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Prevalence of Lymphatic Filariasis and Associated Clinical Morbidities Among Adolescents in Three Rural Communities in Ondo State, Southwest Nigeria

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Abstract

Lymphatic filariasis, commonly reffered to as LF is one of the most important Neglected Tropical Disease identified by World Health Organization. In Nigeria, few studies on LF status among adolescents are documented. This study therefore assessed the prevalence of lymphatic filariasis and associated clinical morbidities among adolescents in three rural communities in Ondo State, Southwest Nigeria. A total of 231 subjects within the age range 5-18years consented to the study procedures. 100µl Blood samples per participant was collected using the finger-prick method and tested using the Binax Now® Immuno Chromatographic Test (ICT) kit to detect *Wuchereri bancrofti* antigens. Physical observations for chronic morbidity signs of LF were also conducted, and structured questionnaires were administered to assess their Knowledge, Attitude and Practices (KAP) towards LF. Questionnaire responses were graded using a clearly defined scoring index. Data were analyzed using SPSS Version 17. Results revealed that 67(29%) of the 231 respondents were positive with *W. bancrofti* infection, while chronic morbidity prevalence was 0.86%. Although, no significant relationship *(*$p>0.05$) exist between infection and sex, more males (37.6%) were infected than females (23.2%). The age group 15-18 years had the highest prevalence of *W. bancrofti* infection (41.8%). KAP studies revealed that only 21.6% of respondents were aware of LF, but only 6% knew of the transmission route. There was no significant relationship ($p>0.05$) between *W. bancrofti* infection and KAP of the participants. This study issues a call of concern, as the burden and subsequent consequences LF could inflict on adolescents and the economy could be worrisome. Therefore, vector control approaches coupled with preventive chemotheraphy and public enlighten programs, should be considered as part of the public health interventions in the study communities.

Keywords: Adolescents; Lymphatic Filariasis; *Wuchereria Bancrofti*; Ondo State

Introduction

Lymphatic filariasis, commonly reffered to as LF is one of the most important Neglected Tropical Disease (NTDs) identified by World Health Organization (WHO). The disease has a wide geographical spread across 81 countries in South-East Asia, Pacific island groups, Carribean, Sub Saharan Africa, Central America and Northern South America. About 1.43 billion people are living in areas endemic for LF, and another 120 million people, majority of whom reside in India, China and Indonesia are affected by the disease [1].

LF is caused by three parasitic nematode species; *Brugia malayi, Brugia timori* and *Wucheraria bancrofti,* with the latter being the most widespread. The parasites are transmitted from one host to another through the bites of infected mosquitoes which could be of different genera; *Culex, Aedes, Mansonia* and *Anopheles*. In West-Africa, the predominant ones are species of the *Anopheles gambiae* and *Anopheles funestus* complexes [2]. LF has a wide range of clinical spectrum ranging from debilitating Acute Bacterial Dermato Lymphgangio Adenitis (ADLA) attacks, covert

lymphatic and renal disease, and various degrees of lymphedema, to the terrible disfiguring, and often socially ostracizing, chronic manifestations of hydrocele and elephantiasis[3]. It has thus been ranked the second most common cause of long term disability after mental illness [4]. Infection often occurs in childhood but the obvious clinical effects of the disease such as filarial lymphedema or hydrocele may not occur until they reach adolescence as progression of the disease is slow (REF). Studies involving children and adolescents have been conducted in Mali, Zanzibar islands of Unguja, Pemba and Sri Lanka [5-7]. In Nigeria, few studies on LF status among adolescents are documented.

Adolescents who are between the ages of 15-18, most of whom may have completed their basic education, form a significant percentage of the population and about two-third of them live in rural areas [8], are unemployed [9] and mostly depend on agriculture for food and income [10]. This study therefore assessed the prevalence of LF and associated morbidities among adolescents living in three rural communities where no previous epidemiological study on LF have been conducted.

Materials and Methods

Study Area

This study was carried out in three rural communities; Idoani, Imeri and Idogun is in Ose Local Government Area (LGA) in Ondo State, Nigeria (Figure 1). Ose LGA which is forest zoned lies between Latitude 3˚ 91' 39 N and Longitude 7˚ 50' 11 E bounded by Owo LGA in the West, Akoko - South in the North, Edo State in the East and Ose River in the South - Eastern part. The popular Ose River is located after Idogun community. Predominant occupation within the area includes agricultural farming, artisanship and trading.

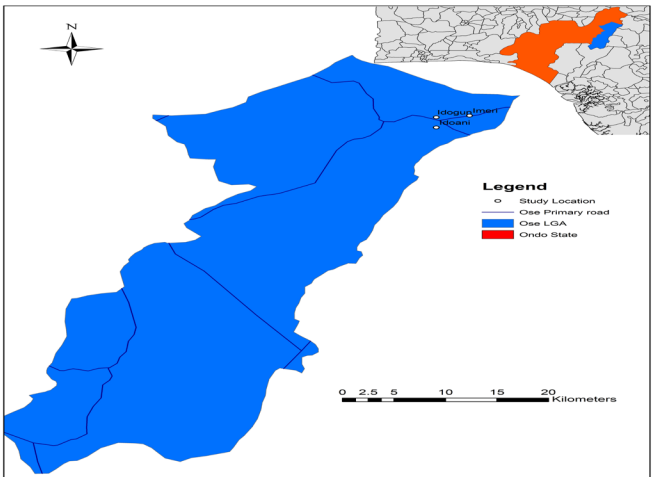

Figure 1: Map of the study area in Ose Local Government Area in Ondo State, Nigeria.

Ethical Approval

Prior to commencement of study, ethical approval dated 17th of March, 2015 with reference number FMC/OW/380/VOL. XXVII/176 was obtained from the Ethics Review Committee of the Federal Medical Centre, Owo, Ondo State. Verbal consents were sought from community leaders and Formal Consent Forms (FCFs) completed by study participants who agreed to participate after detailed sensitization about the nature, scope and purpose of the research study using the aid of Information, Education And Communication (IEC) materials

Study design and sampling technique

This study was cross-sectional in design. A total sampling method was employed in recruiting participants in the three study communities. Persons who were not resident in the communities and had not spent at least 5 years in the community were excluded from the study. After sensitization, a total of two hundred and thirty-one (males = 93; females = 138) participants consented formally to the study procedures and were recruited into the study.

Collection of blood samples and detection of *W. bancrofti*

Blood sampling of parasitological examination was done under the supervision of medical doctors attached to the rural health centres in the study communities. Finger pricked blood samples was collected from study participants using a sterile lancet. The middle finger was first cleaned with 70% alcohol and then pricked with the lancet. Using a calibrated capillary, 100µL of blood sample was collected using aseptic method and tested on Binax Now® Immuno Chromatograhic Test (ICT) cards (Manufactured by Alere Scaborough Inc.) which detects *Wuchereria bancrofti* antigen during the daytime. Care was taken to avoid collection of air bubbles along with the blood. The 100µL of blood sample from the capillary was slowly added onto the top of the pink and white pad. The sample was watched for approximately 30 seconds as the blood flowed into the pink area. The adhesive liner was removed and card closed. Test results were read 15 minutes later. Result of the test was interpreted after 15 minutes as positive - when (2 lines) appear in the viewing window or negative - when (1 line) appears in the viewing window.

Physical examination for Clinical Signs of Lymphatic Filariasis

Physical examination of females included; the legs, arms and breasts while that of males included the genitals, the lymph glands in the groin and axilla, the legs and arms. Presence of clinical signs were identified, graded and recorded. The grading of clinical signs was done according to the guidelines provided by [11].

Questionnaire Administration

A short structured questionnaire designed by the researchers to obtain respondents knowledge on LF, attitude and practices towards LF was validated and pre-tested to ensure consistency and realiabilty. The questionnaires were administered with the help of the nurses for proper translation and understanding by the respondents. The domain (Knowledge, attitude and practices) were assessed following a set scoring index (Table 1). A score index was created for each category. The grades for scoring was good if the scores were = 4 for a category, fair if it was = 3 and poor if it was = or <2.

	Category	Scoring Index
C1	**Knowledge of LF**	
1	Causative agent	If participants mentions filarial parasite, give a score of 1, If otherwise give a score of 0
2	Mode of transmission	If participants mentions through an infected mosquitoes bite, give a score of 1, If otherwise give a score of 0
3	Mode of treatment for elephantiasis and hydrocoele	If participants mentioned taking albendazole and ivermectin, or surgical procedures, give a score of 1, If otherwise give a score of 0
4	Mode of prevention	If participants mentioned sleeping under nets and other mosquito evading techniques, give a score of 1, If otherwise give a score of 0
C2	**Attitude of participants towards an LF patient**	
1	Possibility of acquiring LF through residing with LF patients	If participants acknowledges this possibility give a score of 0, If otherwise give a score of 1
2	Possibility of acquiring LF through working with LF patients	If participants acknowledges this possibility give a score of 0, If otherwise give a score of 1
3	Possibility of acquiring LF through showering affections on LF patients	If participants acknowledges this possibility give a score of 0, If otherwise give a score of 1
4	Possibility of acquiring LF through marrying someone having elephantiasis or hydrocele	If participants acknowledges this possibility give a score of 0, If otherwise give a score of 1

Table 1: Scoring index for assessing knowledge, attitude and practices of participants towards LF patients.

**C1=category 1, C2= category 2

Data Analysis

Data obtained were analyzed using the Statistical Package For Social Sciences (SPSS) version 17.0. Descriptive statistics including frequencies and percentages was employed. Prevalence rates were calculated and associations between variables were ascertained using Pearson chi-square with confidence interval was set at $p \leq 0.05$.

Results

By demographic, 157 (67.9%) of the participants were above the age 10 years while 74 (32.1%) were between ages 5 and 10 (Table 2).

	Number Examined	Percentage (%)
Sex		
Male	93	40.3
Female	138	59.7
Total	**231**	**100**
Age group (years)		
5 - 6	29	12.6
7 - 10	45	19.5
11 - 14	83	35.9
15 - 18	74	32
Total	**231**	**100**

Table 2: Demographic information of Adolescents examined for LF caused by *W. bancrofti* in the study area.

An overall prevalence of 29% (67/231) was recorded for *W. bancrofti* (Table 3) in the three communities.

	Frequency	Percentage
Positive for LF	67	29.0
Negative for LF	164	71.0
Total	**231**	**100**

Table 3: Prevalence of *W. bancrofti* amongst Adolescents.

More males (37.6%) were infected than the females (23.2%), However there exist no significant relationship between infection and sex (P>0.05). Prevalences by age revealed that participants

within the age range of 5-6 years were the least infected (17.2%) and the adolescents within the age range of 15-18 years were with majority (41.8%) of the infection. A significant relationship existed between infection and the age categories (P<0.05) (Table 4).

	Prevalence			
Sex	Positive	Negative	**Total**	*p* - value
Male	35(37.6)	58(62.4)	**93(40.2)**	0.338
Female	32(23.2)	106(76.8)	**138(59.8)**	
Total	**67(28.5)**	**164(71.5)**	**231(100)**	
Age-groups				
5 - 6	5(17.2)	24(82.8)	29(12.5)	0.027
7 - 10	10(22.2)	35(77.8)	45(19.4)	
11 - 14	21(25.3)	62(74.7)	83(35.9)	
15 - 18	31(41.8)	43(58.2)	74(32)	
Total	**67(28.5)**	**164(71.5)**	**231(100)**	

Table 4: Prevalence of *W. bancrofti* amongst Adolescents by sex and age.

An overall chronic morbidity prevalence of 0.43% was recorded duting the study, involving a case of leg lymphedema showing non-pitting oedema, deep folds, skin hardening (1.2%) and a bilateral hydrocele (1.35%) in the age groups 11-14 and 15-18 respectively (Table 5).

	No examined	No positive for Lymphoedema (%)	Number positive for Hydrocele (%)
Sex			
Male	93	0**(0)**	1**(1.1)**
Female	138	1**(0.72)**	0**(0)**
Total	**231**	**1(0.43)**	**1(0.43)**
Age-groups			
1 - 6	29	0**(0)**	0**(0)**
7 - 10	45	0**(0)**	0**(0)**
11 - 14	83	1**(1.2)**	0**(0)**
15 - 18	74	0**(0)**	1**(1.35)**
Total	**231**	**1(0.43)**	**1(0.43)**

Table 5: Distribution of clinical morbidities by age and sex.

M - Male; F - Female; % - Percentage

It was observed in Table 5 that 50 of the participants claimed to have knowledge on the mode of transmission, treatment and prevention of LF.

Majority of the respondents who had the right knowledge and attitude about the disease were also with the highest infection rate (66.7% and 31.2% respectively), although there were no significant association between prevalence and KAP of the participants (p>0.05) (Table 6).

Variables	**Number Examined N(%)**	**Infection Status**	
		Positive N(%)	**Negative N(%)**
Knowledge			**p>0.05**
Good	3	2(66.7)	1(33.3)
Fair	16	5(31.3)	11(68.7)
Poor	31	11(35.4)	20(64.6)
Total	**50**	**18(36)**	**32(64)**
Attitude and practice			**p>0.05**
Good	32	10(31.2)	22(68.8)
Fair	75	23(30.7)	52(69.3)
Poor	124	34(27.4)	90(72.6)
Total	**231**	**67(28.5)**	**164(71.5)**

M - Male; F - Female; % - Percentage

Table 6: Relationship between KAP and prevalence of *W. bancrofti* among the adolescents.

Discussion

The overall LF prevalence of 29% recorded in this study is of public health concern, as it is indicative of an ongoing transmission of *W. bancrofti* among the adolescent group in the study communities. Although, the scope of this study does not include detailed study on adolescents in Nigeria, the importance of this age group in the economic development of Nigeria is well documented, most especially on agriculture [12-14]. The burden and subsequent consequences LF could inflict on this age group, and the economy of the study communities is thus bothersome.

Comparatively, the prevalence recorded amongst adolescents was higher than the 1.1% reported by [15] in Brazil. This diference could be attributed to factors like rainfall, presence of containers holding water, littering of refuse in the environment which aids the breeding of the *W. bancrofti* transmitting vector and the dependence on infested rivers as sources of safe potable water. Although more males were infected than the females in the study, however, there was no significant relationship between infection and sex, which corroborates with the findings of [16] and [15]. The high rate of prevalence among the adolescent males could be attributed to their own way of dressing and sleeping patterns at night thereby exposing their bodies to mosquitoes. It was also observed that LF prevalence progresses as the age of the participants increases. This

finding is similar with those of [15-18]. In Kano State Nigeria, [19] reported increase in prevalence as age advanced. These would have been due to changes in behavioral patterns of community members, exposure due to outdoor activities and length of stay in such endemic communities.

The general poor knowledge of the disease by the respondents as observed was in agreement with studies on the knowledge of LF by [20-22] in Ebonyi, Kogi and Benue States in Nigeria. Majority of those with good knowledge and attitude towards LF, harboured more of the parasite, which indicated that the prevalence of LF was not associated with the knowledge, attitude and practices of participants.This corroborates with the findings of [23] and reiterates the importance of vector-targeted approaches in the phase of controlling LF [1]. Chronic episodes including leg lymphedema and hydrocele were observed during the study, with overall prevalence of 0.55%. This was lower from studies reported by [24] in Ebonyi State, Nigeria where chronic manifestations of leg lymphedema (2.36%) and hydrocele (1.69%) were observed. These clinical manifestations are known to influence the productivity of an affected individual. Subsequent increase in the number of cases with chronic manifestations, most especially among the youths may lead to incapacitation and inability to work on farms, leading to reduced yield (quantity and quality) of agricultural farm products produced, which will in turn affect economic output. This trend may persists across generations because the deformation caused by the disease is mostly irreversible [25].

Conclusion

The Government in unification with Health Non-Governmental Organisations and Research Parastatals should organize Managing Morbidity and Preventing Disability programmes to alleviate the pains of infected LF patients in the study area. Unceasing yearly monitoring of prevalence of LF should be embarked on. Baseline studies to provide imformation on the diversity of the vectors in the study area should be carried out. And lastly,vector control approaches coupled with preventive chemotheraphy and public enlightenment programs, should be carried out in the study communities.

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