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Perstans Filariasis in Rural Communities of the Lower Cross River Basin Nigeria: Parasitological Observations

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Abstract: The study was undertaken to ascertain the prevalence and microfilarial density of *Mansonella perstans* filariasis in 6 rural communities of the Lower Cross River Basin, Nigeria. Parasitological examination of 829 consenting subjects was carried out between January and November, 2002. Data collected was stratified by community, age and sex and analysed using the chi-square test. Overall, 131 (15.8%) of the subjects were infected with microfilariae of *M. perstans*. Prevalence varied significantly ($p<0.05$) within the communities (range 3.7-33.5%). Infection was significantly ($p<0.05$) higher in females (21.2%) than in males (12.1%) and occurred in all age groups with highest prevalence of (30.0%) in subjects within the age group of 21-40 years. The microfilarial density increased with age, reaching a peak (31.90 mf/50 μL blood) in persons within the age bracket of 21-40 years. The overall geometric mean density was 21.63 mf/50 μL blood and it was significantly ($p<0.05$) higher in males (28.24 mf/50 μL blood) than in females (15.02 mf/50 μL blood). In view of the fact that *M. perstans* has been implicated in the aetiology of many diseases, its infection could no longer be ignored.

Key words: *Mansonella perstans*, microfilaria, prevalence cross river basin, Nigeria

INTRODUCTION

Mansonellosis due to *Mansonella perstans* is widely distributed in Africa, the Carribean, Central and South America (McMahon and Simonsen, 1996; Ottenson, 1990). The vectors are blood-sucking midges such as *Culicoides grahamii*, *C. austeni* and *C. fulvithorax* which thrive in the underbush and rotten banana stems (Crewe, 1977; Service, 2000; Agbolade, 2002). *M. perstans* is generally regarded as asymptomatic because in some regions up to 90% of infected native subject may exhibit little or no clinical manifestations. However, this filarial species is being implicated with clinical filariasis in some endemic areas. Serious symptoms that have bee reported in mansonellosis include pruritus, transient swelling (similar to Calabar swelling), fever, pain in the bursae and/or joint synovia, in serous cavities or in the liver region, elephantoid scrotum, extreme exhaustion, eosinophillia, monocytosis and neutrophilic toxic granulations (Adolph *et al*., 1962; Arene and Atu, 1986; Pierkersku, 1989; Ottenson, 1990; Udonsi, 1986; Agbolade, 2002; Agbolade and Akinboye, 2005).

M. perstans is arguably the most widespread human filarial infection in Nigeria (Uttah *et al*., 2005). There is high endemicity of mansonellosis in the coastal and mainland areas of Niger Delta. It is also the predominant filarial species in Calabar (Useh and Ejezie, 1995) from where it forms an epidemiological continuum with neighbouring rainforest Cameroon, which is reported to have high prevalence of 50% (Anderson *et al*., 1974). Similarly, high prevalence have been documented in other parts of Nigeria (Arene and Atu, 1986; Udonsi, 1986; Anosike *et al*., 1992, 2005).

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There is paucity of information about mansonellosis in the Lower Cross River Basin Nigeria. This study was therefore conducted to ascertain the prevalence and intensity of *M. perstans* in Obanliku Local Government Area (LGA) of Cross River State, Nigeria.

MATERIALS AND METHODS

Study Site

The study was conducted in 6 rural communities of Obanliku Local Government Area (LGA) of Cross River State, Nigeria between January and November 2002. Cross River State is situated within the Cross River Basin located between latitude 5°31[1] and 4°27[1] North and longitudes 7°50[1] and 2°21 East and has an area of 23,074,425 square kilometers. The state is dominated by the rainforest vegetation. However there are traces of derived and guinea savanna in the Northern fringes of the state. The climate is classified as hot-humid, with two main seasons namely: the rainy season (April-October) and the dry season (November-March). An annual rainfall of about 160 and 220 mm is recorded in the hinterlands and coastal areas, respectively. Relative humidity ranges between 80 and 90%, while temperature ranges between 23.4 and 27.9°C. The major occupation of the people are farming, fishing and hunting. Crops cultivated are yams, cassava, maize, rice. Cattle rearing and bee farming is largely practiced. A detailed description of the study site and area is documented elsewhere (Opara *et al*., 2005; Ibanga, 2004).

Community Mobilization

Pre-survey visits were made with letters to the chairman of Obanliku Local Government Area and the Primary Health Co-ordinator (PHC) to intimate them on the proposed survey. The PHC then later introduced the research team to the District Health Supervisors (DHS). Thereafter the villages were visited, where the Village Heads, opinion leaders and chiefs, were informed about the aims and objectives of the survey, consent was sought and obtained.

Ethical Consideration

The Cross River State Ministry of Health approved of the survey, informed consent was sought and obtained from individuals and parents of persons less than 18 years. Before commencement of the study, the inhabitants were informed of the nature, scope and purpose of the study. Inconveniences of pains on pricking the finger and late hours of blood collection was explained and individuals were allowed voluntary participation.

Sample Collection and Examination

Blood samples for parasitological examinations were taken from every consenting person of 1 year and above, between 22.00 and 02.00 h. The left thumb was cleansed thoroughly with methylated spirit and allowed to air dry. Using a disposable sterile lancet a deep prick was made and blood was collected using non-heparinized capillary tubes, about 50 µL of blood was used to prepare a thick smear on microscopic slides as described by Cheesbrough (1998). These were air dried overnight, fixed in methanol stained with Geimsa, before microscopic examination. The microfilariae of *M. perstans* was identified and distinguished from the microfilariae of other filarial pathogens especially *Wuchereria bancrofti* and *loa loa* by their morphology as described by Cheesbrough (1998).

Clinical Examination

We did not investigate clinical manifestation because, *M. perstans* co-exist with *Wuchereria bancrofti* and *Loa loa* in the study area (Braide *et al*., 2003; TDR, 2001), a possible overlap with other filarial pathogens in the aetiology of the clinical symptoms may exist.

Data Analysis

Differences in proportion were tested by chi-square. While variations in microfilariae density were analysed by t-test.

RESULTS

Of the 829 persons examined 131 (15.8%) were infected with *M. perstans*. The prevalence varied significantly ($p<0.05$) among the communities ranging from 3.7% in Besenge to 33.5% in Utuhu (Table 1). The microfilariae prevalence in relation to sex is also presented in Table 1, of the 494 males and 335 females examined, 60 (12.1%) and 71 (21.2%), respectively were positive for *M. perstans*. There was significant difference ($p<0.05$) between prevalence and sex. Infection was recorded in all age groups. The highest infection rate was observed in the age group 21-40% (30.0%), while the least infection was recorded in subjects older than 60 years (1.6%). (Table 2). There was a significant difference ($p<0.05$) between prevalence and infection. The overall geometric mean intensity among microfilariae positive subjects was 21.63 mf/50 µL (range 1-170 mf/50 µL). Males (28.24 mf/50 µL) had a significantly ($p<0.05$) higher intensity than females (15.02 mf/50 µL) (Fig. 1).

Table 1: Sex-related prevalence of *M. perstans* infection in Obaniliku Local Government Area, Cross River State, Nigeria

	Males		Females		Total	
Communities	No. examined	No. (%) infected	No. examined	No. (%) infected	No. examined	No. (%) infected
Old Ikwette	40	3 (7.5)	26	5 (19.20)	66	8 (9.1)
Utuhu	98	26 (26.5)	66	29 (43.90)	164	55 (33.5)
Begiatsul	101	3 (3.0)	81	7 (8.60)	182	10 (5.5)
Begiagba	70	7 (10.0)	37	5 (13.50)	107	12 (11.2)
Kukare	71	17 (24.0)	52	22 (42.30)	123	39 (31.7)
Besenge	114	4 (3.5)	73	3 (4.10)	187	7 (3.7)
Total	494	60 (12.1)	335	71 (21.10)	829	131 (15.8)

Table 2: Age-related prevalence of *M. perstans* infections in Obanliku LG, Cross River State

	0-20		21-40	
Community	No. examined	No. (%) infected	No. (%) examined	No. (%) infected
Old Ikwette	12	0 (0.0)	16	6 (37.5)
Utuhu	41	20 (48.8)	51	27 (52.9)
Begiatsul	38	2 (5.3)	50	7 (14.0)
Begiagba	24	3 (12.5)	30	6 (20.0)
Kukare	35	10 (28.6)	25	19 (76.0)
Besenge	24	1 (4.2)	55	3 (5.5)
Total	174	36 (20.7)	227	68 (30.0)

Table 2: Continued

	41-60		>60	
Community	No. examined	No. (%) infected	No. (%) examined	No. (%) infected
Old Ikwette	20	3 (150.0)	18	0 (0.0)
Utuhu	42	6 (14.3)	30	2 (6.7)
Begiatsul	55	2 (3.6)	39	0 (0.0)
Begiagba	28	4 (14.3)	25	0 (0.0)
Kukare	35	9 (25.7)	28	1 (3.6)
Besenge	65	0 (0.0)	43	0 (0.0)
Total	245	24 (9.7)	183	3 (1.6)

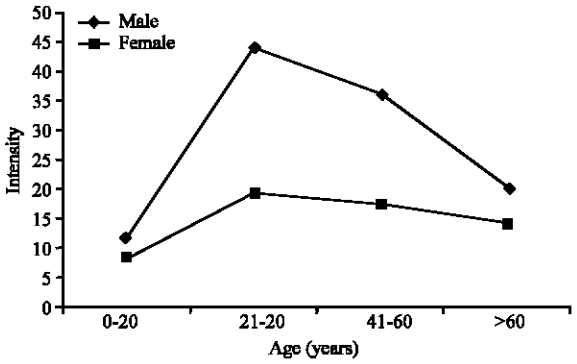

Fig. 1: Geometric mean intensity of microfileriaemia among infected person

DISCUSSION

This study reveals a relatively low prevalence of *M. perstans* infection among the people of Obanliku Local Government Area of Cross River State Nigeria. This result may be an underestimation of the actual prevalence of mansonellosis in this study area because of the volume of blood used in preparing the thick smear. It has been reported by Dreyer *et al.* (1996) that 20-60 µL blood films do not reliably detect microfilariaemic individuals with low parasitaemia level, in addition thick smears grossly underestimate the prevalence of filariasis (Faris *et al.*, 1993). However, the 15.8% prevalence obtained in this study is similar to 14.6, 13.4 and 12.5% obtained by Wijeyarantne *et al.* (1982), Udonsi (1988) and Uttah *et al.* (2005), respectively. These values contrast with the lower values obtained by Anosike *et al.* (1992), Arene and Atu (1986), Agbolade and Akinboye (2001), all working in different parts of Nigeria. There was a significant variation in prevalence of mansonellosis in the different communities, this may be attributed to the uneven distribution of ecological factors that favour the breeding of culicoides vectors. The age-related prevalence shows that microfilariae were found in all age groups, indicating that the infections are acquired early in life. This is not entirely surprising considering the socio-cultural and economic practices of the people in the study area, they live in mud houses that are virtually unprotected from insect attacks and in close proximity to brooks. Most of these mud houses are surrounded by banana and plantain plantations, which are ideal breeding sites for the vectors. The prevalence in the age group of 20-40 years was higher than the others. This is because at the age of 21-40 years people are considered to be the most physically fit and able to do laborious work, hence spending most of their time doing outdoor work which leads to a higher risk of being bitten by the vectors, similar observations have been recorded by Anosike *et al.* (1992). Females were significantly more infected than males. This difference between sexes in prevalence has often been related to occupation leading to increased exposure to vectors. It was observed in the study area that women engage in late** evening story telling outside their houses and nocturnal outdoor meetings, in addition early morning and late evening market is also highly practiced among the women folks. It has been reported by Service (2000) that culicoides bite at anytime and late evening corresponding to peak period of these activities engaged by women. All these socio-cultural and economic activities expose the women folks to bites of the vector. Similar observation has been reported by Ufomadu and Ekejindu (1992).

We did not carry out any clinical investigation in this study, because in parts of Africa where several filarial diseases coexist, some confusion might arise with respect to their clinical manifestation since their might be possible overlap with other filarial pathogens in the aetiology of these conditions

(Anosike *et al*., 2005). Since the study are is endemic for onchocerciais, bancroftian filariasis and *Loa-loa*, (Briade *et al*., 1980, 2003; TDR, 2001), carrying out clinical investigation might give a misleading result.

The findings from this study indicates that Perstans filariasis is an important serious health problem since it coexist with other filarial pathogens. Vector control measures do not seem practicable considering the peculiar breeding habitat of the culicoides vectors. The need for a well-articulated filariasis control programme for endemic rural communities whose major health problems are rooted in their socio-cultural and economic lifestyle and amplified by several contingencies of their physical environment and occupational imperatives cannot be over-emphasized. Since *M. perstans* has been implicated in the aetiology of many diseases, its infection in human subjects should no longer be ignored.

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