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Studies on Bancroftian Filariasis in Selected Villages of Suru Local Government Area of Kebbi State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Lymphatic filariasis was earmarked for elimination by the year 2020 through the Global programme for the Elimination of Lymphatic filariasis (GPELF). Mas 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

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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.

1. 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 Brugai 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 latter 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 lessons, 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. *Wucheveria bancrofti* Malayi and Brugia timori with W.bancrofit 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.

2. MATERIALS AND METHODS

2.1 Study Area

Suru LGA is situated between latitude $11^0$30ˈN and $12^0$05ˈN and longitudes $3^0$15ˈE and $4^0$010ˈE. 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 21^0c – 38^0c, 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.

2.2 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.

2.3 Blood Collections and Serological Test

The ICT kit used is lateral flow chromatographic immunoassay (Onsite Filariasis 1gG/1gm Combo Rapid Test - serum/plasma/whole blood; CTK Biotech Inc. San Diego, CA, USA.) based on the detection of Circulating Filarial Antibody (CFA).

Fig 1. Map of Kebbi State showing Suru LGA

Fig. 2. Map of Suru LGA showing study villages

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 100µl 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 15minutes. 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.

2.4 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 20µl of blood samples. The thick films were air dried, fixed in methanol, stained with giemsa and examined under microscope [14].

2.5 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 4-7days.

2.6 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.

2.7 Data Analysis

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

3. RESULTS

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).

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**

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.

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

Village	No. Examined	Lympoedema	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	Lympoedema	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**

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.*

4. 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.

5. 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.

6. RECOMMENDATION

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

CONSENT AND ETHICAL APPROVAL

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.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. WHO. Lymphatic filariasis; 2022. Available:https://ww.who.int/news-room/fact-sheets/detail/lymphatic-filariasis accessed on 07/08/23
2. Anosike JC, Nwoke BEB, Ajayi EG, Onwuliri CO, Okoro OU, Aso JE, Amajuoyi OU, Ikpeama CT, Ogbusu FI, Meribe CO Lymphatic filariasis among the Ezza people of Ebonyi State, Eastern Nigeria. Annals of Agricultural and Environmental Medicine. 2005;12:181-186.
3. Eigege A, Richard Jr, FO, Blaney DB, Miri ES, Gontor I, Ogar CR, et at. Rapid assessment for lymphatic filariasis in Central Nigeria: A comparison of immunochromatographic card test and hydrocele rates in an area of high endemicity. American Journal of Tropical Medicine and Hygiene. 2002;68(6):643-646
4. GAELF. Global Alliance to Eliminate Lymphatic filariasis. A future free of LF; 2022. Available:https://www.gaelf.org
5. World Health Assembly (WHA). A future free of lymphatic filariasis; 2005. Retrieved from:http://www.filariasis.org/pdfs/brochures/future-free-of-if English pdf on 23/01/18
6. Healthroise Health Topics A – Z – filariasis: Disease and conditions; 2011. Assessed on 30/12/19 from:http://. healthmsn.com/health-topics/filariasis 2011.
7. Better Medicine. Lymphatic filariasis; 2011. Assessed on 13/10/18 from:www. bettermedicine.com.larticle/lymphatic filariasis
8. WHO. Forms of Lymphatic filariasis and diagnosis; 2011. Assessed on 30/09/18 from:http://www. who.int/lymphaticfilariasis/epidemiology.forms/en/index.hrml
9. Frontiers Assess. Neglected Tropical Diseases. 2022;3. Available:https://doi.org/10.3389/fltd.2022. 103802
10. Carter Center. Lymphatic filariasis Elimination Programme; 2011. Assessed on 03/08/15 from:http://www. cartercentre.org.health.index.html
11. Carter Center. Two states in Nigeria eliminates disfiguring parasitic disease lymphatic filariasis as a public health problem. Report from Carter Centre; 2017. Retrieved from:https://reliefweb.int
12. Shehe A. Kebbi State. Yesterday and Today Multinational Concept Limitd, Lagosm. 2014;433.
13. Cheesbrough M. District Laboratory Practice on Tropical Countries. Part 1 (2nd Ed). Cambridge University Press. 2005; 454.
14. Braidem EI, Ikpeme B, Edet E, Attina I, Ekpo UF, Esu B, Kale OO. Preliminary observations on the occurrence of lymphatic filariasis in Cross River State, Nigeria. Nigeria Journal of Parasitology. 2003;24:9-16
15. Nwoke BEB, Dozie INS, Jiya J, Sake Y, Ogidi JA et al. The prevalence of hydrocele in Nigeria and its implication on mapping of lymphatic filariasis. Nigeria Journal of Parasitology. 2006;27:29-35
16. Dogara MM, Nock H, Agbede R, Ndams S, kumbur J. Entomological survey of mosquitoes responsible for the transmission of Lyphatic filariasis in three endemic villages ofkano state, Nigeria. Internet Journal of World Health and Societal Politics. 2014;7(2). DOI:10.5580/2644

17. Attah OA, Adamu T, Yahaya MM, Farouq AA, Bala AY, Kanya DY, Ukatu VE. Lyphatic filariasis in some words in Bodinga Local Government Area of Sokoto State, Nigeria. Continental Journal of Biological Sciences. 2017;10 (1):12-21
18. Singh AK, Agurwal L, Lakhmani K, Sengupta C, Singh RP. Detection of antifilarial antibody among hydrocele patients living in an endemic area for filariasis. Journal of Family Medicine and Primary Care. 2016;5(3):553-557
19. Ladan MU, Tukur A, Sirajo IM Seroprevalence of Lymphatic fitariasis in six communities of Bungudu LGA, Zamfara State, Nigeria. International Journal of Pure and Applied Bioscience. 2018;6(3): 11-18
20. WHO. Lymphatic filariasis fact sheet No.190; 1998.
Accessed on 03/03/12 from:http://apps. who.int/int.fs/en/fact190.html1998
21. Richards FO, Eigege A, Miri ES, Kal A, Umaru J, Pam D, et al. Epidemiological and Entomlogical Evaluation After Six Years or More of Mass Drug Administration for Lymphatic Filariasis Elimination in Nigeria. PLos/Neglected Tropical Diseases. 2011;5(10):1346.
22. Britwum N, de Souza DK, Msefo B, Aloom BA, Alomau B, Aseidu O, *et al*. Fifteen Years of Programme Implementation for the Eliminatuon of Lymphatic Filariasis in Ghana: Impact of MDA on Immunoparasitological Indicators PLos Neglected Tropical Diseases; 2017.
Retrieved from:http://doi.org/10.1371 journal.pntd.0005280 on 18/10/2017.
23. Ukatu VE, Abubakar U, Adamu T, Daneji AI, Atta AO, Nenge I. Epidemiological and parasitological studies on lymphatic filariasis in Argungu Local Government Area of Kebbi State, Nigerian Nigerian Journal of Parasitology. 2020; 41(1):35-40
24. Ukatu VE, Abubakar U, Adamu T, Daneji AI, Onyilo ME, Bagudo AI, Dogara MM. Lymphatic filariasis in six rural villages of Yauri Local Government Area, Kebbi State, Nigeria. Journal of Advanced Education and Sciences. 2023;3(1):21-26.
25. Adekunle NO, Sam-Wobo SO, Adeleke MA, Ekpo UF, Davis E, Ladokun AO, Egbeobauwaye, E, Sarakat OA. Prevalence and distribution of *W. bancrofit* in Ose LGA, Ondo State, Nigeria. Nigerian Journal of Parasitology. 2016;37(1):96-100.

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