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The Prevalence of Lymphatic Filariasis Infection among Primary School Children (5-9 Years) of Infected Adults in Ihiala Local Government Area of Anambra State, Nigeria

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Abstract

Aims: To determine the prevalence of *Lymphatic flariasis* infection among primary school children and of infected adults in Ihiala LGA, Anambra State.
Study design: Cross-sectional study.
Place and Duration of Study: Department of the Ministry of Health Anambra State and a few selected primary school children in Ihiala Local Government Area between June 2021 and July 2022.
Methodology: A total of 150 residents were examined for *Lymphatic filariasis*. In the Primary Health Centre, a screening for clinical manifestation was done among adults. Sample analysis was done using Filariasis Test Strip while Semi-structured questionnaires were used to collect data on knowledge, attitude and practices (KAP) among residents.
Results: Out of 299 blood samples collected from school children and 150 questionnaires distributed to residents to ascertain the awareness of *Lymphatic filariasis* among residents in the study areas and also to evaluate the efficacy of Ivermectin and Albendazole distributed annually through Mass Drug Administration since 2014, Filariasis Test Strip (FTS) showed 0.0% prevalence of circulating filarial antigen among the school children while the total prevalence of clinical manifestations among residents was 43.33% with higher rate in males (57.33%) than females (42.67%) while forty to 49-year-olds recorded the highest prevalence (13.33%) of clinical manifestations. Statistical analysis was performed with ANOVA using SPSS package and the mean difference is significant at the .05 level that is the P value of the analysis is significant at ≥0.005 level.
Conclusion: Our findings on Filariasis Test Strip (FTS) showed 0.0% prevalence of circulating filarial antigen among the school children implying that *Lymphatic Filariasis* transmissions is low in the study area, suggest the Ivermectin and Albendazole distributed through MDA since 2014 in the endemic areas of Anambra have been effective for *Lymphatic filariasis* control and should remain the recommended strategy for the elimination of *Lymphatic filariasis.*

Keywords: *Lymphatic Filariasis, Filariasis Test Strip, Ivermectin, Albendazole*

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Introduction

Lymphatic filariasis is an infectious disease prevalent in most tropical and subtropical countries and causes irreversible disabilities in tropical and sub-tropical countries [1]. *Lymphatic filariasis* is most commonly referred to as elephantiasis. It is categorized as a neglected tropical disease and a significant public health issue. It is brought on by a chronic infection from a mosquito-vectored filarial worm, which can lead to lymphatic dysfunction and cause deformities in the breasts, testicles, and limbs. These deformities frequently result in incompetence, social isolation, excruciating pain, and financial hardship for those who suffer

from them. Lymphatic filariasis is most commonly referred to as elephantiasis [1]. *Lymphatic filariasis* (LF) is the second most frequent mosquito-borne disease in the world. The parasite which causes *lymphatic filariasis* are thread-like parasites, hence the name. Elimination programme for LF has been ongoing since 2014 in Anambra State through the Ministry of Health by annual Mass Drug Administration of two de-worming antifilarial drugs: Ivermectin and Albendazole. Knowledge on the prevalence of *Lymphatic filariasis* among primary school children and of infected adults is important. The painful and disfiguring manifestations of the disease, and lymphoedema, elephantiasis and scrotal swelling caused by *Lymphatic filariasis* can lead to permanent disability and is considered as one of the most prevalent conditions among affected populations. *Lymphatic filariasis* is caused primarily by three filarial nematodes [2], of the Filarioidea family: *Wuchereria bancrofti*, *Brugia malayi*, and *B. timori*, all of which have a similar life cycle and mosquito bites transfer the disease from person to person: *Aedes polynesiensis, Anopheles gambiae,* and *Culex quinquefasciatus.* The study was limited to the Uli and Amorka settlements in Anambra State Ihiala local government area. The findings from the study will provide baseline epidemiological/recent data on the current burden of *Lymphatic filariasis* among school children (aged 5-9years) which will indicate the level of transmission, treatment and control of *Lymphatic filariasis* in Ihiala local government area of Anambra state. The knowledge of prevalence of *Lymphatic filariasis* infections would be an excellent indicator of the quality of life in the study areas. The study also provide an epidemiological mapping of Uli and schools with infected children and finally, would inform appropriate authorities to embark on health intervention programmes on *Lymphatic filariasis* infections reduction particularly in Ihiala LGA, Anambra State, Nigeria.

Material and Methods

Data Collection

A total of 150 residents were examined for Lymphatic Filariasis. In the Primary Health Centre, a screening for clinical manifestation was done among adults and a Semi-structured questionnaire was used to collect data on knowledge, attitude and practices (KAP) among residents.

Ethical Approval

Ethical approval was obtained from the university ethical committee as indicate on the appendix in this work for the blood samples of 299. Consent forms was obtained and signed by the schools and head teachers to stimulate their pupil's willingness to participate in the research work and also grant the researcher and team access to the pupils and school. The names of schools; Nidegungwu Community Primary School Uli was signed by the Head teacher Mrs. Tessy Agubuokwu on the 27th of January 2022, Uli Central School Uli was signed by the Head teacher Ndinojuo Livinus on the 27th of January 2022 and Community Primary School Amorka was signed by the Head teacher Mrs. Florence Ezekwelu on the 27th of January 2022.

Sample analysis was done using Filariasis Test Strip. Out of the 299 blood samples collected from the study areas; Uli community had a total of 202 and Amorka community had a total 97 pupils. In Uli Community two schools were selected for the study; Uli Central School Uli comprised of 88 male pupils and 65 female pupils giving a total of 153 pupils and Ndiegungu Community School Uli comprised of 23 male pupils and 26 female pupils giving a total of 49 pupils while In Amorka a school was selected; Community Primary School Amorka comprised of 50 male pupils and 47 female pupils giving a total of 97 pupils participated in the study.

Sampling Technique

Antigen testing was performed during the day between 9:00 am to 1pm in different schools within the period of the research. Filariasis Test Strips (FTS) were used for diagnosis. Each strip is individually packed with a desiccant and a plastic work tray and micropipette. A fixed volume of 75ul of whole blood was obtained through the finger prick using lancets to the test strips. Patient Result Stickers were used for adhering test strips to work surface and for recording patient's results.

Sample Collection

Individual fingers were cleaned with alcohol wipes and pricked with a lancet (Becton Dickenson, Franklin Lakes, NJ), and 75ul of blood was collected using a plastic micropipette via capillary action. By holding the micropipette horizontally, automatically the capillary action caused the sample to the fill line and stop. The blood sample was added directly onto the Filariasis Test Strip (placed in the plastic work tray) sample application pad. Ten minutes after the blood sample was taken, the results were interpreted.

Principle of the Test

Antigen testing was performed using Alere Filariasis Test Strips according to the manufacturer's recommendations (Alere, Scarborough, ME). This test works in the same way as the ICT in detecting circulating filarial antigen, but on a different platform [3]. The Alere Filariasis Test Strip (FTS) is a qualitative point-of-care diagnostic tool for identifying the presence of *Wuchereria bancrofti* circulating filarial antigen (CFA) in human blood, serum, or plasma. When 75ul of finger-pricked blood is applied to a sample application pad containing dried polyclonal antibody to CFA tagged with colloidal gold, the diagnosis is antigen-antibody made. CFA binds to the tagged antibody (if it is present). The tagged antigen–antibody complexes flow down a nitrocellulose strip with the plasma, while blood cells are maintained in the sample pad. Immune complexes become immobilized when they connect to a monoclonal antibody to CFA that has been stripped across the nitrocellulose membrane, producing in a positive test with a visible "T-line." The procedural control "C-line" forms when excess-labeled polyclonal antibody crosses a line carrying a secondary antibody to the immunoglobulin in the sample pad. In the FTS, CFA-containing samples create visible T- and C-lines, whereas negative samples only produce the C-line.

Evaluation of the efficacy of mass drug administration (MDA)

Evaluating the efficacy of MDA with Ivermectin and Albendazole since 2014 was done by comparing the data collected from the Anambra State Ministry of Health to the research findings.

Results and Discussion

Table 1 and Table 2: Prevalence of *lymphatic filariasis* among pupils in Ihiala LGA, Anambra State. The present data demonstrate zero microfilaria in primary school children between the ages of 5 and 9 years, implying that lymphatic filariasis transmission is low in the study area. This contradicts research findings that indicate a greater prevalence in various sections of Nigeria [4] in Bauchi and Ebonyi states, respectively; and in Western Nigeria [5]. Comparing with reports of [6] in Taraba State who reported a prevalence rate of (33.3%), and [7] which showed a prevalence rate of (18.8%) in a research conducted in Anambra State, 16.7% obtained by [9] which is relatively high to findings. Table 3: The physical manifestation of LF is majorly seen among men, which includes elephantiasis, hydrocoele, while lymphoedema are seen majorly in women as seen in Table 4. Napier [5] reported on research conducted in Ebonyi State, Nigeria's south-eastern region, which agrees with previous research on the same common clinical symptoms which states that these clinical indications may be the most common connected with the condition in this section of the country, based on the population he studied. Nwoke [9] also agrees with the findings of this study that hydrocele and elephantiasis are more common in people over the age of 40. Results obtained also shows a variation in the distribution of infection in relation to sex, age, occupation and level of education as agreed in similar studies [10]. In Figure 1, the prevalence of Elephantiasis Infection on Leg %, [11] reported that men were found to have a higher prevalence of the condition than women which also agrees with [12] that *Lymphatic filariasis* is an important public health problem in Ogidi as observed elsewhere in Nigeria.

Table 1: Circulating filarial antigen of *Lymphatic filariasis* in relation to School among pupils

Schools	**Total infection rate**	
	Examined	Infected (%)
Uli Central School (UCS)	153	0
Ndiegungwu Community School (NCS)	49	0
Community Primary School Amorka (CPSA)	97	0
	TOTAL 299	

Table 2: Circulating filarial antigen of *Lymphatic filariasis* in relation to Age and Sex among pupils

	Males		**Females**		**Total infection rate**	
Age (years)	Examined	Infected (%)	Examined	Infected (%)	Examined	Infected (%)
5 - 9	88	0	65	0	153	0
5 - 9	23	0	26	0	49	0
5 - 9	50	0	47	0	97	0
				TOTAL	**299**	

Table 3: Prevalence of chronic Clinical manifestations (hydrocele and elephantiasis) of *Lymphatic filariasis* among infected male adults.

Age	**Male**			
	No. examined	**No. with elephantiasis of the legs (%)**	**No. with hydrocele (%)**	**Clinical manifestations**
20-29	13	(1)	0	2
30-39	11	(9)	4	14
40-49	22	(15)	3	20
50-59	12	(7)	6	15
60-69	10	(6)	3	14
70-79	11	(4)	3	12

Table 4: Prevalence of chronic Clinical manifestations (elephantiasis of the legs and elephantiasis of the breast) of Lymphatic filariasis among infected female adults.

Age	**Female**			
	No. examined	**No. with elephantiasis of the legs (%)**	**No. with elephantiasis of the breast (%)**	**Clinical manifestations**
20-29	5	(1)	0	1
30-39	9	(1)	0	1
40-49	10	(2)	0	2
50-59	15	(2)	0	2
60-69	6	(4)	1	5
70-79	4	(2)	0	2

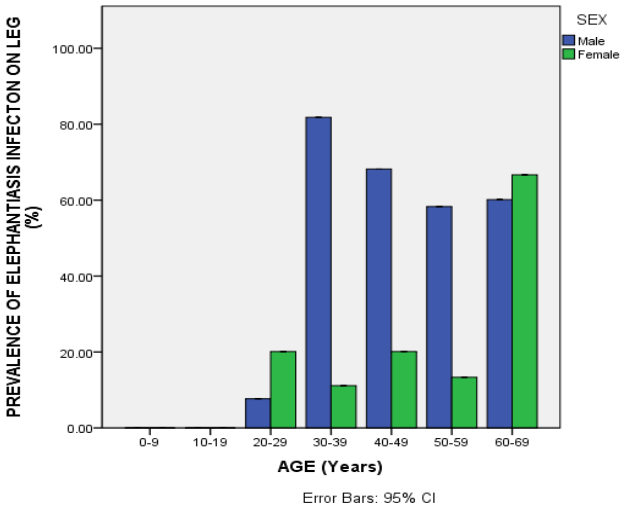

Figure 1: Prevalence of Elephantiasis Infection on Leg %

Table 5: Most of the participants are aware of the dangers LF imposes to human health hence lived in urban settings with good sanitary infrastructure (66.67 %). While approximately 53 % residents participated in this study knew that LF is transmitted from mosquito bite and approximately 50 % respondents were aware that blocked drainages could breed mosquitoes. In Table 6, filariasis was classified as a transmissible infection or condition by around 17% of the participants. A percentage (33.33 %) of respondents use modern day repellents, 53.33 % use bed nets, and 13.33 % utilize natural and alternative techniques to protect themselves from mosquito bites. This could be attributed to inhabitants being exposed to mosquito bites, not using mosquito net and unhealthy environment. Water found in containers, potholes and all hollow materials that are found around giving mosquitoes the opportunity to breed. This agrees to the work of [13, 14]. Adequate knowledge of more than 50% participants leads to appropriate control measures in the control against the disease. Majority of residents knew about the disease, which was known by its local name (Ukwu aba-akpokwu) reflecting the physical conditions of their afflictions or marked clinical manifestation of the disease.

Table 5: Socio-economic characteristics of residents

Characteristics	Frequency	Percentage (%)
Male	` 87	58
Female	63	42
Education: Graduate	90	60
Education: Non-graduate	60	40
House Type		
Mud	50	33.33
Bricks	100	66.67

Table 7: The participants' perceptions of the impact of filariasis on a diseased person's socioeconomic position were investigated. For issues such as 'Getting a work,' 'Earning an income 'or' Social stigma encountered by a diseased person,' males and females had remarkably similar opinions. However, when the data was evaluated by respondents' educational levels, it was discovered that a greater proportion of educated individuals than uneducated people believed that and few person would endure social shame, have trouble finding work, and earn less money than a healthy person. Similar to the preceding scenario, a large majority of literate persons believed that diseased people would have problems getting married, and a larger proportion of male participants than female participants shared this belief. The level of knowledge contributes to the dissemination of diseases agreed by [4,14,15]. In this research, inhabitants with no formal education recorded highest prevalence than others. Lack of information encourages failure. This agrees with the work of [16, 10]. This study reflects the society; that a Filaria afflicted individual is still prone to experience social stigma in the twenty-first century, making it difficult for the person to find a job with a good salary and marry. The results, particularly the responses of the literate population, support this. To improve people's awareness and perceptions of LF, a successful community participation activity must be maintained.

Summary

Wuchereria bancrofti, *Brugia malayi*, and *Brugia timori* are thread round worms known to transmitting various mosquito species, which are the major cause of Lymphatic filariasis infection. *W. bancrofti* has only one confirmed host, humans, accounting for 90% of infections, but *B. malayi* and *B. timori* [8] could be transmitted by a range of other animals. *W. bancrofti* is linked to dermatitis, elephantiasis, and hydrocoele. Dermatitis is a common symptom of several filarial parasite species, but hydrocoele is the most well-known sign of bancroftian filariasis [17] detected hydrocoele and elephantiasis in people over the age of 40 in endemic African locations. Ivermectin is a highly efficient, safe, inexpensive, effective, and well-tolerated microfilaricide that may soon become a key component of many public health initiatives aimed at stopping the spread of Lymphatic Filarial (LF) infection and ultimately eliminating it. In Nigeria, most parts of the world mosquitoes that transmits malaria (*Anopheles* and *Culex*) are the same that transmit lymphatic filariasis, in LF program we have urban transmission and rural transmission where *Anopheles* Mosquitoes perpetuate the rural transmission region because they often bite in the rural villages while *Culex* Mosquitoes are more of the Urban transmission region and transmit the disease in urban areas [18]. Long-lasting insecticidal nets (LLIN) and mass medication administration are the most essential malaria control strategies. A proactive strategy combining well-funded control programs with other community-based health initiatives, such as malaria elimination (rollback malaria), onchocerciasis, or trachoma elimination, and childhood immunization, might substantially speed up progress toward these goals. Other public health advantages are provided to the poorest and hardest-to-reach people through these health projects, which are generally centered on complete community engagement. This opens up possibilities for public health debate and program collaboration at the national, district, and community levels. One of the significant success of the WHO, Carter Center, and NTD program has been the global reduction in *lymphatic filariasis*. The proposed method of community-wide, intensive mass medication administration focuses on breaking local transmission by lowering the prevalence rate of microfilaria positive infections to less than 1% and antigen positive infections to less than 2%. After the threshold has been

reached, bulk medication administration can be halted. To verify that transmission has been ended, geographically mapped assessment units must pass Transmission Assessment Surveys, which were undertaken in this study. The WHO defined the elimination of LF as a public health problem as the decrease of infection prevalence in areas to below a target threshold and the provision of the recommended basic package of care in all areas with lymphoedema or lymphedema-like symptoms. Despite LF challenges, control efforts in West Africa should be majorly supplemented with vector control, if the Global Programme to Eliminate *Lymphatic Filariasis* (GPELF) 2020 is to be achieved in West African countries, which are aimed at interrupting transmission and the prevention of disability.

Table 7: Perception of filariasis among residents

Variables	Occurrence	Percentage (%)
People with Filariasis (Ukwu Aba-Akpokwu) find it difficult in getting job		
Yes	100	66.67
No	50	33.33
Do you think patient suffering from Filariasis (Ukwu Aba-Akpokwu) suffer from stigmatization		
Yes	120	80
No	30	20
Do Filariasis patients (Ukwu Aba-Akpokwu) find it difficulty getting married?		
Yes	130	86.67
No	20	13.33
Do you think patient suffering from Filariasis (Ukwu Aba-Akpokwu) earn lesser?		
Yes	100	66.67
No	50	33.33

Table 6: KAP data of Residents

No. of residents with Clinical manifestation of Filariasis (Ukwu aba-akpokwu)		
Yes	64	42.67
No	86	57.33
Is Filariasis (Ukwu aba-akpokwu) a communicable disease?		
Yes	25	16.67
No	80	53.33
Not Known	45	30
Do you know the cause of Filariasis (Ukwu aba-akpokwu)?		
Mosquito Bite	80	53.33
Flies	20	13.33
Others	25	16.67
Don't Know	25	16.67
Identify a known mosquito breeding site		
Blocked drainage system	75	50
Scrap	10	6.67
Stagnant water	35	23.33
All of the above	30	20
Identify affected part by Lymphatic filariasis		
Leg	130	86.67
Don't Know	20	13.33
Do you know any test for Filariasis infection?		
Yes	100	66.67
No	50	33.33
Which is your first contact point		
Private Hospital	40	26.67
Health Center	80	53.33
Traditional Healers	30	20
Are you aware Filaria tablets are available and distributed free every year?		
Yes	110	73.33
No	15	10
Don't know	25	16.67
Did you consume Ivermectin and Albendazole tablets during MDA?		
Yes	110	73.33
No	40	26.67
How do you protect yourself from mosquito bite?		
Repellents	50	33.33
Bednets	80	53.33
Natural methods	15	10
Any other	05	3.33
How do you control mosquitoes?		
Cleaning of drainage/chemical spray	145	96.67
Don't know	5	3.33

Conclusion

The findings from this investigation revealed some critical insights into the state of *Lymphatic filariasis* in the study area. Firstly, the results obtained from the Filariasis Test Strip (FTS) examination of blood samples collected from school children showed a 0.0% prevalence of circulating filarial antigen. This indicates that *Lymphatic filariasis* transmission is currently low among primary school children in Ihiala LGA. This finding suggests that the annual distribution of Ivermectin and Albendazole through Mass Drug Administration (MDA) since 2014 in the endemic areas of Anambra has been effective in controlling *Lymphatic filariasis* in the region. Furthermore, the study identified a 43.33% prevalence of clinical manifestations among adult residents, with a higher rate in males (57.33%) than females (42.67%). The age group of forty to 49-year-olds recorded the highest prevalence (13.33%) of clinical manifestations. These results emphasize the importance of continued monitoring and targeted intervention strategies for specific demographic groups to further reduce the burden of *Lymphatic filariasis* in the area. In light of these findings, it is recommended that the distribution of Ivermectin and Albendazole through MDA remains the recommended strategy for the elimination of *Lymphatic filariasis* in Ihiala LGA, Anambra State. This study contributes valuable information to the ongoing efforts to combat this neglected tropical disease and improve the overall health and well-being of the community.

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Appendix: Multiple Comparisons

LSD

Dependent Variable	(I) School	(J) School	95% Confidence Interval Upper Bound
No Examined	Uli Central School	Ndiegungwu Community School	56.69
		Community School Amorka	33.02
	Ndiegungwu Community School	Uli Central School	-49.98
		Community School Amorka	-20.31
	Community School Amorka	Uli Central School	-26.31
		Ndiegungwu Community School	27.02

Based on observed means.
The error term is Mean Square (Error) = .000.
*. The mean difference is significant at the .05 level.

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