting above 500eggs/10ml urine. Again the highest egg counts of 88.4 eggs/10ml urine and 64.4 eggs/10ml urine for male and female. These were recorded in people in their first two decades of life. Haematuria was the predominant presenting symptom observed among the infected persons (48.1%) even as a greater number of persons within the first two decades of life had haematuria (macro and micro). This finding is in line with the reports of Emejulu *et al* (1994) and Anosike *et al* (2003) who reported a close association between haematuria in urine and the presence of *S. haematobium* ova. Haematuria as observed herein, decreased with age, a phenomenon attributable to the waning of egg hypersensitivity with age (Nduka *et al* 1995). In the area of occupation, farmers and students had the highest infection rates compared to others and this could be attributed to their frequent contact with water bodies as they perform water-related activities such as rice farming, bathing and majority wash their bodies after a hard day's work, swimming during recreation in schools etc. Civil servants and applicants had the least infection prevalence due mainly to the nature of their work which guarantees reduced contact with water bodies. The relative abundance of *Bulinus globosus* and its high infection revealed that this snail species is responsible for the transmission of vesical schistosomiasis in Bende area of Nigeria. This study has revealed that persons between the ages of 0 –20 years of age are important in the spread of this disease since they pass high number of eggs and are engaged in increased activities that bring them in constant contact with water bodies. Therefore anti-schistosomal chemotherapy directed at this age group could play a great role in the reduction of infection in Bende local government area. The populace should be encouraged to come into less contact with contaminated water bodies as this has the potential of reducing infection transmission. Government should encourage wider research in various studies so as to

explore the possibility of initiating an integral control programme comprising both snail control and chemotherapy to greatly reduce the prevalence of vesical schistosomiasis in the area.

Table 4: Prevalence of *S. haematobium* infection among different occupational groups in northern Abia State

OCCUPATION	NO EXAMINED	NO INFECTED
Civil Servants	331	77(23.3)
Students	410	168(41.0)
Farmers	966	537(55.6)
Traders	344	123(35.8)
Artisans	163	48(29.4)
Applicants	148	34(23.0)
Retirees	44	11(25.0)
TOTAL	2406	998(45.5)

Table 5: Snails collected from various fresh water habitats in the study area

TYPES OF SNAIL	NUMBER COLLECTED	NUMBER INFECTED (%)
Bulinus globosus	302	94 (31.1)
Biomphalaria pfefferi	24	0 (0.0)
Bilinus truncatus	28	0 (0.0)
Bulinus forskali	30	0 (0.0)
Lymnea natalensis	10	0 (0.0)
Melanoides tuberculata	2	0 (0.0)
TOTAL	396	94 (23.7)

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