

## Original papers

## The occurrence of *Mansonella perstans* among residents of Calabar metropolis in Cross River State of Nigeria

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**ABSTRACT.** The occurrence of *Mansonella perstans* was studied among people who had resided in Calabar metropolis for at least one year prior to the time of this study, which lasted from February to August, 2011. One thousand residents, comprising 530 males and 470 females, with an age range of 4 to 59 years, participated in the study, after an informed consent. Two millilitres of venous blood were collected at day time into EDTA bottles. The blood samples were processed by diluting 1ml of blood in 9 mls of 1% formalin and centrifuging the preparation at 3,000 revolutions per minute for 5 minutes. Deposits were left as blood smears on clean slides and after air-drying, were stained with 3% Giemsa solution for microscopy. Overall, the prevalence of *Mansonella perstans* was 2% (20 vs 1,000). The prevalence of the parasite among the females was 2.1% (10 vs 470) and males 1.9% (10 vs 530). Microfilaraemia only occurred among subjects aged between 25 and 45 years. The results of this study suggest that loiasis, which earned Calabar an unenviable mention in early medical literature, is no longer very prevalent in the area. Instead, a low prevalence of mansonellosis occurs, in tandem with the existence of sparse farmlands of banana and plantain. Old stems of these crops provide suitable habitats for *Culicoides* species, which transmit *Mansonella perstans*.

**Key words:** Calabar, *Culicoides*, *Mansonella*, microfilaraemia, Nigeria

### Introduction

*Mansonella perstans* is a tissue-developing nematode, which is classified among filarial worms. Early medical literature also referred to it as *Acanthocheilonema perstans* or *Dipetalonema perstans* [1,2]. The worm is widely distributed in tropical Africa and South America [3,4]. The parasite is transmitted to man through bites of females *Culicoides* (midges). In West Africa, the parasite is transmitted mainly by *Culicoides austeni* and *C. grahamsi*. Male flies do not suck blood but feed mainly on plant juices [5].

*Loa*, *Onchocerca* and *Wuchereria* have been associated with filariasis and serious pathologic sequelae [6–8]. Several workers only associate *M. perstans* with little pathologic effects, such as allergy, eosinophilia and joint pains. Other species of *Mansonella*, e.g. *M. ozzardi*, have been associated with symptoms which resemble those of

bancroftian filariasis [9]. The symbiotic relationship between filarial nematodes and rickettsial bacteria makes filariases very important parasitic diseases [10,11].

During routine laboratory diagnosis over many years, the Authors have examined blood samples of several patients who were clinically diagnosed with pyrexia, pruritus corporis, severe headaches, burning and crawling sensations, depigmentation of the skin, etc. After a thorough parasitologic examination of the blood samples, the commonest blood parasite recovered had always been *M. perstans*. In tropical regions in which pyrexia of unknown origin co-exists with *M. perstans* and other “well-established, more pathogenic” filarial worms, there is the need to re-define the pathogenic status or potential of *M. perstans*. An adult female *M. perstans* measures about 80mm in length and 0.12mm in width; male worms are much smaller. *Microfilaria perstans* exhibits no periodicity and is

Table 1. Occurrence of filaraemia according to gender and age groups

Age groups	Male		Female	
	No. examined	No. positive	No. examined	No. positive
4 – 10	23	–	29	–
11 – 17	47	–	50	–
18 – 24	80	–	44	–
25 – 31	94	5	65	2
32 – 38	108	3	110	3
39 – 45	99	2	94	5
46 – 52	61	–	42	–
53 – 59	18	–	36	–
<b>Total</b>	<b>530</b>	<b>10</b>	<b>470</b>	<b>10</b>

unsheathed [2]. This means that during acute infections with heavy parasite burdens, microfilariae can easily be recovered from peripheral blood of patients at any time.

### Materials and Methods

**Study area.** The study area was Calabar, the Capital of Cross River State of Nigeria. The city is located in the south eastern corner of Nigeria. Two Local Government Areas make up the Calabar metropolis. The city has a total land area of 406 km<sup>2</sup> and a population of 371,022 according to the 2006 National Census [12]. In Calabar, two climatic conditions prevail yearly: a lengthy rainy season

spanning 10 months and a brief period of dry season within 2 months [13]. The city is nourished by waters from Calabar, Kwa and Cross Rivers and its vegetation is that of a typical tropical rain forest.

**Collection of blood specimens.** Venous blood specimens were collected from residents of Calabar Municipality and Calabar South Local Government Areas, which make up Calabar metropolis. Only persons who had resided in Calabar for at least one year were enlisted in the study after obtaining their consent. This exclusion criterion became necessary to rule out imported cases of mansonelliasis. A total of 1,000 residents (530 males and 470 females) participated in the study. Two millilitres of venous blood were collected from each subject from the

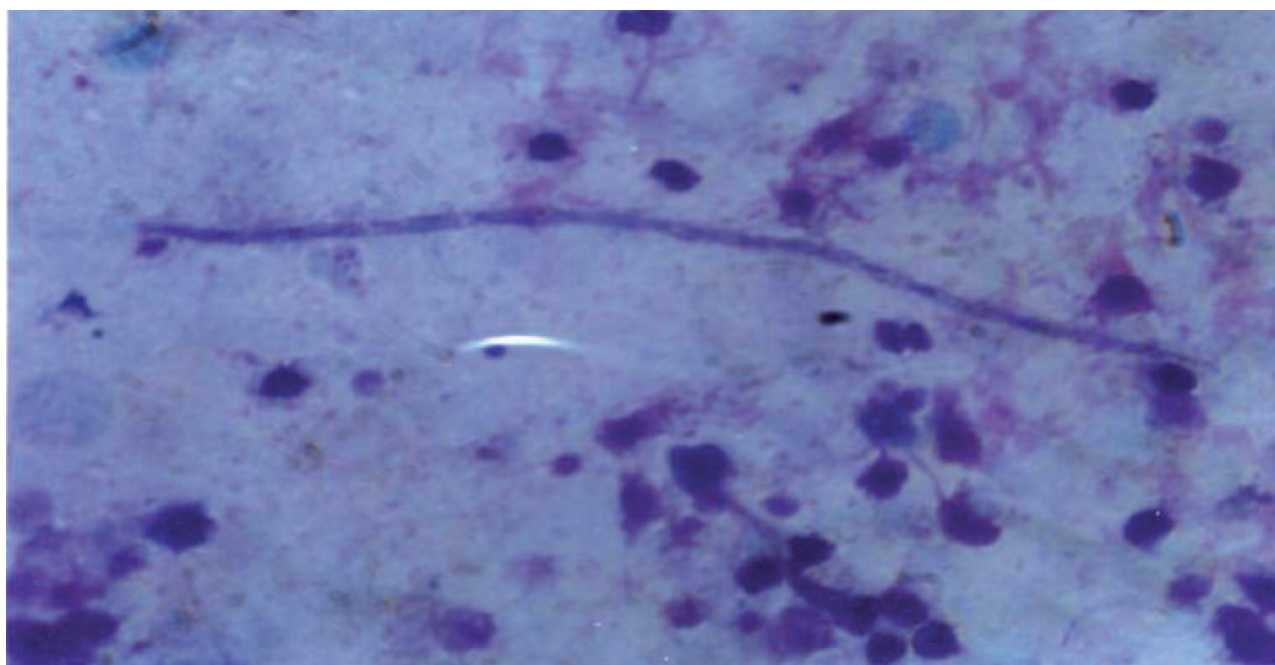


Fig. 1. A photomicrograph of microfilaria of *Mansonella perstans* detected in a blood sample

cubital fossa and placed in EDTA (ethylene diamine tetra-acetic acid) bottles. Collection of blood samples lasted from February to August, 2011. Blood samples were collected once from each subject during the daytime only. It was not convenient to conduct blood collection in the night.

**Processing of blood specimens.** Blood specimens were processed at the Parasitology Laboratory of the University of Calabar Teaching Hospital within 24 hours of collection. A drop of whole blood was placed on a clean, grease-free slide and examined with x10 objective lens as a wet preparation. If microfilaria was detected, the preparation was kept to dry in air and subsequently stained as described below. Also, 1 millilitre of blood was placed in a centrifuge tube after mixing. Nine millilitres of 1% formalin were added to the blood sample in a centrifuge tube. The preparation was centrifuged at 3,000 revolutions per minute for 5 minutes. Supernatant was carefully decanted and blood smears were made on clean slides. After drying in air, the blood smears were stained with 3% Giemsa solution for 30 minutes. The stained blood smears were carefully examined as follows: (1) using x10 objective lens, the entire stained smear was scanned through for microfilaria; (2) if any microfilaria was detected, immersion oil was applied to the smear and it was re-examined with x100 objective lens.

**Statistical analysis.** The Chi-square test was used to assess the statistical significance of all results obtained.

## Results

Microfilariae of *Mansonella perstans* were detected in blood samples of 20 volunteers (Fig. 1). An overall prevalence of 2% filaraemia (20 vs 1,000) was recorded in the study. Out of 470 female subjects, 10 harboured microfilariae of *M. perstans*, with a prevalence rate of 2.1%. Among the male volunteers, the prevalence of microfilaria *perstans* was 1.9% (10 vs 530). Microfilariae of *M. perstans* were only detected in the blood of subjects aged between 25 and 45 years in both sexes. As shown in Table 1, no microfilaria was detected in the blood of volunteers aged from 4 to 24 years and 46 to 59 years.

No microfilaria of *Loa loa* was detected from blood samples examined throughout the study.

## Discussion and Conclusions

The vegetation of pre-colonial Calabar consisted mainly of oil palm trees (*Elaeis guineensis*) and Pará rubber trees (*Hevea brasiliensis*), which provided suitable habitats for vectors of loiasis, *Chrysops* species. This clearly explains why loiasis was prevalent in pre-colonial Calabar. In contemporary Calabar, rapid deforestation (as a result of road and building projects) has shifted vector habitats to the fringe of the city. Oil palm and rubber trees are not very common features in the main Calabar city today. This means that the flight range of insect vectors has also been restricted to areas in which habitat conditions are suitable for their survival. Loiasis is known to have disappeared in Guinea, Guinea Bissau, Ivory Coast and Mali. It is very likely that paucity of suitable breeding sites for *Chrysops* species has led to a diminution in the number of the vectors.

A higher prevalence of *M. perstans* in women (2.1%) than in men (1.9%), suggests that women were more exposed to vectoral bites due to their involvement in farming and other out-door activities. Young women (4 to 24 years old) and elderly women (46 to 59 years old) harboured no microfilariae. This result shows that women in these age groups were less involved in farming and out-doors activities; thus, they were less exposed to vectoral bites.

In conclusion, the results of this study suggest that loiasis is no longer very prevalent in the area. Instead, a low prevalence of mansonelliasis (2%) occurs in Calabar, due to the existence of sparse farmlands of banana and plantain. Old stems of these crops offer suitable breeding sites for *Culicoides* species, which transmit *M. perstans* [2,5]. There is no doubt that the change in the vegetation of Calabar, over time, has contributed to the shift from a preponderance of loiasis to that of mansonelliasis, as observed in this study.

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