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Bancroftian Filariasis in the Niger Delta Area of Eastern Nigeria

[1]C.M.U. Ajero, [1]B.E.B. Nwoke, [2]N.J.C. Okolie, [2]H.U. Nwanjo, [3]G. Oze,
[2]M.C. Okafor, [2]D. Nwosu, [2]B. Anyaehie and [2]G.C. Uloneme
[1]Department of Animal and Environmental Biology,
[2]College of Medicine and Health Sciences, Imo State University, Owerri, Nigeria

Abstract: In a study to determine the prevalence and intensity of Bancroftian Filariasis (BF) in the Niger Delta area of Eastern Nigeria, 3,400 people in 34 villages were examined. Four hundred and twenty one (12.38%) subjects had *Wuchereria bancrofti* microfilarIae in their blood. There was a significant difference in the prevalence based on the villages sampled ($p<0.05$). More males (15.0%) were infected than females (9.10%) with the female prevalence significantly lower in most of the villages ($p<0.05$). The prevalence was age dependent with a progressive rise and decline after 59 years. The intensity of the microfilariae among infected subjects showed a generally low microfilarial count with a mean microfilariae load of 5.5.

Key words: BF, Niger Delta area, prevalence, disease, microfilarial

INTRODUCTION

Bancroftian Filariasis (BF) is a human infectious disease caused by the nematode parasite *Wuchereria bancrofti*. The disease which is transmitted by a number of mosquito species is a major public health problem and affects vulnerable people of all ages and both sexes.

In Africa at least 36 million persons are affected with 104 million at risk (WHO, 2002). It is commonly seen among the poorest of the poor and for many years has a very low public health rating in the priorities of most countries where it is prevalent. It is identified as the second leading cause of permanent and long-term disability worldwide (WHO, 1998).

The pathology of BF derives from impairment of lymphatic circulation which provoke acute (adenolymphamgitis) and chronic (hydrocoele, lymphoedema, elephanitiases etc) clinical manifestations.

Besides the direct cost of treating the disease, there is enormous indirect losses resulting from incapacitation and loss of labour severely stressing household, local and national economics (Wegasa *et al*., 1979; WHO, 1998; Guyapong *et al*., 2000; Molyneux *et al*., 2000). Several field reports from Nigeria (Safolume *et al*., 1970; Wijeyaratne *et al*., 1982; Udonsi, 1986, 1988; Ufomadu and Ekejindu, 1992; Mbah and Njoku, 2000; Nwoke *et al*., 2000; Anosike *et al*., 2005) and the report of the postal survey by Nigeria Lymphatic Filariasis Elimination Programme (NLFEP) has shown that BF is prevalent and widespread. According to WHO (2002) Nigeria has the largest population at risk on the African continent and ranks second worldwide. However, more epidemiological information is needed on the disease distribution and intensity in many parts of the county. This is because many areas in the country are yet unidentified and unstudied even though the enabling environmental and social factors necessary for the spread of the disease abound. This situation no doubt has continued to affect the planning and forward implementation of any control or elimination measures against BF. The aim of the study is to determine the distribution and intensity of bancroftian filariasis in the Niger Delta area of eastern Nigeria.

MATERIALS AND METHODS

The study area: The Niger delta area of eastern Nigeria delimited in this study situates in Imo State. However, few surrounding villages in Anambra State were included. The area has two district seasons, wet season (April-September) and dry season (October-March). The mean annual rainfall is between 1,800 and 2,500 millimeter per year. The maximum and minimum temperatures are 31.9 and 22.5°C, respectively while the daily sunshine rate is about 4.4 h per day. The vegetation is typically rainforest. The land has 2 ecological zones, namely a slightly elevated and farm mosaic and adjuring fresh waterline that are made up of creeks and ponds. The subjects of the sampled community are predominately illiterate. Their occupation is mainly farming and fishing

Corresponding Author: C.M.U. Ajero, Department of Animal and Environmental Biology, Imo State University, Owerri, Nigeria

relying mainly on the streams and rivers for water supply. Other occupations include trading, palm wine tapping and hunting activities. There are also a sizeable number of artisans and civil servants The area is part of the larger Niger delta region that is the store house of Nigeria crude oil and gas resources accounting to about 90% of foreign exchange earning. They are unfortunately known to have undocumented records of bancroftian filariasis infection.

Epidemiological survey: Blood samples were collected from volunteers in 34 villages. In each of the sample villages 50 males and 50 females, 20 years and above and resident (at least 10 years) in the community were randomly sampled for MF of bancroftian filariasis at 19.00-27.00 h. This was necessitated by the nocturnal periodicity exhibited by bancroftian microfilaria in peripheral blood of infected subject. To ensure reliable results, field health assistants in the community clinics and health centers were trained in the collection of 8 blood samples and administration of questionnaire.

Adopting finger prick method, thick blood smear was used because it was more acceptable to the local population. For obvious public health reasons each sterile blood lancet was used for only one individual. Thick smear were made from about 20 μL blood sample. The thick films were air-dried, fixed in methanol, stained in Giemsa and examined under binocular compound microscope for the presence of microfilariae. In the laboratory slide preparations were processed and stained with Mayer's haematoxylin. Microscopic examination was conducted in all the slides and the microfilariae were identified based on their morphology (Ukaga *et al*., 2002) and results were recorded.

RESULTS

The village infection rate and distribution of BF in the Niger Delta area of eastern are shown in Table 1. Of the three thousand four hundred villagers examined, 421 (12.38%) had microfilariae in their blood. The highest prevalence rate was recorded in Osse-Mmahu (28.00%). At Egbema and Oguta microfilarial rates of 11.00 and 20.00%, respectively were obtained. The prevalence in other communities ranged from 0.0% in Obile to 24.00% in Egwe. There was a significant difference in the prevalence based on the villages sampled ($p<0.05$).

Two hundred and eighty one (15.10%) of the 1861 males and one hundred and fourty (9.10%) of the 1539 females had microfilaria of *Wuchereria bancrofti* in their blood (Table 1). The prevalence of microfilariae was consistently lower among the females in the villages except in Ndeogu and Obiakpu. Analysis of the data

Table 1: Sex related microfilaria rate

Name of village	Sex	Number examined	Number infected	Microfilarial rate
Umuapu	M	65	3	4.62
	F	35	0	0.00
Obile	M	60	1	1.67
	F	40	0	0.00
Ohaba	M	50	1	2.00
	F	50	1	2.00
Obosima	M	60	1	1.67
	F	40	0	0.00
Oboama	M	35	2	4.00
	F	65	2	4.00
Umuebem	M	45	2	4.44
	F	55	2	3.64
Uli	M	45	0	0.00
	F	55	0	0.00
Obinze	M	72	3	4.17
	F	28	1	3.57
Aga	M	60	5	8.33
	F	40	3	7.50
Nzorom	M	44	8	18.18
	F	56	4	7.14
Ubachima	M	63	6	9.52
	F	37	1	2.70
Assa	M	42	7	16.67
	F	58	3	5.17
Mgbirichi	M	50	7	14.00
	F	50	3	6.00
Egbema	M	50	9	18.00
	F	50	2	4.00
Mmalu	M	56	10	17.86
	F	44	6	13.64
Nwori	M	48	8	16.67
	F	52	5	9.62
Orsu-Obodo	M	52	8	15.09
	F	47	1	2.13
Onuokiko	M	50	7	14.00
	F	50	7	14.00
Nkwesi	M	60	5	8.33
	F	40	4	10.00
Mgbela	M	42	8	19.05
	F	58	7	12.07
Ndeogu	M	62	8	12.90
	F	38	8	16.48
Edu	M	63	13	20.63
	F	37	5	13.51
Awara	M	58	10	17.24
	F	42	6	14.29
Abacheke	M	50	12	24.00
	F	50	6	12.00
Osse-mmalu	M	70	21	30.00
	F	30	7	23.33
Elue	M	49	14	28.57
	F	51	6	11.76
Eze-orsu	M	60	11	18.33
	F	40	2	5.00
Egbuoma	M	58	12	20.69
	F	42	8	19.05
Oguta	M	60	16	26.67
	F	40	4	10.00
Egwe	M	55	19	34.55
	F	45	5	11.11
Nnebukwu	M	60	16	26.67
	F	40	6	15.00
Ezeigbo	M	58	12	20.69
	F	42	8	19.04
Abaziem	M	50	7	14.00
	F	50	7	14.00
Obiakpu	M	48	10	20.83
	F	52	11	21.15
Total	M	1861	281	15.10
	F	1539	140	9.10

Table 2: Age related distribution of bancroftian filariasis among infected persons

Age (years)	Number of villagers' examined	Number positive for microfilaria	Microfilaria rate (%)
20-29	901	71	7.88
30-39	852	84	9.86
40-49	746	112	15.01
50-59	460	102	22.27
60+	441	52	11.79
Total	3400	421	12.38

Table 3: Prevalence and intensity of BF infection in each community

	Number (Mean of MF density) found in blood						
Villages	0-5	6-10	11-20	21-30	31+	Mean MF density (MFD)	Mf intensity (GM mean)
Umuapu	2(4.5)	1(6.0)	0(0.00)	0(0.00)	0(0.00)	5.0	4.9
Obile	1(4.0)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	4.0	4.0
Ohaba	2(4.0)	0(0.00)	0(0.0)	0(0.00)	0(0.00)	4.0	4.0
Obosim	1(4.0)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	4.0	4.0
Oboama-agwa	2(2.5)	1(7.00)	1(12.00)	0(0.00)	0(0.00)	6.0	5.8
Umuebem	2(3.5)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	8.75	7.0
Uli	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0(0.00)	0.00	0.0
Obinze	3(1.5)	0(0.00)	0(0.00)	0(22.0)	0(0.00)	6.60	5.23
Aga	3(3.7)	2(7.5)	1(0.00)	0(0.00)	0(0.00)	9.1	7.00
Nzorom	7(2.5)	2(7.0)	3(13.0)	0(0.00)	0(0.00)	5.7	5.0
Ubachima	5(4.4)	2(9.5)	0(0.00)	0(0.00)	0(0.00)	4.0	2.3
Assa	6(3.3)	1(8.0)	1(11.00)	1(22.5)	1(31.00)	9.5	8.1
Mgbirichi	3(4.7)	2(8.5)	2(15.00)	2(22.5)	1(31.00)	13.7	11.0
Egbema	8(4.3)	2(8.0)	1(2.00)	0(0.00)	0(0.00)	5.6	5.2
Mmalu	10(4.3)	3(8.0)	2(6.00)	1(21.01)	0(0.00)	6.8	3.7
Nwori	8(4.6)	1(7.0)	0(0.00)	1(24.00)	3(32.00)	12.6	8.5
Orsu-obodo	3(3.3)	3(7.75)	2(13.5)	0(0.00)	1(31.00)	8.7	8.7
Nkwesi	5(3.2)	2(7.00)	1(18.00)	0(0.00)	1(32.00)	8.9	6.0
Mgbela	10(3.7)	4(6.75)	1(12.00)	0(0.00)	0(0.00)	5.1	5.0
Ndeogu	8(3.5)	6(5.33)	1(12.00)	0(0.00)	2(31.00)	7.5	5.4
Edu	8(3.5)	6(8.67)	1(11.00)	1(21.00)	2(34.00)	9.2	7.0
Awara	7(2.5)	7(6.8)	2(12.50)	0(0.00)	0(0.00)	5.8	5.5
Abacheke	7(3.1)	7(6.2)	1(13.00)	1(25.00)	2(45.50)	10.78	6.7
Osse-mmalu	12(3.2)	12(8.2)	1(12.00)	2(24.00)	1(13.80)	11.5	9.8
Elue	5(5.0)	7(8.2)	5(14.00)	2(22.40)	1(32.00)	11.5	9.8
Eze-Orsu	5(4.5)	4(6.3)	3(18.40)	1(30.00)	0(0.00)	9.7	6.1

shows that there is a significant difference in the prevalence of infection among sexes in the various villages ($p<0.05$).

Table 2 illustrates the prevalence of bancroftian filariasis in relation to age. Prevalence increased with age from the 20-29 years group up to a peak (22.27%) in those in the 50-59 years group, thereafter a sharp decline was observed in age 60 years. A chi-square analysis revealed that distribution of the *W. bancrofti* parasite among age group varied significantly ($p<0.05$).

The intensity of the microfilariae among infected subjects showed a generally low microfilarial count (Table 3). The microfilariae density (mfd) varied from one community to another. The highest value of 28.00 mfd was recorded in Osse Mmahu while the least of 0.0 mfd was recorded in Uli. However, the mean microfilarial density of the area was 9.5. The mfd and mf rate were negatively correlated ($r = 0.38$; $p<0.05$) similarly, the geometric mean of microfilariae analysed based on adult aged >20 years, revealed a very low community microfilarial load of 5.55.

DISCUSSION

In the study, the endemicity of *W. bancrofti* microfilariae underscores the availability of environmental conditions that favour the breeding, survival and spread of the vector species as well as the prevailing human factors that enhance vector-man contact for the continued transmission of *Wuchereria bancrofti.* The microfilariae rate of 12.38% observed in the study area infers that there is active transmission. This figure far more exceed the recommended threshold of 1-2% necessary for initiation of community mass drug treatment (WHO, 1998; Taylor and Hoerauf, 2001).

The results of this study showed that infection rates of the parasite were age related. The study revealed that older people enjoy the privilege of staying

outdoors in the night, which is the peak betting period of vectors of bancroftian of bancroftian filariasis (Service, 1980; Lardeux and Chelfort, 1997; WHO, 2002). The prevalence tend to build up over years with g radual increase in age. Similar age related infection has been reported (Anosike, 1994; Nwoke *et al*., 2000).

Furthermore, males had significantly higher infection rates ($p<0.05$) than females. This result may suggest higher transmission rate among males, but in this area, both males and females were generally involved in all manner of outside activities and there were no obvious differences in exposure that could account for the difference. Higher prevalence rates among males have also frequently been observed in other studies (Udonsi, 1986; Anosike, 1988; Nwoke *et al*., 2000; Estambale *et al*., 1994). Several investigators have suggested that in wuchereriasis endemic area, females have increased resistance to infection and this has been supported by serological studies showing high antibody positively to adult worm antigens in females (Grave and Davis, 1979; Branbin, 1990).

From the epidemiological perspective, the microfilarial density of human filariasis is very important particularly sas regards the onset of clinical manifestations; thus the higher rates of infection 28 and 17.8% in Osse-Mmahu and Onuokiko respectively indicate a greater risk of chronic disease manifestation.

The intensity of *W. bancrofti* recorded in the study was relatively low with about 60% of all infected persons harbouring counts less than 6 mf per 2 mL blood. On the whole a low prevalence rates of 12.38% and low community microfilaremia of 5.5 were obtained. However, immediate treatment of communities in the area will reduce the figure below the WHO approved threshold of 1-2% in few years.

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