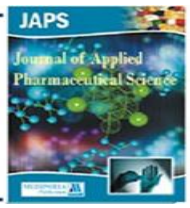
Journal of Applied Pharmaceutical Science
Available online at www.japsonline.com



ISSN: 2231-3354
Received on: 06-11-2011
Revised on: 13:11:2011
Accepted on: 17-11-2011

Prevalence of Bancroftian Filariasis among Edim Otop sub-urban dwellers in Calabar Municipality of cross river state, Nigeria

Ekanem I. A., Alaribe A .A .A and Ekanem A.P.

Ekanem I. A., Alaribe A .A .A
Department of Medical Microbiology and Parasitology, College of Medical Sciences, University of Calabar, Nigeria.

Ekanem A.P.
Institute of Oceanography, University of Calabar, Nigeria.

For Correspondence
Ekanem A.P.
Institute of Oceanography, University of Calabar, Nigeria.

ABSTRACT

Study on the prevalence of brancroftian filariasis among sub-urban dwellers of Edim Otop Community in Calabar, Nigeria was carried out between April and November, 2009. Two hundred and twenty two willing participants within the age range of 15-55 years, from 5 designated zones were randomly selected for the collection of day and night blood samples for screening by ICT card test and Knott's concentration methods respectively for *Wuchereria bancroftian* antigen and microfilaria. The participants were made up of 129 males (56.31%) and 92 females (43.69%). The numbers of positive cases obtained by the highly sensitive ICT card test were 38 (17.20%). There was no positive case by the conventional Knott's concentration method. The highest number of positive cases (4.5%) was obtained from Edim Otop Close and Bassey Oqua zones with 40 and 38 participants, while the least number of positive cases (2.2%) were obtained from Edim Otop Crescent and University of Calabar Satellite town as compared to other zones of the study. . The highest (15.85%) antigenaemia were observed within the ages of 37-47 and the least (0.9%) within 15-25 years old participants. A higher percentage of positive cases were recorded among male participants (57.89%) than females (42.11%). There was no significant difference (P>0.05) in the distribution of parasites according to age and gender in the study area using Chi square methods. Edim Otop Community in Calabar, Cross River State is presented in this study as having shown positive cases of antigenaemia due to Wuchereria bancrofti.

Keywords: *Bancroftian Filariasis*, Edim Otop Sub-Urban dwellers, Nigeria.

INTRODUCTION

Bancroftian filariasis is a mosquito borne disease caused by *Wuchereria bancrofti*. It is transmitted by anopheline mosquitoes, *Culex*, *Aedes*, *Ochlerotatus*, and *Mansonia. W. bancrofti* is responsible for 90% cases of lymphatic filariasis (LF) and is found throughout the tropics and some sub-tropical areas of the world (WHO, 2002). It is the second most common cause of long-term disability after mental illness (WHO, 1997; Ottesen et al, 1997). One-third of the people infected with LF live in India and Africa, the remaining lives in the Americas, the Pacific Islands, Papua New Guinea and South-East Asia (Molyneux, 2005). Although the disease is not explicitly mentioned in the Millennium Development Goals, LF and other neglected tropical diseases are recognized in the report on the Commission for Africa as contributing significantly to the overall African disease burden (Molyneux, 2005). LF and other helminthic diseases leave infected individuals, particularly women and children, more vulnerable to HIV/AIDS, tuberculosis and malaria (WHO, 2002). Although there is an established high prevalence of transmission in rural communities of endemic areas, little research has been done on urban transmission of endemic

areas. A recent study conducted by a team of epidemiologists from Nigeria and the United States looked at the urban area of Jos for the prevalence of lymphatic filariasis. Although the World Health Organization (WHO) estimated a low occurrence of less than 1% urban cases of lymphatic filariasis as resulting from urban transmission, the study revealed that approximately 6% of urban cases of lymphatic filariasis resulted from urban transmission (Terranella et al, 2006). According to the authors of this study, and other members of the public health community, this percentage is high enough to confirm transmission of lymphatic filariasis in urban areas.

`Bancroftian filariasis is spread from infected persons to uninfected persons by the bite of infected mosquitoes. Most infections are asymptomatic, but the living adult worm causes progressive lymphatic vessel dilation and dysfunction. Lymphatic dysfunction may lead to lymphadema of the leg, scrotum, penis, arm, or breast, which can increase in severity as a result of recurrent secondary bacterial infection (Dreyer et al, 1998).

The thread-like parasitic filarial worms, *Wuchereria bancrofti* and *Brugia malayi* that cause lymphatic filariasis, live almost exclusively in humans. The development of the disease itself in humans is still something of an enigma to scientists. Though the infection is generally acquired early in childhood, the disease may take long to manifest itself. The worst symptoms of the chronic disease generally appear in adult men more often than in women. In endemic communities, some 10 to 50% of men suffer genital damage, especially hydrocele fluid-filled balloon-like enlargement of the sacs around the testes, and elephantiasis of the penis and scrotum (Pani et al, 1991). Elephantiasis of the entire leg, vulva, or the breast, swelling up to several times of the normal size can affect up to 10% of men and women in endemic communities. Acute or local inflammation, involving skin, lymph nodes and lymphatic vessels, often accompany the chronic lymphoderma, or elephantiasis. Some of these are caused by the body immune response to the parasite, but most are because of bacterial infection of the skin, where normal defences have been partially lost due to underlying lymphatic damage. The determination of the prevalence of lymphatic filariasis due to *Wuchereria bancrofti* in sub-urban dwellers of Edim Otop Community in Calabar, Cross River State, Nigeria and assess the epidemiological trend of the disease in the environment was the objective of this study.

MATERIALS AND METHODS

Study Area

The study area of this research was Edim Otop community in Calabar Municipality of Cross River State, Nigeria, with estimated population of about 3,500 people. The main occupation of residents of this area is subsistent farming and trading. It is a typical sub-urban area which is densely populated with low income earners, characterized by poor sanitary conditions including poor drainage systems which aid in the development of vectors (Srividya et al, 1991). Ethical clearance was obtained from the Ethical committee of the Cross River State Ministry of Health before the study was conducted.

Sample Collection

After explaining the purpose of the study to the village Chief and obtaining his approval and permission, the study area was divided into 5 zones (Urua Nyom Ebe, Edim Otop Crescent, Bassey Oqua, Edim Otop Close and the University Satelite Town) for the sake of convenience and accessibility. Two hundred and twenty two willing participants were drawn from the 5 zones.

Day and night blood samples were collected from willing participants within the age range of 15 – 55 years. Structured questionnaires were also given to them for completion; those who could not write were assisted.

The day samples were collected after the area (thumb) was cleansed with 70% alcohol and allowed to dry. With the aid of a sterile lancet, a prick was made, the first drop of blood expressed was cleaned off with a dry cotton wool and the subsequent blood was collected into 100µl capillary tube by capillary action. This was used to perform the ICT Card Test. The Card Test is an in vitro immunodiagnostic test which utilizes a polyclonal antibody (PAb) and a monoclonal anti-body specific to *Wuchereria bancrofti*. The PAb is attached to colloidal gold and impregnated into pink and white sample pad. The capillary blood was then transferred from the tube to the pad on the ICT test kit and allowed to flow down the pad and the serum flowed forward into the pink area, allowing any *Wuchereria* antigen present to bind to the colloidal gold labelled PAb. The card was then tightly pressed to close.

The result of each ICT Card test was read after 10 – 15 minutes. The result was said to be positive when two pink lines appeared on the card window (T and C). The test is positive even when the test line appears lighter or darker than the C (control) line. A negative result was obtained when only the control line was seen. Test results with the individual identity number were recorded on the card and also in a book where data were kept.

Night Sample Collection for Knott's Concentration Analysis

Microfilariae of *W. bancrofti* are usually found in the peripheral blood of patients at night. Samples collected during the day cannot be used to carry out this analysis therefore blood samples were collected from subjects in the night between the hours of 9.00 to 10.30pm. During the day after bleeding the subjects, they were sufficiently briefed on the need for a night sample collection. Their consents were obtained and time fixed for the night sample collections.

Capped test tubes containing 9mls of 2% formalin was used for the test. About 1.5mls of blood was collected from the participant by vein puncture; 0.5mls of blood was used for direct wet preparation; 1ml was inoculated into the test tube mixed properly by gently rocking to effect lysis of the cells as described (Knott, 1935).

The samples were centrifuged at 5000rpm for 2 minutes. The supernatant were decanted leaving the deposits which were

used to prepare thick film on clean grease free slide. The film were allowed to air dry and stained with 2% Giemsa stains for about 45 minutes and were examined under the microscope with X40 and X100 lens for identification of the microfilaria.

Thick Blood Film

This method detect, *Wuchereria bacrofti* larval forms through finger prick or direct vein puncture collected during the time of peak microfilaraemia. The identification of the microfilariae (mf) in the blood stream is the definitive method of the diagnosis of infection. It is only when micro-filariaraemia load is high that the larval forms can be detected.

On clean grease free slide 10µ of blood was used to make a thick film. These were left to dry at room temperature, stained in 2% Giemsa for 45 minutes and examined under the microscope.

RESULTS

Out of 222 participants whose blood samples were collected, 125 were males while 97 were females from the 5 designated zones in Edim Otop Community between April and November, 2009. The distribution of participants according to gender is shown in Table 1. The results show that more males were willing to participate in the study than females.

Table 2 shows the distribution of participants according to age range. The study considered participants within the age range 15 years and above. More of the participants clustered between 26 years and 47 years. Age range 37-47 years had 64 (28.83%) of the participants. The least number of participants were between the age bracket 15-25 representing about 19.37% of the total number of participants. Thirty-eight (17%) of the blood samples of participants tested positive for the presence of *Wuchereia Bancrofti* antigen. The highest parentage of parasitaemia was obtained in Edim Otop close zone and Bassey Oqua, constituting a prevalence of 4.5% out of 40 and 38 participants respectively from the zones.

Table 1: Distribution of Participants According to Gender.

Zones	Males	Females	Total
Bassey Oqua	20	18	38 (17.12%)
Edim Otop Crescent	20	26	46 (20.72%)
Urua Nyom Ebe	36	12	48 (21.62%)
Satelite Town	26	24	50 (22.52%)
Edim Otop Close	23	17	40 (18.02%)

Table 2: Distribution of Participants According to Age

Age Range	Bassey Oqua	Edim Otop Crescent	Urua Nyom Ebe	Satelite Town	Edim Otop Close	Total
15 – 25	06	10	12	08	07	43 (19.37%)
26-36	12	12	13	15	10	62 (27.93%)
37-47	12	13	13	14	12	64 (28.83%)
48 & above	08	11	10	13	11	53 (23.87%)

Table 3: Prevalence of Antigenaemia (Card Test) amongst the Participants in Designated Areas.

Units	No. of Participants	No. of positive	Percentage
Edim Otop Crescent	46	5	2.2
Bassey Oqua	38	10	4.5
Urua Nyom-Ebe	48	8	3.6
Satelite Town	50	5	2.2
Edim Otop close	40	10	4.5
Total	222	38	17.2

Table 4: Comparison of Card Test and Knott's Concentration Techniques.

Units	Participants	Card Test (Positive)	Knotts Conc. (Positive)
Edim Otop Crescent	46	5	Nil
Bassey Oqua	38	10	Nil
Urua Nyom Ebe	48	8	Nil
Satelite Town	50	5	Nil
Edim Otop Close	40	10	Nil

Table 6: Prevalence of Antigenaemia by Gender.

Units	Participants	Males	Females
Edim Otop Crescent	46	3	2
Bassey Oqua	38	7	3
Urua Nyom Ebe	48	3	5
Satelite Town	50	3	2
Edim Otop Close	40	6	4
Total	222	22 (57.89%)	16 (42.11%)

Table 7: Perception of Participants about Disease.

Unit	No Idea	Natural	Evil Act	Act of God	Food Borne	Sex	Mosquito
Edim Otop Crescent	6	6	10	5	5	8	6
Bassey Oqua	2	6	10	4	5	7	4
Urua Nyom Ebe	12	8	10	8	1	7	1
Satelite Town	10	8	6	8	8	6	4
Edim Otop Close	10	4	6	3	4	10	3
Total	40 (18%)	32 (14%)	42 (8.9%)	28 (12.6%)	23 (10.4%)	38 (17%	18 (8%)

DISCUSSIONS

Nigeria is one of the countries with the optimal habitat necessary for the development of the vectors of lymphatic filariasis which is endemic to most tropical and subtropical areas of the world which is presented as the second most common cause of long-term disability after mental illness (WHO, 2002; WHO, 1997; Ottesen, 1997). A lot of work has been done in rural Communities

Table 5: Parasites Distribution According to Age Group.

Age Range	Bassey Oqua	Edim Otop Crescent	Urua Nyom Ebe	Satelite Town	Edim Otop Close	Total
15-25	-	-	01	-	01	02 (0.90%)
26-36	02	01	03	01	05	12 (5.40%)
37-47	05	02	02	01	03	13 (5.85%)
48 & above	03	02	02	01	03	11 (4.95%)

of Nigeria, but only very few Urban and Sub-urban Communities have been given research attention on lymphatic filariasis. Edim Otop Community is the first Sub-urban community in Cross River State Nigeria in which a research on lymphatic filariasis has been conducted to the best of our knowledge. Two hundred and twenty people living within the study area enrolled for the study. However, it was observed that more male (56.31%) were willing to participate in the study than female (43.69). This could be attributed to the fact that men are more prone to the disease than female and also, the fear of genital and other malfunctions resulting from the enlargement of the scrotum is another reason of participation by active young men who may seek freedom from such disability and social disgrace and morever, lymphatic filariasis and other helminthic diseases leave affected individuals more vulnerable to HIV/AIDS, tuberculosis and malaria (Michael et al, 1994; Partono et al, 1978; Taylor and Denham, 1992; Dreyer et al, 2000; WHO, 2002) This is further confirmed by the results of the distribution of participants by age in which the highest percentage (28.83%) representing an active age of 37-47 of the total number of participants was obtained.

A total of 17.2% positive cases were recorded with the use of highly sensitive ICT card test which is capable of detecting *Wuchereria* antigen in the blood at any time; there was no positive case by knott's concentration method. This may be attributed to the stage of the infection because; it is only when microfilaria is present in general circulation that it can be detected by knott's concentration method. On the basis of the results obtained, this study, has found ICT card test method more sensitive and better screening method for lymphatic filariasis. The identification of the most effective correct diagnostic tool is very important for the Global Program to eliminate lymphatic filariasis (Weil and Ramzy, 2007). The highest parasitaemia (5.85%) in this study was recorded within the age range of 37-47 years which may be attributed to the fact that some members of this age range are involved in incessant travelling to highly endemic parts of the state for business transactions, thereby being exposed to bites of infected mosquitoes. This age group contributes up to 58.5% of microfilarial carriers globally (Michael et al, 1996). The least (0.90%) parasitaemia was recorded within the age range of 15-25 years; this may be a reflection of the low number of participants within this age range.

A higher prevalence rate was recorded in this study among male participants (57.89%) than females (42.11%) which may, in addition to other factors, be due to the fact that more males participated in the study than females. Prevalence of lymphatic filariasis in males than females reported by other workers is known to be associated with sexual dimorphism in which the concentration of major circulating immunoglobulin classes (IgG, IgM and IgD), which according to the report is lower in males than in females of the same age (Michael et al, 1996; Brabin, 1990).

The results obtained in this study are similar to that obtained in Jos, Plateau State. [5]. The low clinical symptoms seen in the study area, is a reflection of the fact that clinical manifestations of bancroftian filariasis is relatively slow to develop, and are proportionate to the intensity of the infection. The time taken for the parasite to develop in the definitive host to the optimum of infecting the vector is of the same order as the life span of the definitive host. The population dynamics of filarial infections are therefore based on two biological time-scales. One, a short term scale similar to the life span of the vector and the other a long term scale similar to the life-span of the host (Srividya et al, 1991). Though the infection is generally acquired early in childhood, the disease may take long to manifest itself (Partono et al, 1978). These results have some coincidences with (Pani et al, 2004) in which they compared the sensitivity of the new format immunochromatographic card test (ICT) with the conventional laboratory techniques in the detection of microfilaria of *W. bancrofti*, the sensitivity of the ICT method was higher than the conventional technique (Pani et al, 2004). In addition to being useful for defining the prevalence and distribution of *Wuchereria bancrofti* as part of the global program to eliminate lymphatic filariasis, the ICT filariasis test is also useful in assessing the residual antigen levels following antifilarial treatment (Schuetz et al, 2000).

The socio-economic factors and general believe of the people enhances transmission of the infection in the study area. Most people in the area attributes transmission of the disease to other factors such as promiscuity, act of God, hereditary, instead of mosquito bite which was the believe of only a few. These believe and their economic status also tends to affects their attitudes towards keeping mosquito away from their homes by the use of insecticides, mosquito treated nets and other devices. The poorer communities have provided optimal breeding environments for vectors because of lack of resources to control them (Pani et al, 1991).

REFERENCES

Brabin L. Sex differentials in susceptibility to lymphatic filariasis and implications for maternal child immunity. *Epidemiol Infect*. 1990;105: 335-353.

Dreyer G, Figueredo-Silva J, Neafie RC. Lymphatic filariasis. In: Nelson AM, Horsburgh CR, eds. Pathology of Emerging Infections. Vol2. (1998). Washington, DC:. *American Society for Microbiology*. 317-342

Dreyer G, Noroes J, Figuerdo-Silva J & Piessens, W. Pathogenesis of lymphatic disease in bancroftian filariasis: a clinical perspective. *Parasitolology Today*; 2000;16: 544-548.

Knott, J. The periodicity of the microfilaria of Wuchereria bancrofti. Preliminary report of some infection experiments. Trans. Roy. Soc. Trop. Med. Hyg. 1935; 29: 59 – 64.

Michael, E., Simonsen, PE. Malecela, M., Jaoko, WG., Pedersen, EM., Mukoko, D, Ruegoshora, RT, Meyrowitsch, DW. Zool. Transmission intensity and the Immunoepidemiology of Brancroftian filariasis in East Africa. Parasite Immunol. 1994; 23, 373-378.

Michael E, Bundy DAP, Grenfell BT. Re-assessing the global prevalence and distribution of lymphatic filariasis. *Parasitology*. 1996;112: 409-428.

Molyneux BH, PJ Hotez, A Fenwick. Rapid-impact interventions: how a policy of integrated control for Africa's neglected tropical diseases could benefit the poor. PLoS Med. 2005; 2: e336.

Ottesen EA, Duke BO, Karem M. Behbehanik. Strategies and tools for the control/elimination of lymphatic filariasis. *Bulletin of the world Health Organization*. 1997;75:491-503.

Partono F, Purnomo, Pribadi W, Soewarta A. Epidemiological and clinical features of *Brugia timori* in a newly established village,

Karakuak, West Flores, Indonesia. J. Trop Med Hyg. 1978;27: 910 – 915.

Pani SP, Balaknishnan N, Srividya A, Bundy DAP, Grenfell, BT . Clinical epidemiology of Bancroftian filariasis effect of age and gender. Transaction of Royal Society of Tropical Hygiene. 1991;5:260.

Srividya A, Pani SP, Rajagopalan PK. The dynamics of infection and disease in bancroftian filariasis. *Transaction of Royal Society of Tropical Medicine and Hygiene*. 1991;85(2):255-9.

Schuetz A; Addiss DG; Eberhard ML; Lammie PJ. Evaluation of the whole blood filariasis ICT test for short-term monitoring after antifilarial treatment. *American Journal ofTropical Medicine and Hygiene*. 2000;62(4):502-3.

Taylor AER, Denham DA. Diagnosis of filarial infections. *Tropical Disease Bulletin*. 1992;89:R1-R33.

Terranella A, Eigiege A, Gantor A, Dagua P, Damishi S. Urban lymphatic filariasis in Central Nigeria. *Annals of Tropical Medicine and Parasitology*. 2006; 100, (2), 163-172.

Weil GJ, Ramzy RM. Diagnostic tools for filarriasis elimination programs. *Trends In Parasitology*. 2007;23 (2), 78–82.

World Health Organization. Resolution of the Executive Board of the WHO: Elimination of Lymphatic filariasis as a Public Health Problem. *Fifieth World Health Assembly*, Geneva WHA. 1997;50:29.

World Health Organization (2002). Lymphatic filariasis: the disease and its control. *Fifth report of the WHO expert committee on filariasis. Geneva*