Australian Journal of Basic and Applied Sciences, 5(5): 875-879, 2011
ISSN 1991-8178

Endemicity of Lymphatic Filariasis in Three Local Government Areas in Imo State, Nigeria

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Abstract: A study was carried out to determine and compare the rate of occurrence of lymphatic filariasis in three Local Government Areas (LGAs) in Imo State, South Eastern Nigeria. One sample community was selected from each of the LGAs comprising of Umuezereokam in Owerri West, Ebikoro in Owerri North, and Nguru in Ngor Okpala. In all, six hundred blood samples, made up of two hundred each from each of the LGAs were collected at random between 10pm and 12am each screening day, from equal number of male and female volunteers, aged between 11 and 80, and screened for a possible presence of the microfilaria of lymphatic filariasis, using the Giemsa thick stained blood film. Results obtained show that the microfilaria of *Wuchereria bancrofti* was the only filarial worm isolated in the three LGAs. The results further revealed that Ngor Okpala recorded the highest rate 56 (28%) of infection, followed by Owerri North with 47 (23.5%), while the least was observed in Owerri West with 43 (21.5%). Also, more male, 85 (42.5%) than females, 61 (30.5%) were positive for the disease. There was however, no significant difference ($P < 0.05$) between the rate of occurrence of the infection in the LGAs between the male and female cases at 95% confidence interval. Lymphatic filariasis will indeed become a veritable public health problem in the LGAs unless its progression is adequately monitored by the relevant government authorities and independent health care providers.

Key words: Lymphatic filariasis, Local Government Area, Microfilaria, *Wuchereria bancrofti*, Imo State.

INTRODUCTION

Lymphatic Filariasis is a common infection frequently seen in most tropical and subtropical countries. It is a leading cause of permanent and long-term disability. In its severest form, the disease could lead to elephantiasis, which is a crippling condition in which limbs or other parts of the body could become grotesquely swollen or enlarged. This condition could be observed in as many as 10% of women and 50% of men in communities endemic for the disease. Indeed, these conditions have a devastating effect on the quality of life of those affected, impairing them not only physically but emotionally and economically (Carter Center, 2008).

Lymphatic filariasis is spread from infected to uninfected persons by night-biting mosquito species of *Culex* and *Anopheles* especially, *C. quinquefasciatus* and the malaria vectors, *A. gambiae* and *A . funestus*

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(CDC, 2008); while the disease itself is caused by infection with any of several round thread-like parasitic worms, namely *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*. Humans are the only definitive host for *W. bancrofti*, which accounts for 90% of infections while for *B. malayi* and *B. timori*, which account for the remaining 10%, a number of other animals could harbour the parasites (Behbehani, 1999).

Although lymphatic filariasis very rarely causes death, it is a major cause of clinical suffering, disability and handicap. More than 1.3 billion people in 83 countries and territories, approximately 18% of the world's population live in areas at risk of infection with one third each said to be in India and Africa and the remainder in Asia, the Pacific and the Americas (WHO, 2004). In Africa, the prevalence of lymphatic filariasis is especially striking, affecting over 40 million people in the sub-Saharan region alone (Dunya *et al*., 1996); overall, Africa is thought to account for 40% of all cases of lymphatic filariasis in the world (Gyapong and Amuyunzu-Nyamongo, 1999).

Countries found to be endemic for the disease include: India, Indonesia, Nigeria and Bangladesh which jointly account for nearly 70% of all cases. Other regions include Central Africa, the Nile delta, Pakistan, Sri Lanka, Burma, Thailand, Malaysia, Southern China, the Pacific Islands, Haiti, the Dominican Republic, Guyana, Surinam, French Guiana, and Brazil (Cox, 2002). Nigeria, classified as the third-most endemic country in the world, with an estimated 22 million cases (Carter Center, 2008), have had outbreaks reported in several states including Ebonyi (Anosike *et al.,* 1999), Oyo (Awolola *et al.,* 2004), Plateau (Terranella *et al.,* 2006), Cross River (Braise *et al.,* 2003; Ibanga *et al.,* 2008) among others.

The economic burden of lymphatic filariasis is tremendous. In India alone, it is estimated that the annual economic loss due to lymphatic filariasis is $1 billion (Smith, 2006), while in Nigeria, the economic losses are often not calculated, but is assumed to be likely significant (Carter Center, 2008).

The epidemiology of the disease in Nigeria is complicated because of the diversity of environmental conditions of the different regions. Recently, large-scale dam and irrigation projects in addition to deteriorating drainage systems have created suitable breeding sites for filarial vectors in various parts of Nigeria. Consequently, the disease distribution is far more extensive than has been hitherto assumed (Anosike *et al.,* 2003). It is therefore our aim to conduct a study in three Local Government Areas in Imo State, South Eastern Nigeria, to determine the extensiveness of the spread of the disease in that part of the country.

MATERIALS AND METHODS

Study Sites:

The study was carried out in representative communities in three Local Government Areas (LGA's) of Imo State, South Eastern Nigeria. The LGA's included Owerri West, Owerri North, and Ngor Okpala.

Owerri West which has its headquarters in the town of Umuguma has an area of 295km² and a population of 99,265 as recorded in the 2006 census (Federal Government of Nigeria, 2007). Most of the residents of the LGA are predominantly farmers, fishermen and civil servants. The LGA is blessed with the Otamiri River, whose presence serves as a mosquito breeding site, even though it is used primarily for domestic purposes, thus making the LGA a potentially endemic one for mosquito - and other water - associated parasitic infections. The LGA is made up of several rural communities including Ihiagwa, Nekede, Eziobodo, Okolochi, Obinze, Umuezereokam (which was used as the study site) as well as several others.

Owerri North, the second LGA studied has its headquarters in the town of Orie Uratta. It has an area of 198km² and a population of 175,395 as recorded in the 2006 census (Federal Government of Nigeria, 2007). The major occupations of indigenes of the LGA are farming, fishing, and trading, while the rest are in the civil service. The presence of three rivers, namely Otamiri, Oramiurukwa, and Okitankwo which serves the indigenes' water needs; also provide a veritable breeding ground for mosquito and other water borne parasitic diseases. Some of the rural communities that make up the LGA include Emekuku, Emii, Egbu, Naze, Uratta, and Ebikoro (the study site).

The last of the three LGA's studied was Ngor Okpala with headquarters in the town of Umuneke Ngor. It has an area of 561km² and a population of 159,932 as recorded in the 2006 census (Federal Government of Nigeria, 2007). There are so many communities in the LGA including Ntu, Alulu, Amala, Orburu, Obokwe, Eziama, Okpala, Ohekelem, Ihite, Obike, Elelem, Nguru (the study site) and many others. The inhabitants of this LGA share similar occupations with the indigenes of the first two studied LGAs. Two rivers, Otamiri and Oramiurukwa traverse the landscape of the LGA providing the indigenes with the essential natural resource, the mosquitoes, an important breeding site and other parasitic diseases, a vehicle for transmission.

Study Population:

The study population included 600 volunteers, made up of 200 indigenes each, of Umuezereokam community (Owerri West), Ebikoro community (Owerri North), and Nguru community (Ngor Okpala). All the volunteers which were composed of equal numbers (100 each) of males and females aged between 11 and 80 were selected at random. The purpose of the study was fully explained to them and their community leaders and their informed consents obtained before blood samples were collected from healthy and sick volunteers (TDR, 2002). This was carried out for a period of six months, from the month of June, 2008 to the month of November of the same year.

Collection of Samples / Screening:

3ml of blood samples were collected from each volunteer using 5ml syringes. The samples were then transferred into fresh EDTA bottles, labeled with a code number, age and sex of each volunteer, and taken to the laboratory for screening and identification of microfilaria (if present) of Lymphatic Filariasis. All blood samples were collected at night between 10pm and 12am in the homes of the volunteers. The screening was done using Giemsa-stained thick blood films as recommended by WHO (WHO, 1991).

RESULTS AND DISCUSSION

Six hundred blood samples made up of 200 each, from the indigenes of the communities (Umuezereokam, Ebikoro, Nguru) under study, were collected at random and screened for a possible presence of the microfilariae of lymphatic filariasis. Using species characteristics, all positive samples were identified as the microfilariae of *Wuchereria bancrofti* (Table 1).

Table 1: Identification of parasite in blood samples of 600 volunteers in three LGAs in Imo State, Nigeria

Blood film	Sheath	Nuclei	Tail	Confirmed organism
Thick Film	Present (unstained)	Central (discrete)	bent	Microfilaria (*W. bancrofti*)

The results further revealed in Table 2 that Umuezereokam community, (Owerri West), produced a total of 43 (21.5%) samples positive for *W. bancrofti*, Ebikoro community, (Owerri North) produced 47 (23.5%) and Nguru community (Ngor Okpala) 58 (28%). The result also revealed that the age group of 11 – 20 produced the highest number of positive cases with 10 (5%) for Owerri West, 14 (7.0%) for Owerri North, and 20 (10%) for Ngor Okpala.

Table 2: Age distribution of volunteers in a study in Imo State, Nigeria (Figures in parenthesis represent percentages)

Age	Owerri West			Owerri North			Ngor Okpala		
	No screened	No +ve	No –ve	No screened	No +ve	No –ve	No screened	No +ve	No -ve
11-20	58(29)	10(5.0)	48	84(42)	14(7.0)	70	62(31)	20(10)	42
21-30	38(19)	4(2.0)	34	41(20.5)	0(0.0)	41	26(13)	12(6)	14
31-40	25(12.5)	12(6.0)	13	29(14.5)	16(8.0)	13	18 (9.0)	2(1.0)	16
41-50	26(13)	0(0.0)	26	15(7.5)	7(3.5)	8	15(7.5)	4(2.0)	11
51-60	31(15.5)	6(3.0)	25	17(8.5)	6(3.0)	11	34(17)	6(3.0)	28
61-70	13(6.5)	10(8.0)	3	10(5.0)	4(2.0)	6	30(15)	4(2.0)	26
71-80	9(4.5)	1(0.5)	8	4(2.0)	0(0.0)	4	15(7.5)	8(4.0)	7
Total	200(100)	43(21.5)	157	200(100)	47(23.5)	153	200(100)	56(28)	144

The study recorded a total number of 146 (73%) positive among the males and females from the three LGA's under review. Out of this number, 85 (42.5%) were males while 61(30.5%) were females. Ngor Okpala with 36 (18%) produced the highest number of male sufferers while Owerri West produced the highest number of female sufferers with 21 (10.5%) (Table 3).

Table 3: Sex distribution of volunteers in a study in Imo State, Nigeria (Figures in parenthesis represent percentages)

Sex	Owerri West			Owerri North		Ngor Okpala		Total+ve
	No screened	No +ve	No –ve	No +ve	No –ve	No +ve	No -ve	
Male	100	22(11)	78	27(13.5)	73	36(18)	64	85(42.5)
Female	100	21(10.5)	79	20(10)	80	20(10)	80	61(30.5)
Total	200	43(21.5)	157	47(23.5)	153	56(28)	144	146(73)

Discussion:

Lymphatic filariasis is caused by infection with any of several round thread-like parasitic worms, namely *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori* which are transmitted by various mosquito species. Humans are the only definitive host for *W. bancrofti*, which accounts for 90% of infections while for *B. malayi* and *B. timori*, which account for the remaining 10%, a number of other animals could harbour the parasites (Behbehani, 1999). The results obtained in this study which identified *W. bancrofti* as the only cause of lymphatic filariasis in the three LGAs under survey in Imo State, Nigeria, further established the fact that this parasite is responsible for most human infections of the disease.

The age group of 11-20 produced the highest rate of infection in the three LGAs compared to other age groups, with Ngor Okpala producing the highest number of positive cases. This could be as a result of the fact that this age group is made up young boys and girls who expose themselves to the stagnant water breeding sites of the disease-transmitting mosquitoes. The infection in the children was found to be subclinical as no characteristic symptoms of the disease were observed and this is in agreement with the findings of WHO (World Bank, 2009).

The fact that Ngor Okpala produced the highest rate of infection could not be unconnected with the fact that the LGA is more rural than the other two. In addition to the stagnant waters, shrubs and bushes were found in close proximity to living homes and these could provide additional breeding sites for the mosquitoes, thereby increasing the chances of more disease cases within this rural LGA. In addition, the near absence of pipe borne water forces the inhabitants to rely on water from the rivers, which are preserved in containers around houses, for their daily needs. This further serves as a veritable breeding ground for the mosquitoes and hence, a potential source of infection for other water borne parasitic infections.

The findings in the three LGAs studied revealed that within the period of study more men than women suffered from the scourge of lymphatic filariasis. The most commonly observed clinical signs and symptoms of the disease in the men especially, the few elderly ones who volunteered, included elephantiasis, hydrocoele, dermatitis and periodic fever while in the women, the most common symptom was lymphoedema. In a study in Ebonyi State, South Eastern, Nigeria, Anosike *et al*., (2005) reported similar clinical signs in the population he sampled, signifying that these clinical signs could be the commonest associated with the disease in this part of Nigeria. The higher prevalence of the disease in men than women has been reported elsewhere (Obi *et al.,* 2010).

From this study, lymphatic filariasis could be regarded as a disease of rural dwellers who cultivate the land. Their farming practices especially in wet lands bring them in close proximity to the Anopheles mosquito insect vectors of the disease. In addition to filariasis therefore, malaria is likely to be the next common disease in the communities since both diseases share this common vector. In Nigeria, much awareness is created as to dangers of malaria infection but none is mentioned about lymphatic filariasis. Though a neglected disease, the latter is the second most dangerous insect transmitted parasitic infection after malaria (Shona *et al.,* 2001), and the second most common cause of disability after mental illness (Ottesen, 1984). However, though enough publicity is not given to the morbidity and mortality issues of the disease, drug (ivermectin) distribution is initiated in any community where the disease is reported. While this measure could be considered as alright, it is our opinion that Government and other health care providers should not wait till this disease outbreak is reported before any intervention programme is initiated but should introduce a surveillance system whereby health monitors would visit farming and fishing communities periodically, screen a few blood samples of inhabitants and initiate early treatment in the case of identification of positive samples. In addition, since the disease in the children studied was subclinical, and since it has been established that the untreated subclinical infection in children progresses to a clinical situation in adult life, all children diagnosed of the infection should be administered with the appropriate dose of ivermectin. In addition, every individual involved in farming in the rural communities should be taught to wear protective clothing while in the farm to reduce contact with the blood sucking insect vectors even if the clothes will hamper their productivity. Furthermore, enough enlightenment should be created as to the dangers of storing water in open containers, as well as not clearing bushes, around living homes. Finally, Government and WHO effort currently being made to distribute insecticide treated nets to all parts of Nigeria should be sustained as the nets, though made to prevent malaria, could also serve to prevent lymphatic filariasis.

The impact of lymphatic filariasis on the economy is indeed enormous since as the disease progresses, the individual's capacity to labour, both productively and reproductively, is increasingly hampered.

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