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Original article

Prevalence and risk factors of Lymphatic Filariasis, post evaluation of Mass Drug Administration in selected communities of Kaduna South Local Government Area, Kaduna State

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ABSTRACT

Lymphatic filariasis (LF) is a debilitating and disfiguring Neglected Tropical Disease. Nigeria was rated as the third most endemic country in the world. This study was undertaken to assess the prevalence, clinical symptoms and risk factors of lymphatic filariasis in selected communities of Kaduna South Local Government Area, Kaduna, Nigeria. A total of 547 blood samples were collected using the finger prick method between the hours of 10pm to 12am. Questionnaires were also administered to obtain information about the clinical signs, risk factors, impact and barriers to up take of Mass Drug Administration (MDA). The result of this study revealed a 0% prevalence rate for lymphatic filariasis (LF) across all age groups, gender, occupation and education. There was no association between the impacts of LF and prevalence with $P < 0.05$. There was a strong association between the impact of administration of Ivermectine and Albendazole on LF in the communities. The barriers to up take of MDA recorded in study were "Fear of side effects (12.3%) and Not necessary (10.2%)". This study revealed that the prevalence of LF has been reduced with the success of MDA, result confirmed the effectiveness of Ivermectine and Albendazole on microfilaria and can therefore contribute to the control of LF in Nigeria.

Keywords: Lymphatic filariasis, MDA, Neglected Tropical Disease, Questionnaires

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INTRODUCTION

Lymphatic filariasis (LF) also known as elephantiasis, is a vector-borne parasitic disease, a debilitating and disfiguring neglected tropical disease (NTD) with an estimate of 657 million people in 39 countries remain threatened and require preventive chemotherapy [1]. Neglected Tropical Diseases (NTDs) are a group of primarily communicable and tropical diseases affecting rural populations in resource-limited countries. Worldwide it is estimated that more than 1 billion

people are affected by at least one NTD [2]. The NTD concept emerged from an international workshop organized in 2003 in Berlin (Germany) by the World Health Organization and German institutions with the initial intention of intensifying the control of these diseases. The clinical signs of NTD infections include significant disability, discrimination, and stigma [3,4]. Among the NTD, Onchocerciasis and trachoma can lead to blindness, lymphatic filariasis (LF) to elephantiasis, major lymphoedema, usually of lower limbs, and Buruli ulcer can reduce mobility and lead to skin cancer [4-6]. Although, NTDs are mainly disabling, some of them, such as rabies, Human African Trypanosomiasis (HAT), or snakebite envenoming, can also lead to death if not diagnosed and promptly treated [5].

Lymphatic filariasis is one of the preventive Neglected Tropical Diseases, which is mainly endemic in the tropics and subtropical areas primarily affecting the poor and marginalized communities [7].

Globally, it is estimated that *Wuchereria bancrofti* causes 90% of LF cases [8]. Once a person is infected, the parasites nest in the lymphatic vessels causing damage, which leads to lymphoedema, elephantiasis of limbs, and hydroceles [9]. The affected people are often subjected to stigmatization and discrimination [10]. Most infected people do not show any signs or may present with acute filarial episodes. Notably, the risk of developing clinical manifestations decreases with Mass Drug Administration (MDA) of either ivermectin or diethylcarbamazine in combination with albendazole [11]. An estimated 856 million people who live in 72 endemic countries are at risk of LF, out of which 120 million are estimated to be infected with the disease [12]. About 36 million people remain with the chronic disease manifestation [1]

Nigeria was rated as the third most endemic country with lymphatic filariasis in the world after India and Indonesia. Nigeria is reported with the highest burden of lymphatic filariasis compared to other endemic counties in Africa [13, 6]. As of 2024, the overall prevalence of LF in Nigeria is approximately 11.18% with significant regional variations [14]

To stop the spread of LF infection and alleviate suffering, the World Health Organization (WHO) created the Global Programme to Eliminate Lymphatic Filariasis (GPELF) in 2000. The principal elimination strategy is to interrupt transmission using Mass Drug Administration (MDA) with the combinations of albendazole plus ivermectin or albendazole plus diethylcarbamazine (DEC) administered once a year for at least five consecutive years [13, 15]. MDA coverage is rarely investigated systematically across time and geography. There is also inconsistency of MDA, investigations into coverage react to unsatisfactory outcomes and tend to focus on a single year and health district. Also, poor effective policy implementation in health agencies fail to utilize previous information in strategic plan documents and execution.

The knowledge gap regarding the disease and prevailing attitude and perceptions towards the programme may be the source of the major causes of lower compliance. Any successful strategy to eliminate the disease must consider the range of people's knowledge and perceptions for the program to gain wide acceptance. Moreover, assessment of knowledge, attitudes and practices (KAPs) of a community is one of the rapid assessment procedures (RAPs) in assessing the burden of the disease and

the effectiveness of a lymphatic filariasis elimination program. Effective mass drug administration (MDA) is the cornerstone in the elimination of LF. Notably, the risk of developing clinical manifestations decreases with mass drug administration of either ivermectin or diethylcarbamazine in combination with albendazole [11].

MATERIALS AND METHODS

Study Area

The study was conducted in some selected communities of Kaduna South Local Government Area (LGA) of Kaduna State. Kaduna South Local Government Area (Figure 1) is one of the 23 Local Government Area of Kaduna State. It is geographically located between latitude 10^0 051 N and 10^0 371 N of the equator and between longitudes 7^0 221 E and 7^0 311 E of the Greenwich Meridian. The population of Kaduna South according to National Population Commission, 2006 [16] stood at 402,731 persons, and available evidence shows that, the area is inhabited by different ethnic groups, with Hausa and English as the most general languages used as a means of communication. Kaduna South LGA occupies an area of approximately 123.88 kilometers square of land mass. The selected communities in the study area comprised of Barnawa, Badiko, Kakuri, Makera, Sabon Gari, Tudun-Wada, and Unguwan Mu'azu.

Study Population

Age and Gender of Participants

The study participants comprised of males and females from age 5 years and above. The reason for this age group is that clinical signs and symptoms of lymphatic filariasis take longer period of time to manifest which means a long incubation period is required. In addition to repeated exposure over an extended period before lymphatic filariasis is noticed as an infection.

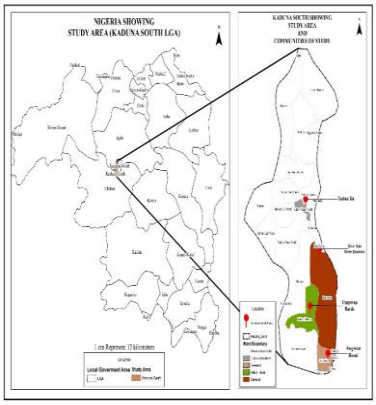

Figure 1: Map of Kaduna Showing Study Area
Source: Cartography and GIS Laboratory, Kaduna Polytechnic

Criteria of Inclusion and Exclusion

Inclusion criteria include:

I. Consent must be given by targeted participants
II. Participants must be permanent residents of the communities.

Exclusion criteria include:

I. Refusal to give informed consent by the subject.
II. Participants below the ages of 5.
III. People who are not permanent residents in the communities

Ethical Consideration

Ethical clearance (Ref No. MOH/ADM/744/VOL.1/955) was obtained from the Kaduna State Ministry of Health before the commencement of the study.

Administration of Questionnaire

A standardized close-ended questionnaire was administered to each participant by oral interview of the respondents [17]. The questionnaire was used to assess the associated risk factors, impact of LF on the selected communities, the impact of

administration of Ivermectine and Albendazole on LF, the barriers in the uptake of MDA. Information on demography, domestic and pre-domestic environment, and personal activities that might be related to exposure to vector bites was also included in the questionnaire.

Sample Collection

Blood samples were collected in selected communities namely, Ungwan Barde, River Side Down Quarters, Tudun Ilu and Angwan Romi. Blood samples were collected between 11 pm and 1 am (local time) by the finger-pricking method [15]. The left thumb was cleaned with methylated spirit-soaked cotton wool and disposable sterile blood lancet was used to prick the finger. A little pressure was then applied on the finger to ease the flow of blood. About 2-3 drops of blood were placed on a clean, glass slide and edge of spreader was used to make a thick blood film, which was then air-dried and transported to laboratory for analysis.

Sample Analysis

Parasitological examination

In the laboratory, the air-dried blood smears were stained with 10% Giemsa's solution for 10 minutes and examined under a light microscope at x100 objective lenses. *W. bancrofti* was identified according to by the sheathed microfilaria without a caudal nucleus and the space between nucleus and body wall [18].

Data Analysis

The data generated was analyzed using simple frequencies, percentages and presented in a tabular form. Chi-square test was used to test for association between infection, age and gender. And between infection and risk factors, in-take of drugs, effect of drugs and impact of lymphatic Filariasis at a probability level of 0.05 ($p>0.05$).

RESULTS

Prevalence and Clinical Signs of Lymphatic Filariasis in Selected Communities of Kaduna South L.G.A

A total of 547 blood samples were collected and examined. Out of the 547 participants whose blood samples were analysed, 152 (27.8%) were from Unguwan Barde, 133 (24.3%) from Tudun Ilu, 137 (25.1%) from Angwan Romi, 125 (22.9%) Riverside Down Quarters. None of the participant examined was positive for microfilarial and did not show any clinical signs (Hydrocele and Lymphoedema). There is no association ($p< 0.05$) between prevalence and clinical signs of Lymphatic Filariasis among the selected communities as presented in Table 1.

Prevalence of Lymphatic Filariasis According to Gender

Out of the 547 participants examined, Unguwan Barde had 68 (44.7%) males and 84 (55.3%) females, Tudun Ilu had 86 (64.7%) males and 47 (35.3%) females, Angwan Romi had 64 (46.7%) males and 73 (53.3%) females, Riverside Down Quarters had 70 (56%) and 55 (44%) females. There was no positive result indicating microfilarial across the gender as presented in Table 2.

Prevalence of Lymphatic Filariasis According to Age

Out of the 547 participants, 9.87% were aged 1-10, 22.64% were aged 11-20, 19.74% were aged 21-30, 18.65% were aged 31-40, 15.90% were aged 41-50 and 13.16% were above the age of 50. Out of the 547 participants examined, Age 1-10

had 18 (11.8), 13 (9.8), 13 (10.4), and 10 (7.3), Age 11 – 20 had 41 (27), 35 (26.3), 24 (19.2), 24 (17.5), Age 21-30 had 30 (19.7), 23 (17.3), 26 (20.1), 29 (21.2), Aged 31-40 had 22 (14.5), 26 (19.5), 23 (18.4), 31 (22.6), Age 41-50 had 19 (12.5), 16 (12.0), 24 (19.2), 28 (20.5) and Age ≥51 had 22 (14.5), 20 (15.0), 15 (12.0), 15 (11.0) From Unguwan Barde, Tudun Ilu, Rverside Down Quarters and Anguwan Romi respectively with a no positive case. The result is presented in Table 3.

Table 1: Prevalence and Clinical Signs of Lymphatic Filariasis in Selected Communities of Kaduna South L.G.A

Communities	Number examined	No. +ve for microfilarial (%)	No. –ve for microfilarial	Clinical signs (hydrocele) +ve	Clinical signs (hydrocele) -ve
Ungwan Barde	152	0	152	0	152
Tudun Ilu	133	0	133	0	133
Angwan Romi	137	0	137	0	137
Riverside Down Quarters	125	0	125	0	125
Total	**547**		**0**	**0**	

X^2= 0.000, df= 3, p-value = 0.0000 (P<0.05)

Table 2: Prevalence of LF According to Gender

Communities	Gender		Infected (%)		Non-infected (%)	
	Male	Female	Male	Female	Male	Female
Ungwan Barde	68	84	0	0	100	100
Tudun Ilu	86	47	0	0	100	100
River Side Down Quarters	70	55	0	0	100	100
Angwan Romi	64	73	0	0	100	100
Total	**288**	**259**	**0**	**0**	**100**	**100**

X^2= 0.000, df= 3, p-value = 0.0000 (P<0.05)

Table 3: Prevalence of Lymphatic Filariasis According to Age in Ungwan Barde, Tudun Ilu, Riverside Down Quarters and Angwan Romi Communities

Age Group	Ungwan Barde			Tudun Ilu			Riverside Down Quarters			Angwan Romi		
	No. examined	Infected (%)	Non-infected (%)	No. examined	Infected (%)	Non-infected (%)	No. examined	Infected (%)		No. examined	Infected (%)	Non-infected (%)
1-10	18	0	11.84	13	0	9.77	13	0	10.40	10	0	7.30
11-20	41	0	26.97	35	0	26.32	24	0	19.20	24	0	17.52
21-30	30	0	19.74	23	0	17.29	26	0	20.80	29	0	21.17
31-40	22	0	14.47	26	0	19.55	23	0	18.40	31	0	22.67
41-50	19	0	12.50	16	0	12.03	24	0	19.20	28	0	20.47
≥51	22	0	14.47	20	0	15.03	15	0	12.00	15	0	10.95
Total	**152**	**0**	**100**	**133**	**0**	**100**	**125**	**0**	**100**	**137**	**0**	**100**

$X^2 = 0.000$, df= 3, p-value = 0.0000 ($P<0.05$)

Some Risk Factors Associated with Lymphatic Filariasis in Selected Communities of Kaduna South.

The risk factors analyzed in this study were occupation, educational background, utilization of insecticide treated bed nets and the duration of stay in the communities. Out of the 390 respondents, 195 (50%) are employed, 125 (32.1%) are self-employed and 70 (17.9%) are unemployed. 337 (86.4%) are educated and 53 (13.6%) are uneducated. 293 (75.1%) utilized Insecticide Treated Nets (ITN). 55 (14.1%) have lived in the community for almost a year, 76 (19.5%) for almost two years, 99 (27.5%) for almost four years and 160 (41.02%) have lived for the past four years. This is across all the respondents in the communities. Results show no significant association between all the risk factors studied. Results are presented in Table 4a and 4b.

Impact of Lymphatic Filariasis in selected communities of Kaduna South

Out of the 547 participants across the communities there was no positive case, thus the impact of disease was not there (Table 5).

Impact of Administration of Ivermectine and Albendazole on Lymphatic Filariasis in Selected Communities of Kaduna South

Out of 189 participants that took the drugs some of them experienced side effects such as dizziness 34 (17.9%), fever 26 (13.8%), headache 37 (19.6%), nausea 33 (17.5%) and 59 (31.2%) experienced nothing. This is presented in Table 6.

Table 4a: Some Risk Factors Associated with LF in Selected Communities of Kaduna South. (Ungwan Barde and Tudun Ilu)

Risk factors	Ungwan Barde				Tudun Ilu			
	Responses (%)	No. examined	Number +ve	Number -ve	Responses (%)	No. examined	Number +ve	Number -ve
Occupation								
Employed	57 (54.8)	104	0	104	50 (51)	98	0	98
Self employed	33 (31.7)	104	0	104	29 (28.6)	98	0	98
Unemployed	14 (13.5)	104	0	104	19(19.4)	98	0	98
Education								
Educated	84 (80.7)	104	0	104	88 (89.8)	98	0	98
Uneducated	20 (19.2)	104	0	104	10 (10.2)	98	0	98
Utilization of insecticide treated nets								
YES	76 (73.1)	104	0	104	65 (66.3)	98	0	98
NO	28 (26.9)	104	0	104	33 (33.7)	98	0	98
Duration of stay in the community								
1 year	17 (16.3)	104	0	104	17 (17.4)	98	0	98
2 years	23 (22.1)	104	0	104	20 (20.4)	98	0	98
2-4 years	26 (25)	104	0	104	23 (23.5)	98	0	98
>4years	38 (36.5)	104	0	104	38 (38.8)	98	0	98

X^2= 0.000, df= 3, p-value = 0.0000; X^2= 0.000, df= 1, p-value = 0.0000

Table 4b: Some Risk Factors Associated with LF in Selected Communities of Kaduna South. (Riverside Down Quarters and Angwan Romi)

Risk factors	Riverside Down Quarters				Angwan Romi			
	Responses (%)	No. examined	Number +ve	Number -ve	Responses (%)	No. examined	Number +ve	Number -ve
Occupation								
Employed	41(44.1)	93	0	93	47 (49.5)	95	0	95
Self employed	30 (32.3)	93	0	93	33 (34.7)	95	0	95
Unemployed	22 (23.7)	93	0	93	15 (15.8)	95	0	95
Education								
Educated	81 (87.1)	93	0	93	84 (88.4)	95	0	95
Uneducated	12 (12.9)	93	0	93	11 (11.6)	95	0	95
Utilization of insecticide treated nets								
YES	69 (74.2)	93	0	93	83 (87.4)	95	0	95
NO	24 (25.8)	93	0	93	12 (12.6)	95	0	95
Duration of stay in the community								
1 year	9 (9.7)	93	0	93	12 (12.6)	95	0	95
2 years	17 (18.3)	93	0	93	16 (16.8)	95	0	
2-4 years	24 (25.8)	93	0	93	26 (27.4)	95	0	95
>4years	43 (46.2)	93	0	93	41 (43.6)	95	0	95

X^2= 0.000, df= 3, p-value = 0.0000; X^2= 0.000, df= 1, p-value = 0.0000

Table 5: Impact of Lymphatic Filariasis in Selected Communities of Kaduna South

Communities	No. examined	Dizziness		Fever		Headache		Nausea		None	
		No. +ve (%)	No. –ve	No. +ve (%)	No. -ve	No. +ve (%)	No. -ve	No. +ve (%)	No.-ve	No. +ve (%)	No. -ve
Ungwan Barde	50	12 (24)	38 (76)	6 (12)	44 (88)	15 (30)	35 (70)	9 (18)	41 (82)	8 (16)	42 (84)
Angwan Romi	39	7 (17.9)	32 (82.1)	7 (17.9)	32 (82.1)	5 (12.8)	34 (87.2)	7 (17.9)	32 (82.1)	13 (33.3)	24 (61.5)
Tudun Ilu	51	8 (15.7)	43 (84.3)	7 (13.7)	44 (86.3)	7 (13.7)	44 (86.3)	9 (17.6)	42 (82.4)	20 (39.2)	31 (60.8)
Riverside Down Quarters	49	7 (14.3)	42 (85.7)	6 (12.2)	43 (87.8)	10 (20.4)	39 (79.6)	8 (16.3)	41 (83.7)	18 (36.7)	31 (63.3)

Table 6: Impact of Administration of Ivermectine and Albendazole on Lymphatic Filariasis in Selected Communities of Kaduna South

	Headache		Stomach ache		Stigmatization		Productivity	
Communities	No. +ve (%)	-ve	No. +ve (%)	-ve	No. +ve (%)	-ve	No. +ve (%)	-ve
Ungwan Barde	0	0	0	0	0	0	0	0
Angwan Romi	0	0	0	0	0	0	0	0
Tudun Ilu	0	0	0	0	0	0	0	0
Riverside down quarters	0	0	0	0	0	0	0	0

$X^2 = 0.000$, df= 3, p-value = 0.0000

$X^2 = 33.442$, df= 3, p-value =3e-07;

$X^2 = 34.56$, df= 3, p-value = 2e-07;

$X^2 = 44.86$, df= 3, p-value = 1e-09

$X^2 = 36.99$, df= 3, p-value = 5e-08

$X^2 = 50.59$, df= 3, p-value = 6e-11

Barriers in the Uptake of Mass Drug Administration (MDA) in Selected Communities of Kaduna South

Out of the 244 that received the drugs, 55 participants did not take the drugs while 30 (12.3%) were afraid of the side effects and 25 (10.2%) felt it was not necessary since they were not exhibiting the signs of the disease. The result is presented in Table 7.

Table 7: Barriers in the Uptake of Mass Drug Administration (MDA) in Selected Communities of Kaduna South

Communities	Number Examined	Afraid of side effects (%)	Not necessary (%)
Ungwan Barde	65	7 (10.8)	8 (12.3)
Angwan Romi	54	7 (13)	8 (14.8)
Tudun Ilu	65	9 (13.9)	5 (7.7)
Riverside Down Quarters	60	7 (11.7)	4 (6.7)

DISCUSSION

In this study, of the 547 blood samples collected and screened for the presence of *W. bancrofti* microfilaria, parasites were not detected in all the samples screened. This could be because the area under study has been treated with LF drugs for the mandatory period of 5 years. This study revealed that no clinical manifestations were observed in the participants examined, this finding is similar to [19] and different from reports of [20] who observed a clinical manifestation of lymphoedema. The findings of this study is contrary to that of [20], who observed a gradual increase in prevalence with increasing age range, thereafter there was a decline at the age range 61-80 years among the people of Yakurr of Cross River State.

After the launch of GPELF in the year 2000, national control programmes have been established in endemic countries providing annual MDAs with the recommended two-drug regimens of Ivermectine or DEC plus Albendazole. Regular monitoring of the effect of the MDA is important to evaluate the progress of the programmes and to identify areas where MDAs can be discontinued, or where more efforts and alternative control tools are needed [21]. More than half of the participants 288 (52.65%) were males and 259 (47.35%) were females.

Of all the blood samples collected and examined using microscopy, the presence of microfilarial was not detected in all. There was also no gender related infection as well as age group distribution as the samples observed for both genders and different age groups were not positive for the parasite. This finding agrees with the work of [18] where microfilarial parasites were not detected in Fakai LGA of Kebbi State when observed microscopically. Most of the respondents were either employed or self-employed having different jobs such as business owners, teachers, civil servants, health workers, petty traders. Also, most of the respondents were literate and had attended a minimum of secondary school.

Majority of the respondents had resided for four years and above in the communities they were interviewed. Majority of the respondents were aware of mass drug administration and have received drugs distributed during MDA. Most of those that received drugs received it from a fixed point like the Primary Health Care clinic while few received drugs during house-to-house distribution,

this is in contrast to reports of [22] where majority of the respondents had poor knowledge regarding MDA which led to poor participation. Poor knowledge regarding MDA has also been reported in Kenya [23], Papau New Guinea [24] and India [25,26] where it was reported that there was low compliance for an MDA due to poor knowledge of LF by the target population.

Almost all those who received the drugs majority have consumed them while few did not swallow the drugs which agrees with the work of [27]. Of those who swallowed the drugs, few did so after eating while majority on empty stomach which is most likely due to non-adherence of consumption instructions or an underlying medical condition. Most of them experienced minor side effects like dizziness, fever, nausea, and headache.

For barriers to uptake, two reasons were given: Some were afraid of side effects, others thought it was not necessary since they do not suffer from the disease. This finding is similar to that reported by [28] who recorded a 77% response on the reason 'afraid of side effects. Similarly, research by [29, 30] attributed barriers to uptake with absenteeism, afraid of side effects and perception of co-morbidities.

This finding is an indication that transmission of the disease in the area has been reduced to insignificant level probably due to high compliance of Mass Drug Administration of Ivermectine and Albendazole and also the use of insecticide treated bed nets and vector control of surroundings. The ongoing global elimination effort is faced with the challenges of people accepting drugs when they have no symptoms of the disease [31]. No group of people should be left totally untreated because such groups if infected form reservoirs of mf contributing to continued transmission of infection [32].

The present study provides valuable information on the status of lymphatic filariasis in some selected communities of Kaduna South Local Government Area to the ongoing effort to combat this NTD. The study has shown that most of the residents are knowledgeable about lymphatic filariasis and MDA programme which revealed that the prevalence of LF has been reduced with the success of MDA, result confirmed the effectiveness of Ivermectine and Albendazole on microfilaria and can therefore contribute to the control of LF in Nigeria.

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