Prevalence Of Lymphatic Filariasis In Three Villages In Kano State, Nigeria

M Dogara, H Nock, R Agbede, S Ndams, K Joseph

Citation

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Abstract

The Nigeria Lymphatic Filariasis Elimination Programme (NLFEP) has set 2015 to eliminate the disease in the country. The success of this programme depends on identifying and treating endemic communities. Unfortunately, information on the distribution and nature of the disease from many parts of the country is lacking. This study aims at determining the distribution and nature of the disease in three selected villages in Kano State, Nigeria. Based on the results of an earlier survey of elephantiasis in 44 local government areas (LGAs) of Kano State, three villages; Marke, Gunduwa and Buda from Dawakin-Tofa, Gabasawa and Garko LGAs respectively were selected for this study. A house-to-house census was undertaken to obtain the demographic information of the selected villages. The prevalence of the disease was determined by clinical and parasitological examinations. The clinical examination identified symptoms of adenolymphangitis (ADL), hydrocoeles and elephantiasis among the population of three villages. The Thick Blood Film (TBF) method was used to screen volunteers for the presence of Wuchereria bancrofti. The results showed that 43(1.5%) of the 2790 males examined had hydrocoele. The prevalence increased with age reaching a peak in the 60 - 69 year age group before it drops at 70+ year age group. However, the difference in prevalence between the age groups at $P< 0.05$ was not significant. 12(0.2%) have elephantiasis of various grades, 9(0.3%) were females while 3(0.1%) were males. Parasitological examination among 183 volunteers showed that 3(1.6%) all males were found to be positive. Correlation ($r=0.32$) was significant ($P>0.05$) between hydrocoele and the presence of W. bancrofti microfilaria in the villages. The overall prevalence for the three villages is 58(1.1%). Lymphatic filariasis is endemic in the three villages which is above the 1% level of endemicity recommended for selecting endemic communities for the mass drug administration (MDA) to eradicate the disease.

INTRODUCTION

Lymphatic filariasis is a tropical disease caused by the parasitic filaroid nematode worms Wuchereria bancrofti, Brugia malayi and B. timori (Anosike et al; 2005). Of the 73 countries where lymphatic filariasis is known to occur, 38 are in Africa and in this region infections are exclusively caused by W. bancrofti (Mbah and Njoku, 2000). The third most endemic country for this disease (after India and Indonesia) is Nigeria, where bancroftian filariasis is 22.1% (Michael et al; 1996). Available literature on the disease in Nigeria shows that it is prevalent and widespread in the north central, north east, south east and Niger Delta areas (Abel et al; 2002, Akogun et al; 2002, Anosike et al; 2005, Anosike et al; 1996, Braide et al; 2003, Mbah and Njoku, 2000, Udonsi,1988 and Ufomadu et al; 1990).

The disease caused severe morbidity which is the second most important cause of permanent disability (WHO, 1995). Acute symptoms such as episodic adenolymphangitis cause severe physical suffering while the chronic conditions such as lymphoedema and hydrocoele cause permanent disfigurement and psycho-social problem (Pani et al; 1995, Gyapong et al; 1996, Ramaih et al; 1996b, Pani and Srividya,1997). Lymphatic filariasis results in loss of work, productivity, direct and indirect economic loss and functional impairment (Pani et al; 1995 Ramaiah et al; 1996c, 1997a, b and Ramu et al; 1996). Consequently, the disease is a significant impediment to socio-economic progress of the endemic countries (Srividya et al; 2000).

Dramatic advances in treatment methods, both for controlling transmission and for simple, successful approaches to disease management, along with remarkable improvement in techniques for diagnosis of the infection, led an independent International Task Force for Disease Eradication to identify lymphatic filariasis as one of only six infectious diseases it considered to be “eradicable” or potentially eradicable with tools currently available (CDC, 1993). In 1997, the World Health Assembly targeted

lymphatic filariasis for elimination through Mass Drug Administration (MDA). This is currently recommended in communities known or suspected to have a prevalence of lymphatic filariasis greater than 1% (Ottesen et al; 1997). With new tools and strategies available, there is a now global effort to eliminate the disease by 2020 (Erlanger et al; 2005). The success of the global initiative largely depends on countries identifying endemic communities that require the MDA. The Nigeria Lymphatic Filariasis Elimination Programme (NLFEP) with assistance of Carter Centre has set 2015 as the year to eliminate the disease in Nigeria (Anosike et al; 2005). In order to achieve this goal there is need to identify all endemic communities that will require the MDA. Unfortunately, epidemiological information is still needed on the distribution, clinical signs and intensity in many parts of Nigeria because many areas in the country remain unidentified and unstudied (Anosike et al; 2005).

Previous studies have shown that Kano State is endemic for a number of tropical diseases, notably schistosomiasis. However, the status of lymphatic filariasis in Kano State is unknown. This work which forms part of a larger study, describes the prevalence of the disease using clinical and parasitological methods in three selected villages in Kano State.

MATERIAL AND METHODS

The Study Area: Kano State is located in the north western Nigeria. The state is situated between 100° 37'N - 100° 33'N and 70' 34'E - 90° 29'E respectively. The State is bordered in the east by Jigawa State, on the west by Katsina State, to the south by Kaduna and Bauchi States. It covers a total area of 20,760SqKm with 1,754,200 hectares of arable land and 75,000 hectares of forest vegetation and grazing lands. The topography is generally flat. The main river is the Kano River on which the second largest dam, Tiga is built. Minor rivers include Challawa, Watari, Tomas and Kafin-Chiri. It has an estimated population of about 9,383,332 million people (14).

The State is situated on the Sahel savannah region of West Africa and its climatic condition is tropical having rainy and dry seasons. The length of the wet season is about 100 – 150 days or five months (from mid-May to mid-October of each year). Rainfall pattern is unimodal; with an average rainfall of 600mm. The dry season lasts for about seven months (from mid-October to mid-May of each year). However, there is the dominance of North Easterly winds, the Harmattan which is cold and dry that extends from November to February of each year. The average maximum and minimum temperatures fluctuate throughout the year. The annual mean ranges from 30°C to 35°C. High temperatures are recorded during March to May annually while the lowest 13°C (sometimes it goes down as low as 10°C) is from December to January.

Prevalence of Lymphatic Filariasis in Three Villages: Based on the results obtained from a prevalence survey of elephantiasis in the 44 local government areas of Kano State, three (3) villages were randomly selected for the study. The villages selected were Marke, Gunduwa and Buda from Dawakin-Tofa, Gabasawa and Garko Local Government Areas (LGAs) respectively. A house-to-house census was undertaken to obtain the demographic picture of the selected villages. The prevalence of lymphatic filariasis was determined by clinical and parasitological examinations.

Clinical Examination: Clinical examination was done with the help of Community Health Assistants in-charge of the Comprehensive hospitals in the villages. The initial procedure involved the village heads, ward heads and other opinion leaders that helped in identifying from house-to-house people with chronic symptoms of lymphatic filariasis particularly hydrocoele and elephantiasis. This was then followed by physical examination of the identified individuals in each of the village clinic. The determination of clinical signs focused on histories of acute symptoms such as adenolymphangitis (ADL) and chronic symptoms of hydrocoeles and elephantiasis.

Parasitological Examination: (i) Blood Collection: Volunteers including some of those who were clinically examined were screened for the presence of microfilariae after obtaining informed consent of each participant in the three villages. With the help of qualified health personnel, the peripheral blood was collected by pricking the thumb finger of the subject with a sterile lancet into an unheparinized capillary tube was used to collect the blood from each volunteer between 21-24 hours.

(ii) Slide Preparation and Identification of Microfilariae: The blood was then dropped in the middle of a labelled grease-free microscope slide and then spread out to the size of a coin, using the edge of a slide. The blood was allowed to air dry on the slide. The dry slides were then fixed and stained as outlined in (WHO,1997a). Briefly, the slides were dehaemoglobinized by dipping the slides in clean water for 3 – 5 minutes to wash off the pigment and cells. The slides were then fixed with methanol, stained with Giemsa stain

(1:10 dilution) and then observed under the light microscope (x100 objective) for the presence of microfilariae. Microfilariae were identified based on specific differential morphological features and sizes using the manual developed in (WHO, 1997a). Thereafter, the number of microfilariae observed was counted on each slide. Information on each volunteer and results of the observations made were documented. Positive slides were confirmed by well trained staff at the Carter Centre, Jos.

Ethics Statement: Permission to conduct the research work was given by the Kano State Ministry for Local Government via a letter dated 14 th April, 2004. Informed oral consents of all the subjects that participated in the clinical and parasitological examinations were sought. The consents were sought orally because the subjects could neither read nor write. All the participants gave their consents to participate in the clinical and parasitological examinations. The consents were duly acknowledged in the research report. Review and approval for the work including the accepted oral consents of the participants was granted by the Postgraduate Research Committee, Department of Biological Sciences, Ahmadu Bello University, Zaria, Nigeria.

Data Analysis: The data generated from prevalence of lymphatic filariasis in the three villages was analyzed using Epi-info version 3.8. In case of data generated from clinical examination independence and relationship of age, sex and chronic symptoms (hydrocoele and elephantiasis) were calculated. The data obtained from parasitological examination was also treated in the same way where independence of age, sex and presence of microfilariae in the screened population was calculated. Correlation coefficient was used to determine whether or not there was association between chronic symptoms (hydrocoele and elephantiasis) and presence of microfilariae.

RESULTS

Clinical Examination: The demographic census of the three villages revealed that they have a population of 5,438 inhabitants comprising of 2,790 males and 2,648 females. Specifically, Buda has a total population of 2,250 inhabitants, Marke 1,522 and Gunduwa 994. The result from clinical examination shows that 43(1.5%) out of 2790 males had hydrocoeles of various grades and types. The hydrocoeles rate increased with age between the age group 30 – 39 and 60-69 year age groups, but dropped at 70+ year age group (Table, 1). However, the difference between the age groups was not significant (p>0.05). Nobody below the age thirty years was found to have hydrocoele.

Figure 1

Table, I: Frequency of hydrocoeles in relation to age

Age-Group	Population	Number with hydrocoeles	Percentage
1 – 9	976	0	0%
10 – 19	546	0	0%
20 – 29	404	0	0%
30 – 39	326	4	1.2%
40 – 49	227	11	4.8%
50 – 59	159	11	6.9%
60 – 69	121	11	9.0%
70+	121	6	4.9%
Total	**2790**	**43**	**1.5%**

Of the 43 individuals with hydrocoeles (2.3%) was grade I type, 28(65.1%) grade II type and 14(32.6%) grade III type. The grading of hydrocoeles according to age group is shown in Table, 2. The difference between the grades at P<0.05 was significant. The grading of hydrocoeles also seems to increase with age. The distribution of hydrocoeles according to villages showed that Gunduwa had 9 (1.8%), Buda 13(1.1%) and Marke 21(2.7%). The distribution of the hydrocoeles according to age-groups in the three villages is shown in Table 3, which also exhibited similar pattern when the results of villages were pooled together showing increase with age and then drops with advancing age. The differences in the prevalence between the age groups and between the three villages were not significant (P>0.05). The grading of the hydrocoeles in three villages is shown in Table; 4. The distribution of the hydrocoeles according to grades was significant (P>0.05) between the grades, but not significant between the three villages. Out of the 43 individuals with hydrocoeles, 21 did experienced ADL while 12 claimed that they never had any.

Figure 2

Table, 2: Grading of hydrocoeles according to age group

Age-Group	Grade I	Grade II	Grade III	Total
30 – 39	1	1	2	4
40 – 49	0	11	0	11
50 – 59	0	6	5	11
60 – 69	0	7	4	11
70+	0	3	3	6
Total	**1**	**28**	**14**	**43**

Figure 3

Table, 3: Frequency of hydrocoeles according to age groups

Age-group	Villages					
	Buda		Marke		Gunduwa	
	Popn.	No. with hydrocoeles	Popn.	No. with hydrocoeles	Popn.	No. with hydrocoeles
1 – 9	269	0	273	0	140	0
10 – 19	243	0	122	0	109	0
20 – 29	178	0	131	0	53	0
30 – 39	122	1	116	3	53	0
40 – 49	94	5	48	6	53	0
50 – 59	65	6	43	5	32	0
60 – 69	44	1	25	6	35	4
70+	50	0	20	1	26	5
Total	**1166**	**13**	**778**	**21**	**501**	**9**

Figure 4

Table, 4: Distribution of hydrocoeles according to grades in the three villages

Grades	Villages			
	Gunduwa	Buda	Marke	Total
I	0	0	1	1
II	5	8	15	28
III	4	5	5	14

Twelve individuals were found to have limb elephantiasis of various grades in the three villages. Out of these cases, four were located on the left leg and eight on the right leg. In Buda, among the four individuals with limb elephantiasis one had it on left leg, 3 had it on right leg while in Gunduwa 3 had it on left leg and 2 on right leg. The two persons from Marke with limb elephantiasis had it on their right legs. Nine (0.3%) of those with limb elephantiasis were females while 3(0.1%) were males. The analysis showed that the difference based on sex was not significant (P>0.05). The age distribution according sex is shown in Table, 5.

Figure 5

Table, 5: Distribution of limb elephantiasis in relation to age and sex

Sex	Age-Group	Population	No. with elephantiasis
Females	1 – 9	847	0
	10 – 19	543	0
	20 – 29	498	1
	30 – 39	293	0
	40 – 49	180	3
	50 – 59	98	1
	60 – 69	100	4
	70+	76	0
Sub-Total		**2635**	**9**
Males	1 – 9	873	0
	10 – 19	543	0
	20 – 29	404	0
	30 – 39	326	0
	40 – 49	227	0
	50 – 59	159	1
	60 – 69	121	1
	70+	127	1
Sub-Total		**2783**	**3**
Total		**5438**	**12**

Limp elephantiasis was also found to increase with age and nobody less than 20 years of age was found to have it. The grading of limb elephantiasis based on the work of Mbah and Njoku, (2000) showed that three had Grade I, four had Grade II and five had Grade III. Ten of these individuals with limb elephantiasis do experience ADL while two claimed that they never had it. The distribution of elephantiasis in relation to age and sex in the three villages is shown in Table, 6 which exhibited similar pattern when the results of the three villages were pooled together. The prevalence of elephantiasis in relation to sex and age between the three villages was not significantly different (P>0.05).

Figure 6

Table, 6: Distribution of limb elephantiasis in relation to age and sex in Gunduwa, Marke and Buda villages

Sex	Age-group	Villages					
		Buda		Marke		Gunduwa	
		Popn.	No with hydrocoeles	Popn.	No with hydrocoeles	Popn.	No with hydrocoeles
FEMALE	1 – 9	130	0	271	0	353	0
	10 – 19	94	0	151	0	210	0
	20 – 29	109	0	120	1	208	0
	30 – 39	52	0	74	0	132	0
	40 – 49	42	1	35	0	65	2
	50 – 59	18	1	26	0	40	0
	60 – 69	14	2	30	1	39	1
	70+	15	0	23	0	31	0
	Sub-Total	**474**	**4**	**730**	**2**	**1078**	**3**
MALE	1 – 9	140	0	273	0	369	0
	10 – 19	109	0	122	0	243	0
	20 – 29	53	0	131	0	178	0
	30 – 39	53	0	116	0	122	0
	40 – 49	53	0	48	0	94	0
	50 – 59	32	0	43	1	65	1
	60 – 69	35	0	25	0	44	0
	70+	17	0	20	1	50	0
	Sub-Total	**501**	**1**	**778**	**1**	**1166**	**1**

Parasitological Examination: A total of 183 individuals were screened for W. bancrofti microfilariae in the three villages (Gunduwa, Marke and Buda). The samples comprised of 5 females and 37 males from Buda, 6 females and 89 males from Gunduwa and 43 all males from Marke. The age of the participants ranged between 7 to 90 years. The mean age for the females was 18.5 years and that of males 34 years. The occupational profile of the volunteers screened composed of civil servants 7, traders 9, students 32, pupils 11, farmers 74 and hunter, 1. Four of the participants had hydrocoele while two had elephantiasis.

Out of 183 persons screened, only 3(1.6%) were found positive for W. bancrofti microfilariae. Each of the three villages had one positive case – Gunduwa 1(1.1%), Buda 1(2.3%) and Marke 1(2.3%). The worm burden (microfilariae count) was six, four and two in the three positive cases of 75, 50 and 42 years respectively. Two of those with hydrocoele were found to be positive. Correlation coefficient analysis obtained indicated a weak correlation between hydrocoele and the presence of W. bancrofti microfilariae in individuals (r=0.32). However, none of the two individuals with limb elephantiasis were found to be positive for microfilariae.

Finally, the overall prevalence of the disease in the three villages was 58(1.1%).

DISCUSSION

Out of the two major chronic symptoms of lymphatic filariasis (hydrocoele and elephantiasis), hydrocoele among men occurred more frequently in the three villages. The overall prevalence of 43 (1.5%) when compared with some results of previous studies in Nigeria and elsewhere appeared to be low. For instance, Abel et al; (2002) reported an overall prevalence of 12.9% from central states of Plateau and Nassarawa States, Nigeria, while Udonsi (1986) reported hydrocoele prevalence of 12.3% in Niger Delta areas and 15.5% in the Igwun River Basin respectively. However, the finding of Anosike et al; (2005) of an overall hydrocoele prevalence of 22(1.8%) is comparable with that of the present study. The low prevalence obtained may be because the sample size involved all males in the three villages as it rarely occurs among children. The increase in hydrocoele prevalence with age is in agreement with several studies such as those of Onapa et al; (2001) in three communities in Uganda, Simonsen et al; (1995) in three endemic communities of north-eastern Tanzania and Omudu and Okafor et al; (2007) among Igede ethnic group in Benue State, Nigeria. The grading of hydrocoeles which was found to increase with age is also in agreement with the work of (McMahon, Magayaka and Kolstrup, 1981).

The low prevalence of limb elephantiasis 12(0.2%), its appearance in later stage of life and its gradual increase with age is in agreement with most previous findings such as those of Abel et al;(2002), McMahon, Magayaka and Kolstrup, (1981) and Simonsen et al; (1995). In this study more females had elephantiasis than males which is agreement with the report of Simonsen et al; (1995}, but differed from that of Dzodzomenyo and Simonsen, (1993) and Omudu and Okafor, (2007) which indicated that all those with elephantiasis were females. However McMahon, Magayaka and Kolstrup (1981), reported almost equal frequency among both sexes in five endemic communities in north eastern Tanzania.

The prevalence of microfilariae was 1.6% in the three villages. The low microfilariae prevalence suggests low-level of infection in the villages. It could also result from the lack of reliability and sensitivity of the TBF method used to identify infections that are most probably very light in the individuals sampled. This is supported by the fact that the highest number of worm burden recorded among the three

infected individuals was six. Although, the prevalence is low; it is above the 1% level of endemicity recommended for selecting endemic communities for the mass drug administration (MDA) in the global effort to eradicate the disease.

The low prevalence of microfilariae compared well with previous studies in Nigeria and elsewhere. For example, Anosike et al; (2002) reported an overall prevalence 16.9% in ten communities in Ebonyi State while Udonsi, (1986) reported an overall prevalence of 12.8% in Igwun basin, Niger Delta. In another finding, Dzodzomenyo and Simonsen, (1993) revealed an overall prevalence of 26.4% in an irrigation project community in Southern Ghana.

In this study, none of the female participants was found with microfilariae probably because few of them participated in the screening exercise. In addition, they may not be prone to exposure to the bite of mosquitoes when compared to men. This is because in a typical Hausa society, the women folk traditionally tend to cover their entire bodies and do not stay outdoor as often as men do. The low turnout of female participants in this exercise is attributable to the purdah system prevalent in the three communities which does not allow women to go out most of the times even during the day time talk less of in the night when the survey was conducted. None of the children aged 1- 15 years was found to be microfilariae positive probably because immunological suppression of the microfilariae as suggested by McMahon, Magayaka and Kolstrup, (1981) and the lack of sensitivity and the reliability of TBF method used to determine infection in this group. In addition, the rare occurrence of microfilariae in children is that high numbers of infective bites and a prolonged period of time are necessary before the establishment of a patent infection with mf will occur (Southgate, 1992).

The significant correlation obtained between the hydrocoeles and the presence of microfilariae in this study agrees with findings of Simonsen et al; (1995), but it differed from that of Dzodzomenyo and Simonsen, (1999). This is an indication the hydrocoeles may be due to lymphatic filariasis in these villages.

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Lymphatic filariasis is endemic in the three villages of Kano State, and the prevalence which is well above 1% make these villages to qualify for mass drug administration MDA) in order to eliminate the disease. However, there is need to carry out further studies in more villages using more sensitive and reliable diagnostic techniques such as Immunochromatographic (ICT) card for the detection of infected persons.

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Author Information

Musa Mustapha Dogara
Department of Integrated Science, Federal College of Education

Haruna Ishaya Nock
Department of Biological Sciences, Ahmadu Bello University

Rowland Ibrahim Shehu Agbede
Department of Veterinary Parasitology and Entomology, Ahmadu Bello University

Shehu Iliya Ndams
Department of Biological Sciences, Ahmadu Bello University

Kumbur Kwaghga Joseph
Department of Zoology, University of Jos