



Status of lymphatic filariasis in fakai local government area of Kebbi state, North-western, Nigeria

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Abstract

Lymphatic filariasis, also known as elephantiasis was earmarked for elimination worldwide by the year 2020. Mass Medicine Administration (MMA) has been going on in Fakai LGA for over six years since it was found endemic and eligible for MMA. This study, conducted between November and December 2018 was designed to determine the transmission status and associated morbidities of lymphatic filariasis in Fakai LGA. The study was conducted in six selected villages of Fakai LGA (Awal, Bangu, Chasgu, Fakai, Jinga and Maikende). Four scientific methodologies were employed: Serological test using Immunochromatographic Card Test (ICT) for the detection of Circulating Filaria Antibody (CFA), parasitological test or routine microscopy using night blood samples to isolate the microfilaria of the parasite, search for clinical manifestations of lymphoedema, elephantiasis, hydrocele and breast oedema and mosquito collection and dissection. Out of 423 persons examined, only 3(0.71%) tested positive to the filarial antibody and none (0.00%) had microfilaria in peripheral blood. There was significant association between infection rate and variables of village, age, gender, occupational and educational status ($p < 0.05$). Overall prevalence of all clinical manifestations was 14.18% with lymphoedema, hydrocele and fever/chills constituting 4.73%, 2.13% and 7.33% respectively of the total population. Clinical manifestation was significantly higher in Bangu village (33.33%) ($p < 0.05$) and none was observed in chasgu except fever/chills. A total of 108 female mosquitoes (54 Anopheles and 54 Culex) were dissected and none harbored the microfilaria of *Wuchereria bancrofti*. It was concluded that transmission has been reduced below sustainable level, however, more effort is required at increasing MMA to completely eliminate the infection in Jinga and Fakai villages.

Keywords: lymphatic filariasis, hydrocele, lymphoedema, fakai LGA

Introduction

Lymphatic filariasis (LF), also known as Elephantiasis is a mosquito-borne parasitic disease that damages the lymphatic system leading to severe disfigurement, pain and disability. The causative agents are *W. bancrofti*, *B. malayi* and *B. timori* [1]. Acute stage manifests as fever/chills, pains, inflammation (lymph nodes/vessels) while chronic stage manifestations include lymphoedema, elephantiasis, hydrocele, kidney damage, etc and lead to social stigma and financial loss. The global baseline estimate of people affected by the disease was 25 million men with hydrocele and over 15 million people with lymphedema [2]. Infection is usually acquired in childhood causing hidden damage to the lymphatic system. Repeated mosquito bites are required to get the infection. Those living in endemic areas for a long time are at risk.

Lymphatic filariasis is found in tropical and sub-tropical countries. Eight hundred and fifty six (856) million people in 52 countries worldwide are threatened, 36 million are living with morbidity [3]. Nigeria is currently the 2nd most endemic country globally after India and still the most endemic in Africa

[4]. Over 120 million Nigerians are at risk nation-wide [5].

Mass Medicine Administration (MMA) has been going on for over 6 years in Fakai L.G.A. and it is necessary to determine if transmission has been halted so that MMA can be stopped. This study will provide information on the transmission status of the infection and the disease in Fakai LGA. This much needed data will be utilized for prevention, control and monitoring purposes. Eliminating it will definitely prevent unnecessary suffering and contribute to reduction of poverty in affected communities.

Materials and methods

Study area

The study was conducted in Fakai LGA, Kebbi state. Fakai is located in Kebbi South between latitudes 11° 15' N-11° 44' N and longitude 4° 29' E-5° 10' E [6]. Mean annual rainfall is 500mm and temp of 21° C – 38° C. Four major ethnic groups- Fakkawa, Hausa, Gelawa and Fulani are found in the area. Majority are poor, live in thatched, cracked, mud huts unprotected from mosquitoes.

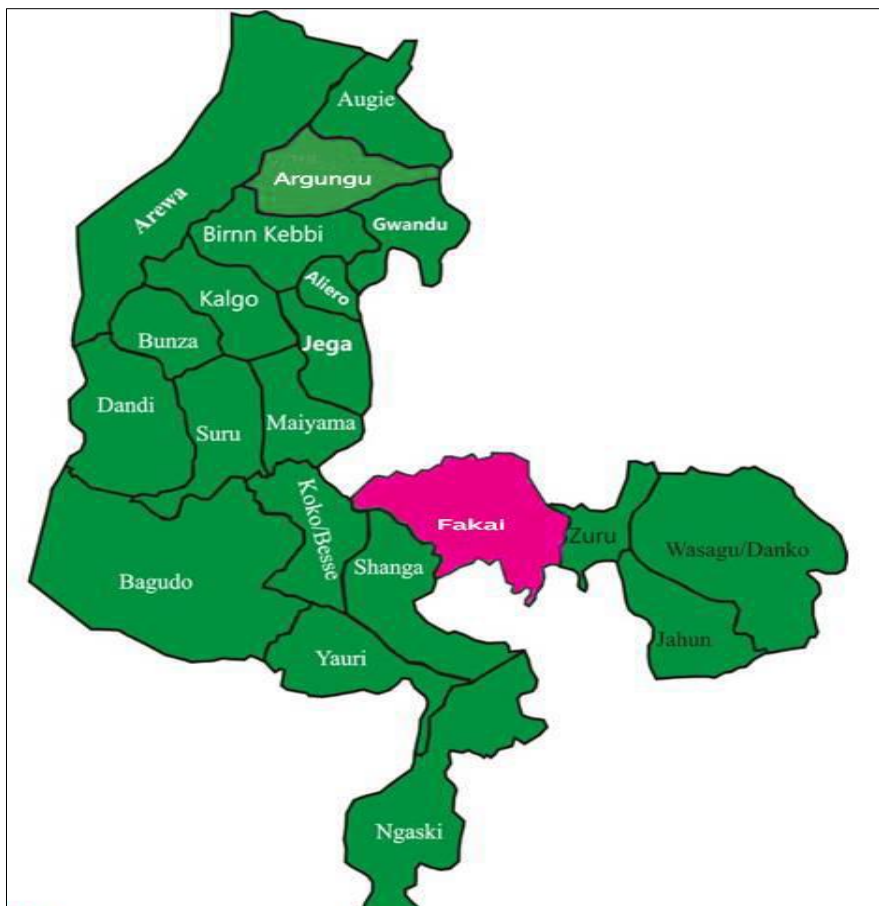


Fig 1: Map of Kebbi state showing fakai LGA

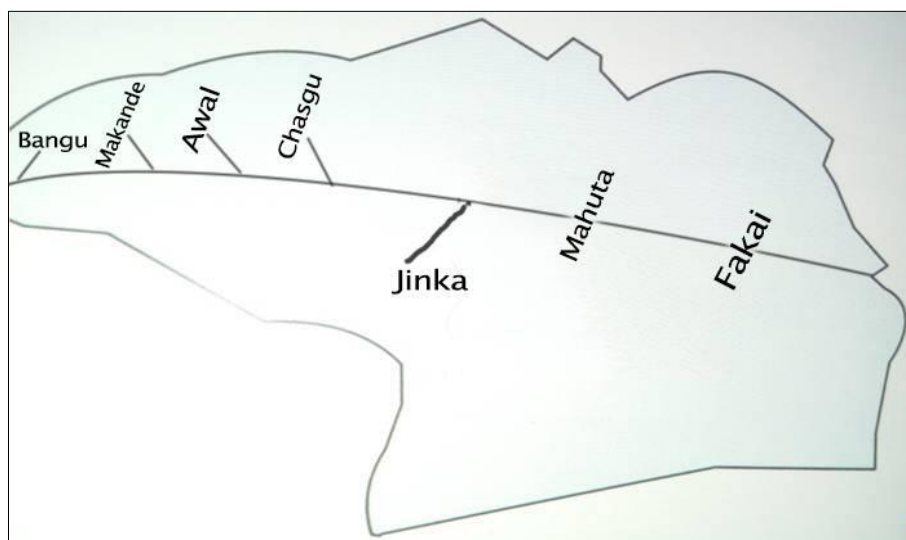


Fig 2: Map of fakai LGA showing study villages

Ethical permission/ sampling method / study design

Ethical Clearance was obtained from Ministry of Health Kebbi State, permission was also obtained from Fakai LGA secretariat and village heads. Six villages were randomly selected by simple balloting technique- Awal, Bangu, Chasgu, Fakai, Jinka and Maikende. It was a cross-sectional study and participation was voluntary. The age allowed was 5 years and above.

Serological test

After collecting demographic data, ICT (kit used is the Onsite

filariasis IgG/IgM Combo Rapid Test) was performed following manufacturer’s instructions on the kit. The participants left index finger was cleaned with cotton wool soaked in methylated spirit and punctured with sterile lancet. Sufficient fresh blood to fill a 100ul capillary tube was obtained and transferred to the sample well on the test cassette. ICT result was read after 15 minutes. Positive result – 2 or 3 pink lines appear on the test window. Negative result – only one line, the c line (control) appear. If the C line did not appear at all, test is invalid. Test result was recorded on both cassette and individual data sheet.

Parasitological examination

Night blood samples were collected by finger-pricking between 10.00pm and 2.00am. Thick smears were made from about 20 µL blood, air dried, fixed in methanol, stained with giemsa and examined under microscope [7]. Microfilariae were identified based on specific morphological features, counted and recorded on the data sheet.

Clinical examination

Search for chronic clinical manifestations was conducted with the help of a trained medical personnel. Consented males were examined in private rooms with good light for hydrocele [8] Limbs of participants and female breasts were examined for lymphedema and breast oedema. Acute stage symptoms (Adenolymphangitis) were diagnosed by taking history of periodic fever/chills lasting 4-7days.

Entomological studies

Houses were randomly selected for mosquito collection. Light traps and pyrethrum spray (Baygon) were used between 6.00pm and 6.00am. Collections were separated by sex, males discarded, females identified into genera, and dissected.

Data analysis

Data was analyzed using SPSS package version 21.0. Chi-square analysis was used to determine association between infection and variables. Entomological data was presented in tables and percentages. P value < 0.05 was considered statistically significant.

Results

Of the 423 individuals examined, 3 (0.71%) were positive for circulating Filarial Antibody (CFA) of *w.bancrofti* while none of the participants was positive for microfilarial of the parasite infection was highest in Jinga village with 2.78% followed by Fakai village with 1.39%. In other, villages no CFA prevalence (0.00%) was recorded (Table 1): There was significant association between the villages and the prevalence of lymphatic filariasis (p < 0.05).

The distribution of the infection according to age group showed that the age bracket 0-9 showed the highest prevalence of 2.33%. This was followed by the age group 30-39 with 1.81%, then 20-29 with a prevalence of 1.56%. the other age groups recorded zero prevalence (Table 2).

Married participants were significantly more infected, 2 (0.93%) than singles (0.48%) (p < 0.05) (Table 3). Females were also significantly more infected (0.78%) than males (0.68%) (p < 0.05) (Table 4) observed differences in the distribution of infection among occupational groups revealed that the highest prevalence was recorded among housewives (2.00%), followed by students/pupils (0.87), then farmers (0.76%). Other occupational groups did not record any infection (Table 5) the differences were statistically significant. Based on educational level, participants who had secondary school as their highest educational level had the highest

prevalence (4.26%) while those who did not go to school at all had 0.36%. Primary and tertiary level participants did not record any infection (Table 6). These differences were significant statistically.

Clinical manifestations of the disease observed in the area include hydrocele, lymphedema and fever/chills. Overall prevalence of hydrocele was 9 (2.13%) and lymphedema was 20(4.73%), fever/chills 31(7.33%) (Table 7). Unilateral and bilateral lymphedema were both observed. Distribution of clinical manifestation according to age showed that those within the age group 70+ had the highest prevalence of clinical manifestation 11(84.64%), followed by 60-69 15(79.00%) and 50-59 18(46.00) (Table 8). The differences were statistically significant (p < 0.05).

Species of mosquitoes caught in the arrear were Anopheles and culex. Out of 108 female mosquitoes dissected, none (0.00%) harboured the microfilaria of *W.bancrofti* (Table 9).

Table 1: Village-based distribution of infection rate in fakai local government

Villages	No examined	ICT +ve	Prev (%)	MF +ve	Prev (%)
Awal	70	0	0.00	0	0.00
Bangu	72	0	0.00	0	0.00
Chasgu	64	0	0.00	0	0.00
Fakai	72	1	1.39	0	0.00
Jinga	72	2	2.78	0	0.00
Maikende	73	0	0.00	0	0.00
Total	423	3	0.71	0	0.00

Table 2: Age group distribution of lymphatic filariasis infection in fakai local government

Age range	No estimated	ICT +ve	Prev (%)	MF +ve	Prev (%)
0-9	43	1	2.33	0	0.00
10-19	51	0	0.00	0	0.00
20-29	64	1	1.56	0	0.00
30-39	55	1	1.81	0	0.00
40-49	142	0	0.00	0	0.00
50-59	39	0	0.00	0	0.00
60-69	18	0	0.00	0	0.00
70+	11	0	0.00	0	0.00
Total	423	3	0.71	0	0.00

Table 3: Distribution of infection rate according to marital status

Marital Status	No. Examined	ICT +ve	Prev (%)	MF +ve	Prev (%)
Married	216	2	0.93	0	0.00
Single	207	1	0.48	0	0.00
Total	423	3	0.71	0	0.00

Table 4: Gender- related distribution of infection rate

Gender	No. Examined	ICT +ve (%)	Prev (%)	MF +ve	Prev (%)
Male	294	2	0.68	0	0.00
Female	129	1	0.78	0	0.00
Total	423	3	0.71	0	0.00

Table 5: Distribution of infection rate according to occupation

Occupation	No. Examined	ICT +ve	Prev (%)	MF +ve	Prev (%)
Farmers	131	1	0.76	0	0.00
Fishermen	3	0	0.00	0	0.00
House Wives	50	1	2.00	0	0.00
Student/ Pupil	115	1	0.87	0	0.00
Traders	54	0	0.00	0	0.00
Civil Servant	21	0	0.00	0	0.00
None	49	0	0.00	0	0.00
Total	423	3	0.71	0	0.00

Table 6: Infection rate based on educational level in fakai local government

Education	No. Examined	ICT +ve	Prev (%)	MF +ve	Prev (%)
Primary	88	0	0.00	0	0.00
Secondary	47	2	4.26	0	0.00
Tertiary	11	0	0.00	0	0.00
None	277	1	0.36	0	0.00
Total	423	3	0.71	0	0.00

Table 7: Clinical manifestations of lymphatic filariasis by village in fakai local government

Villages	No. Examined	Lymphoe dema (%)	Hydrocele (%)	Fever/chills (%)	Total (%)
Awal	70	3 (4.29)	0 (0.00)	2 (2.86)	5 (7.14)
Bangu	72	4 (5.56)	8 (11.11)	12 (16.67)	24 (33.33)
Chasgu	64	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Fakai	72	1 (1.39)	0 (0.00)	2 (2.78)	3 (4.17)
Jinga	72	8 (11.11)	1 (1.39)	11 (15.28)	20 (27.78)
Maikende	73	4 (5.48)	0 (0.00)	4 (5.48)	8 (10.96)
Total	423	20 (4.73)	9 (2.13)	31 (7.33)	60 (14.18)

Table 8: Physical manifestation of lymphatic filariasis by age in fakai local government

Villages	No. Examined	Lymphoe dema (%)	Hydrocele (%)	Fever/chills (%)	Total (%)
0-9	40	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
10-19	151	0 (0.00)	0 (0.00)	4 (2.59)	4 (2.59)
20-29	64	1 (1.56)	0 (0.00)	1 (1.56)	2 (3.13)
30-39	55	2 (3.64)	0 (0.00)	2 (3.64)	4 (7.27)
40-49	42	3 (7.14)	0 (0.00)	3 (7.14)	6 (14.28)
50-59	39	8 (20.51)	1 (2.56)	9 (23.08)	18 (46.00)
60-69	19	5 (26.32)	3 (15.79)	7 (36.84)	15 (79.00)
70+	13	1 (7.69)	5 (38.46)	5 (69.23)	11 (84.61)
Total	423	20 (4.73)	9 (2.13)	31 (7.33)	60 (14.18)

Table 9: Number, genera, infection rate and infectivity rate of mosquitoes dissected

Village	Anopheles	Cudex	No. with MF/ Infection Rate (%)	Infectivity Rate (%)
Awal	7	10	0(0.00)	0.00
Bangu	4	6	0(0.00)	0.00
Chasgu	10	7	0(0.00)	0.00
Fakai	13	10	0(0.00)	0.00
Jinga	10	11	0(0.00)	0.00
Maikende	10	10	0(0.00)	0.00
Total	54	54	0(0.00)	0.00

Discussion

Overall seropvelance of 0.71% in this study is lower than 10.0% [9] in Sokoto State, 21% [10] in India, 38.72% [11] in Zamfara State and WHO’s threshold of 1% seropositivity for MMA in a given community [12]. F prevalence of 0.00% is lower than WHO’s 1.7% threshold for Bancroftian filariasis [13]. This result is an indication that transmission of the disease in the area has been reduced to insignificant level. This is probably due to MMA with Albendazol and Ivermectin or Roll Back Malaria programme.

Significant disparity in village infection rate may be due to non-compliance to MMA Significant higher infection in females than males is similar to [14] in Ogun State. In Kebbi south (Yauri, Zuru, Fakai, etc) women engage in outdoor activities like men and so both are equally exposed to mosquitoes.

Infection was recorded in the younger age group (0-39 years) This is the age that engages more in outdoor activities. Again, in northern Nigeria many boys sleep outside their houses and Islamic schools with no protection from mosquito.

Two major chronic clinical symptoms (hydrocele and lymphoedema) encountered in this study confirms further that the disease is endemic in Fakai LGA. Hydrocele rate of 2.13% is higher than 1.5% reported by [15] in Kano and 0.6% by [9] in Sokoto. It is however lower than 12.8% by [16] in Benue State and similar to 2.6% by [17] in Angol Lymphoedema rate of 4.73% is higher than 3.1% by [18] and 0.2% [9] and 3.7% [19] in Imo.

Hydrocele was observed among elderly men (50 years and above) and Lymphedema (20 years and above). Chronic signs usually appear later in life. Lymphoedema was more common than hydrocele. This may be due to unhygienic practices of rural dwellers which predispose them to secondary bacterial or fungal infection.

Conclusion

Lymphatic filariasis transmission has been reduced below sustainable level in Fakai LGA, however little effort at increasing MMA compliance is needed to completely eliminate it in Fakai and Jinga villages.

Hydrocele was observed among elderly men (50 years and above) and Lymphedema (20 years and above). Chronic signs usually appear latter in life. Lymphoedema was more common than hydrocele. This may be due to unhygienic practices of rural dwellers which predispose them to secondary bacterial or fungal infection.

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