

Studies on Bancroftian filariasis in selected villages of Suru Local Government Area of Kebbi State, Nigeria.

Abstract

Lymphatic filariasis was earmarked for elimination by the year 2020 through the Global programme for the Elimination of Lymphatic filariasis (GPELF). Mass Medicine Administration (MMA) with albendazole and ivermectine went on in Suru LGA for over six years. This study is necessary to determine if transmission has been halted. A total of 420 volunteers in 6 rural villages were examined using Immunochromatographic Card Test (ICT) and routine microscopy. Physical manifestations and entomological studies were also conducted. Three participants 3 (0.71%) were positive using ICT and none had microfilaria of *W.bancrofti*. There was no 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 2.14% with lymphedema, hydrocele and fever/chills constituting 0.95%, 0.00% and 1.19% respectively of the total population. Clinical manifestation was insignificantly higher in Kawara and Suru (5.71%) and none was observed in Bendu, Bandan and Giro. The age group 50-59 (5.88%) was significantly associated with clinical manifestations of the disease. A total of 277 female mosquitoes were dissected and none harbored microfilaria of *W.bancrofti*. It was concluded that transmission has been reduced below sustainable level, however more effort is needed to increase MMA to completely eliminate the infection in Tindifai, Kawara and Suru villages.

Keywords: Lymphatic filariasis, MMA, ICT, Suru LGA.

Introduction:

Lymphatic filariasis is a mosquito-born parasitic disease, a neglected tropical menace that impairs the lymphatic system and leads to the abnormal enlargement of body parts, causing pain, severe disability and social stigma [1]. The causative agents are three parasites. *Wuchereria bancrofti*, *Brugia Malayi*

and *Brugia timori* with *W. bancrofti* being the commonest in Africa [2] and responsible for infection in Nigeria [3].

Infection with lymphatic filariasis is usually acquired in childhood while the visible manifestation appears later in life [4]. The infection can be asymptomatic, acute or chronic, majority of infections are asymptomatic showing no external sign of infection [5]. Acute manifestations include fever, chills, headache, skin lesions, swellings, warmth, redness and pain [6]. When it develops into chronic condition, it leads to lymphedema, hydrocele, breast oedema [7].

The disease is a public health problem in endemic area. In 2000, over 120 million people were infected, more than 1.3 billion people at risk and over 40 million people lived with chronic disease in 81 countries [8]. Currently, due to the success of elimination programme, 863 million people in 47 countries worldwide remain threatened and require preventive chemotherapy to stop the spread of this parasitic infection [1]. The causative agents are three parasites. *Wuchereria bancrofti* Malayi and *Brugia timori* with *W. bancrofti* being the commonest in Africa [2] and responsible for infection in Nigeria [3].

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Nigeria is one of the countries endemic for lymphatic filariasis with an estimated 134 million people at the risk of infection [9]. Kebbi State is endemic

for the disease and commenced MMA using ivermectin and albendazole in 2011. In 2000, Nigeria was the third most endemic country globally after India and Indonesia and most endemic in Africa [10]. Currently Nigeria is the second most endemic country worldwide after only India and still the most endemic in Africa [11]. This study was conducted between June and October, 2018 to assess the extent and severity of the infection in Suru LGA of Kebbi State to see if MMA can be stopped.

Materials and Methods

Study Area

Suru LGA is situated between latitude $11^{\circ}30'N$ and $12^{\circ}05'N$ and longitudes $3^{\circ}15'E$ and $4^{\circ}10'E$. The LGA is bounded by Bunza LGA in the North, Maiyama LGA in the East, Koko/Besse and Bagudo LGAs in the South and Dandi LGA in the West [13].

The LGA has a mean annual temperature of $21^{\circ}C - 38^{\circ}C$, though it sometimes fluctuates. The highest temperatures are recorded in the months of April and May. The harmattan season runs through November to February, while the hot season starts from March through to April. The mean annual rainfall in the LGA is about 1000mm [12]. The bulk of the rains fall between June and September with an average of 220mm in August. The people of Suru LGA is composed of Hausa, Fulani and Kyangawa ethnic groups. They are renowned farmers, cattle rearers, fishermen and traders. They cultivate crops such as millet, sorghum, rice and cowpea. The area is blessed with abundant fertile lands.



Figure 1: Map of Kebbi State showing Suru LGA

Figure 2: Map of Suru LGA showing study villages

Ethical Clearance:

Before the commencement of the study, ethical permission was obtained from Ministry of Health, Kebbi State and Suru Local Government Secretariat. Consent was also obtained from the village heads of the six villages and health focal personnel's and they were all involved in the study.

Sampling Method:

In order to conduct a comprehensive and in-depth studies, only six villages were selected by simple random sampling. The study was a cross-sectional (involving men, women and children) and participation was voluntary. The age allowed was five years and above.

Blood Collections and Serological Test:

The ICT kit used is lateral flow chromatographic immunoassay (Onsite Filariasis IgG/Igm Combo Rapid Test - serum/plasma/whole blood; CTK Biotech Inc. San Diego, CA, USA.) based on the detection of Circulating Filarial Antibody (CFA).

After collecting demographic data, ICT was performed following manufacturer's instructions. 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 100 μ l capillary tube was obtained and transferred to the sample well on the test cassette. One or two drops of sample diluents (buffer) were added and the time noted on the cassette. ICT result was read after 15 minutes. Positive result was when two or three pink lines appear on the test window. Negative result was when only one line, the C line (control) appear if C line did not appear at all, the test is invalid test result was recorded on both cassette and individual data sheet.

Parasitological Examination:

Night blood samples were collected from the subjects between 10:00pm and 2:00am. Finger-prick blood was collected using disposable sterile lancet [13]. Thick blood smears were made from about 20 μ l of blood samples. The thick films were air dried, fixed in methanol, stained with giemsa and examined under microscope [14].

Clinical Examination:

The search for chronic manifestations was conducted with the help of a trained medical personnel. All consented males were examined in private rooms in good light for the presence or absence of hydrocele [15]. Limbs and female breasts were also examined for the presence or absence of lymphedema and breast oedema. Acute stage symptoms (Adenolymphangitis) were diagnosed by taking history of periodic fever/chills that lasted 4-7 days.

Entomological Studies:

Houses were randomly selected in each village for mosquito collection. Light traps and pyrethrum spray (Baygon) were used for mosquito collection which was done between 4:00am and 6:00am. Light traps were set outside while

pyrethrum spray was done inside the houses. Collections were separated by sex and males were discarded while females were identified into species and dissected [16]. All observations were recorded on the data sheet.

Data Analysis:

Data was analyzed using SPSS package version 21.0 Chi-square analysis was employed to determine association between infection rate and variables.

Result:

Of the 420 participants tested, 3 (0.71%) were positive for Circulating Filaria Antibody (CFA) of *W.bancrofti* while none (0.00%) was positive for microfilarial of the parasite. The distribution of infection among the villages shows that three villages (Tindifai, Kawara and Suru) had the same prevalent rate of infection, 1 (1.40%) while the other three had no infection (Table 1). Chi-square analysis revealed no significant association of CFA with study villages ($P>0.05$).

Age group distribution of infection showed that infection was highest in the age group 60-69, followed by 50-59, then 10-19. In the other age groups, no infection was observed. There was no significant association of CFA with age group. (Table 2). Gender related infection revealed that females, 1 (0.88%) were more infected than males 2 (0.65%) (Table 3). However, the association was not also significant ($p>0.05$). Observed differences in the distribution of infection among occupational groups showed that the highest prevalence was recorded among fishermen (6.66%), followed by farmers (0.99%) and pupils/stds (0.81%). Other occupational groups did not record any infection (Table 4). The difference calculated showed no statistical significance ($P>0.05$). Distribution of the infection by marital status showed that the married (1.01%) were insignificantly more infected than singles (0.45%) (Table 5).

Based on educational level, secondary level participants had highest infection rate (1.69%) followed by those who had no education (0.82%). No infection was recorded in primary and tertiary education level.

The result further revealed that lymphedema, hydrocele, fever/chills were the clinical manifestations of the disease observed in the area. Prevalence of overall clinical manifestations was 2.14%. Lymphedema rate was 4 (0.95%), hydrocele was 0.00% and fever/chills, 5 (1.19%) (Table 7). Both unilateral and bilateral lymphedema were observed. Distribution of clinical manifestations by age showed that the age group 50-59 had the highest (5.88%) followed by 40-49 (4.76%), then 20-29 (4.54%), 60-69 (3.33%), 0-9 (1.08%) and 10-19 (0.90%). The age group 70+ recorded zero clinical manifestation.

Mosquito species caught were *Anopheles gambial*, *A. pharounsis*, and *culex quinquefasciatus*. Out of 277 female mosquitoes dissected, none (0.00%) labored the microfilaria of *W.bancrofti*.

Table 1: Village based distribution of infection rate in Suru Local Government Area

Village	No. Examined	No. Positive	Prevalence (%)
Bendu	70	0	0.00
Tindifai	70	1	1.40
Bandari	70	0	0.00
Kawara	70	1	1.40
Suru	70	1	1.40
Giro	70	0	0.00
Total	420	3	0.71

Table 2: Age group distribution of infection rate in Suru Local Government Area

Age Range	No. Examined	No. Positive	Prevalence (%)
0 – 9	92	0	0.00
10 – 19	111	1	0.90
20 – 29	44	0	0.00
30 – 39	56	0	0.00
40 – 49	42	0	0.00
50 – 59	34	1	2.90
60 – 69	30	1	3.33
70 and above	11	0	0.00
Total	420	3	0.71

Table 3: Gender related distribution of infection rate

Gender	No. Examined	ICT Positive	Prevalence (%)
Male	306	2	0.65
Female	114	1	0.88
Total	420	3	0.71

Table 4: Distribution of infection rate according to occupation

Occupation	No. Examined	ICT Positive	Prevalence (%)
Fishermen	15	1	6.66
Farmers	101	1	0.99
Traders	47	0	0.00
Pupils/Stds	123	1	0.81
Civil servants	21	0	0.00
Housewives	26	0	0.00
None	87	0	0.00
Total	420	3	0.71

Table 5: Distribution of infection rate according to marital status

Occupation	No. Examined	ICT Positive	Prevalence (%)
Married	197	2	1.01
Single	223	1	0.45
Total	420	3	0.71

Table 6: Education Infection rate based on level of education

Educ. Status	No. Examined	ICT Positive	Prevalence (%)
Primary	104	0	0.00
Secondary	59	1	1.69
Tertiary	14	0	0.00
None	243	2	0.82
Total	420	3	0.71

Table 7: Clinical manifestations of Bancroftian filatiasis by village in Suru Local Government

Village	No. Examined	Lymphoedema	Hydrocele	Fever/ Chills	Total	Prevalence (%)
Bendu	70	0	0	0	0	0.00
Tindifai	70	0	0	1	1	1.42
Bandari	70	0	0	0	0	0.00
Kawara	70	2	0	2	4	5.71

Suru	70	2	0	2	4	5.71
Giro	70	0	0	0	0	0.00
Total	420	4	0	5	9	
Prevalence (%)		0.95	0.00	1.19	2.14	2.14

Table 8: Clinical manifestation of Bancroftian Filariasis by age in Suru Local Government

Village	No. Examined	Lymphoedema	Hydrocele	Fever/ Chills	Total	Prevalence (%)
0 – 9	92	0	0	1	1	1.80
10 – 19	111	0	0	1	1	0.90
20 – 29	44	1	0	1	2	4.54
30 – 39	56	0	0	0	0	0.00
40 – 49	42	1	0	1	2	4.76
50 – 59	34	1	0	1	2	5.88
60 – 69	30	0	0	1	1	3.33
70 and above	11	0	0	0	0	0.00
Total	420	3	0	5	9 reported	2.14

Discussion:

The overall prevalence of 0.01% recorded in this study is low compared to the findings of [17] who obtained a seroprevalence of 10.00% in Bodinga LGA of Sokoto State, [18] who 21.0% in India and [19] who observed 23.0% in Bungudu LGA of Zamfara State. It is also lower than the WHO threshold of 1% seroprevalence for MMA in a given community [20]. Zero MF prevalence corroborates with [21] in Plateau and Nasarawa and [22] in Ghana. Transmission of lymphatic filariasis in this area has been reduced to sustainable level. This may be due to high compliance to MMA or roll back malaria that has been going on in the State for over 7 years.

Infection rate was not strongly or significantly associated with variables of age, gender, occupation, marital and educational status. This is because the people of Suru LGA are equally exposed to mosquito bites. During the day, they bite them in their outdoor places and at night, in their sleeping houses. This is similar to the report of [23] in Argungu LGA of Kebbi State.

The overall lymphedema rate was very low, and no case of hydrocele was observed. This is almost similar to the report of [18] who reported zero prevalence of chronic manifestations of hydrocele and lymphedema in Bodinga LGA of Sokoto State and [24] who reported zero prevalence of hydrocele and lymphedema in Yauri LGA of Kebbi State. Zero hydrocele rate may be due to free hydrocele surgery conducted in the entire state before the study. Again MMA with ivermectin and Albendazole since 2011 in the LGA might have prevented infections from progressing to chronic stage.

The 277 dissected mosquitoes did not harbour microfilaria of *W.bancrofti*. Studies conducted by [25] did not also find microfilaria of *W.bancrofti*, however the study of [17] in three villages of Kano State found microfilaria in one *C.quinquefasciatus*. it is obvious that the transmission of *W.bancrofti* infection has been reduced below sustainable level in Suru LGA.

Conclusion: this study determined that 3 villages Bendu, Bandan and Giro of Suru LGA have met WHO criteria for stopping lymphatic filariasis MMA. The remaining 3 villages – Tindifai, Suru and Kawara should continue MMA, vector control and surveillance.

Recommendation: further studies is required after 5 years to check if there's remergency from neighboring local government area or state.

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