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PREVALENCE OF *MANSONELLA PERSTANS* INFECTIONS AMONG THE NOMADIC FULANIS OF NORTHERN NIGERIA

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Abstract: The study was undertaken to investigate the prevalence and clinical manifestations of *Mansonella perstans* infection in the nomadic Fulanis of northern Nigeria. Physical examination of 755 consenting nomads for clinical manifestations of *M. perstans* infection was carried out between June 1996–September 2000. This was followed by parasitological examination of blood samples collected by finger prick method to identify *microfilariae* (mf). Data collected was stratified by locality, age and sex, and analyzed using the Chi-square test. Overall, 66 (8.7%) of 755 nomads were infected. Infection was higher in men (9.7%) than in women (6.5%) ($p<0.05$) and occurred in all age groups with highest prevalence in persons in the 4th (14.1%) and 5th (17.1%) decades of life. Fifty-six (81.8%) of the 66 nomads with mf had clinical manifestations with periodic dizziness (18.2%), body itching (15.2%) was the most prevalent while back pain (7.6%) was the least. The findings show that mansonelliasis is an important health problem in nomads. This underscores the need to establish a well-articulated Filariasis Control Programme for this group whose major health problems are rooted in their occupation and amplified by several contingencies of the environment.

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INTRODUCTION

Very few medical reports exist on the nomadic people of the world. In Africa, Hansen *et al.* [11] reported that in 83 adult Kalahari bushmen, living as nomad hunter-gatherers in South Africa, medical conditions such as cirrhosis, varicose veins, hypertonia, obesity, heart disease, as well as rheumatoid arthritis were found to be rare as against hunting accidents that were more common. Comparative studies by the same investigators on the nomadic Masai in Kenya gave about the same picture of a surprisingly healthy population, Haraldson [12] in another study found that about 9% of 406 Masai populations have serological evidence of syphilis.

To date, there is no documented report on filarial infections associated with the nomadic Fulanis of

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Northern Nigeria, despite extensive epidemiological assessment of the status of filariasis in that part of the country [2, 3, 4]. This study was carried out to investigate the prevalence and clinical manifestations of *Mansonella perstans* infection amongst the Nigerian nomadic Fulanis.

MATERIALS AND METHODS

Study Area and Population. The study was conducted in Bauchi State, Nigeria, located between Latitudes 9° 5' and 12° 6'N and Longitudes 8° 3' 11° 6' E. Detailed description of the study area has been previously documented [2, 3]. The Fulanis, Hausas, Fa-awa, Butawa, Warjiwa, Zuru and Sayawas are the major tribes in this part of the country among other tribes. For this investigation, the target population was the nomadic Fulanis and not the settled Fulanis. The nomadic Fulanis have a primitive, pagan religion, often with animism as a dominating ingredient [13]. They often employ horses and donkeys for transportation. Their animals provide them with meat and milk as food in addition to their utilization as hides and hairs for tents and clothing. The Fulanis have a distinctive life style, a great attachment to their own customs and a way of making relations with those they meet. Both men and women participate in animal rearing. In addition, the women usually move into the nearby towns or villages during the day to sell 'Fura' - a cereal meal locally processed from millet or sorghum grains, as well as 'Nono' - fresh milk from cows. In the dietary pattern of the nomadic fulanis of northern Nigeria, 'Fura' is next in importance to 'Tuwo' - a well known traditional staple food also prepared from cereal grains.

Nomadic Fulani's are a race or tribe without a fixed abode, but move from place to place according to the state of the pasturage or food supply. They consist of several groups made up of pastoralists, fishermen, collectors and hunters. The pastoralists make up the majority of nomads today. They keep animals, mainly sheep, goats, dogs, and cattle as well as camels. They usually employ donkeys and horses for transportation. Migrant Fulanis live in large and mobile bush encampments which they are prepared either to defend or flee from, depending on the strength of their enemy. They have a rare empathy with their cattle and are superb stockmen [3].

Physical Examination and Parasitology. Informed consent was obtained from all patients according to the guidelines of the authors' institution. The Institutional Review Board of the Imo State University and the University of Jos, Nigeria, reviewed and approved this study. Between June 1996–September 2000, nomadic Fulanis were identified in their scattered bush encampments in 5 Local Government Councils (LGCs) in Bauchi State, Nigeria. At each settlement, the purpose of the study was explained to each settlement head and his permission obtained. Thereafter, all persons in the settlement aged 5 years and above were asked to gather at a central point. The study was explained to them in Hausa and those willing to participate were enlisted. In all, 755 nomads participated in the study. After individual verbal consent was obtained, they were assigned an ID number and taken to a screened examination area and asked in Hausa their names, ages, and movement patterns in the last decade. Two physicians in the team then examined each subject for possible clinical manifestations of *M. perstans* infection. Clinical manifestations of other filarial aetiology, such as onchocercal nodules, depigmentation (leopard skin), hanging groin, lymphoedema, were noted.

Parasitology consisted of examination of blood specimens for microfilariae (mf) of *M. perstans* (which is non-periodic) using the method of Cheesebrough [8]. The finger prick technique was used because it was easy to handle and generally more suitable for mass surveys than the veni-puncture filtration technique [1]. Moreso, Gubler *et al.* [10] observed that the mf in both techniques peaked at the same rate. First, the left thumb was cleaned with ethanol-soaked cotton swab. A disposable sterile blood lancet was used to puncture the cleaned site and the 20 mm^2 of blood collected from each individual was used to make a thin blood film. This was air dried, fixed in methanol, stained with Giemsa, and examined microscopically. The mf of *M. perstans* was identified and distinguished from the mf of other filarial pathogens (if present) particularly, *Wuchereria bancrofti* and *Loa loa* by their morphology [8]. The mf were counted and recorded on each individual's data form. The differences in infection rates in the various LGCs and by sex and age were analyzed using the chi-square test.

Table 1. Sex-related prevalence of *M. perstans* infection amongst the Nigerian nomadic Fulanis of Bauchi State.

Local government area	Men		Women		Total	
	No. of subjects examined	No. of subjects infected (Percent of total count)	No. of subjects examined	No. of subjects infected (Percent of total count)	No. of subjects examined	No. of subjects infected (Percent of total count)
Toro	95	6 (6.3)	45	3 (6.7)	140	9 (6.4)
Bauchi	57	6 (11.8)	22	3 (13.6)	73	9 (12.3)
Darazo	269	13 (4.8)	109	3 (2.8)	378	16 (4.3)
Dass	67	16 (23.9)	26	4 (15.4)	93	20 (21.5)
Ningi	56	11 (19.6)	15	1 (6.7)	71	12 (16.9)
Total	538	52 (9.7)	217	14 (6.5)	755	66 (8.7)

RESULTS

Sixty-six (8.7%) of the 755 nomadic Fulanis examined had *M. perstans* infections. Of the 538 men and 217 women examined, 52 (9.7%) and 14 (6.5%) respectively were positive for *M. perstans* mf (Tab. l) ($p<0.05$). The prevalence varied among the LGCs with Dass LGC being significantly higher than the others (Tab. 2) ($p<0.05$). Overall, infection was recorded in all age groups. Persons in the 4th and 5th decades of life had the highest prevalences, 14.1% and 17.1% respectively, while nomads in the first decade of life were the least afflicted (1.5%). Seven different types of clinical signs were associated with mansonelliasis in the present study (Tab. 3). These include pectoral pains, periodic dizziness, joint pains, body itching, swollen ankles, elephantoid scrotum and back pains.

Overall, (52.1% of the 755 nomads examined had any one of the observed clinical signs. Fifty-six (81.8%) of the 66 nomads with *M. perstans* mf also presented with any one of the clinical signs. Periodic dizziness (18.2%), followed by body itching (15.2%) were the most common clinical signs in this group, while back pain (7.6%) was the least. 49.2% of nomads without infection also had clinical signs, the most prevalent being body itching (13.8%) and the least, elephantoid scrotum (1.7%).

Table 3. *M. perstans* microfilaremia in relation to clinical signs amongst the nomads.

Clinical signs	No. of nomads sampled (percent of total count)	
	Nomads negative for microfilariae (N = 689)	Nomads positive for microfilariae (N = 66)
Pectoral pains	32 (4.6)	6 (9.1)
Joint pains	48 (7.0)	8 (12.1)
Back pains	38 (5.5)	5 (7.6)
Periodic dizziness	72 (10.4)	12 (18.2)
Body itching	95 (13.8)	10 (15.2)
Elephantoid scrotum	12 (1.7)	6 (9.1)
Swollen ankles	42 (6.1)	7 (10.6)
Without clinical signs	350 (50.8)	12 (18.2)

DISCUSSION

In Nigeria, information on the types of diseases associated with the nomadic Fulanis is scanty or non-existent. Ogbonna *et al.* [13] had observed high rates of dermatophyte infections amongst nomadic Fulani herdsmen of Plateau State.

The study reveals a relatively low prevalence of *M. perstans* infection among nomadic Fulanis in Bauchi State, Nigeria. Since the nomads move from place to place according to the state of pasturage or food supply, especially along river valleys, the present results may be an underestimate of the actual prevalence of mansonelliasis in this group of people. The variation in the prevalence of mansonelliasis in the different LGCs is attributed to the uneven distribution of environmental factors that favour the breeding of *Culicoides* vectors [3] as well as the migratory patterns of the study subjects. Male nomads were more infected than female. The reason for the sex-differential observed remains unclear since both are equally exposed to bites of infective *Culicoides* species in the field during herding. The lower prevalence in women may be the result of some biological factors and/or the dress code for muslim women which leaves less exposed skin on women than men. A similarity is seen in lymphatic filariasis where unexplained hormonal effects (in addition to other factors) result in lower prevalences in women than men [7, 10]. Further studies are required to elucidate the factors (particularly biological) responsible for the disparity in infection rates among sexes in endemic areas. The age-related prevalence appears to exhibit a diphasic pattern with the highest prevalence in nomads in the 4th and 5th decades of life. This could be due to increased contact between these nomads and the transmitting vectors as a result of active and long exposure during herding. This observation is in line with the reports of Wijeyaratne *et al.* [18] among the Fulanis, Hausas and Maguzawas of Kaduna State, and Anosike *et al.* [3] among the Ibos of Imo and Abia States of Nigeria.

Table 2. Age-related prevalence of *M. perstans* infection amongst the Nigerian nomadic Fulanis of Bauchi State.

Age groups	Bauchi		Darazo		Dass		Ningi		Toro		Total	
	No. examined	No. (%) infected	No. examined	No. (%) infected	No. examined	No. (%) infected	No. examined	No. (%) infected	No. examined	No. (%) infected	No. examined	No. (%) infected
0-9	7	0 (0)	34	1 (2.9)	8	0 (0)	3	0 (0)	15	0 (0)	67	1 (1.5)
10-19	13	0 (0)	60	0 (0)	24	10 (41.7)	9	1 (11.1)	11	0 (0)	117	11 (9.4)
20-29	8	1 (12.5)	45	1 (2.2)	11	3 (27.2)	12	1 (8.3)	20	0 (0)	96	6 (6.3)
30-39	15	2 (13.3)	34	2 (5.9)	7	2 (28.6)	8	2 (25.0)	14	3 (21.4)	78	11 (14.1)
40-49	6	2 (33.3)	53	4 (7.6)	9	2 (22.2)	11	6 (54.5)	9	1 (11.1)	88	15 (17.1)
50-59	6	4 (66.7)	41	3 (7.3)	15	1 (6.7)	13	1 (7.7)	28	1 (3.6)	103	10 (9.7)
60-69	10	0 (0)	45	0 (0)	7	2 (28.6)	8	1 (12.5)	34	3 (8.8)	104	10 (9.6)
70+	8	0 (0)	66	1 (1.5)	12	0 (0)	7	0 (0)	9	1 (11.1)	102	2 (2.0)
Total	73	9 (12.3)	378	16 (4.2)	93	12 (16.9)	71	12 (16.9)	140	9 (6.4)	755	66 (8.7)

Although, *M. perstans* has been viewed by some authors as an insignificant filarial pathogen, a causal association between this parasite and various clinical illnesses has been documented. In Uganda, Strohschneider (1956) cited by Sasa [16] examined 152 cases of *M. perstans* infection among African workers and observed that 39 of them had clinical symptoms, such as giddiness, aching limbs, periodic itching, and abdominal or pectoral pains; seven cases among these were severe and had developed edema of the lower limbs or scrotum. In the present investigation, similar clinical signs were observed among nomads habouring *M. perstans* mf. This finding is consistent with several reports from different parts of Nigeria [2, 3, 6, 14, 15]. Though additional studies are required to define clearly the pathogenesis of this parasite in relation to clinical manifestations, what appears to be a consistent pattern of mansonelliasis disease in endemic areas of tropical Africa is emerging. As in the present study, asymptomatic cases of infections have also been previously documented in parts of Nigeria [3, 17, 18].

In parts of Africa where several filarial diseases coexist, some confusion might arise with respect to their clinical manifestations, e.g., characterized by itching, even though itching by onchocreciasis is severe and continuous, as against that by *Mansonella*, which is periodic. However, features like non-painful subcutaneous nodules, spotted depigmentation called 'leopard skin', and hanging groin are pathognomic for onchocerciasis and never implicated in other filarial diseases. Conversely, joint and back pains, as well as occasional dizziness in an individual, is an indication of *M. perstans* infection. The finding in this study of some microfilaremic persons presenting with similar clinical signs (though of lower prevalences) as in microfilaremic ones, indicates a possible overlap with other filarial pathogens in the aetiology of these conditions. Demonstration of the mf of species is necessary therefore for diagnosis of filarial infections.

It is a well-known fact that herding is a difficult task which calls for great skill, much agility and close attention. This is especially so during the planting season when the animals must be prevented from destroying crops on the farms. Indeed, the harsh way of life of nomads has left them with a high tolerance threshold for suffering, and as such, feel a reduced need for health services. The need for a well-articulated Filariasis Control Programme for nomadic Fulanis whose major health problems are rooted in their lifestyle and amplified by several contingencies of their physical environment and occupational imperatives cannot be over-emphasized. For such a programme to be effective, sustainable and far-reaching, it should be integrated into the overall Primary Health Care Services scheme of the Fulanis as a group. There is need to re-examine the existing educational and health care strategies among the nomads in Bauchi State and Nigeria in general. The Federal and State Ministries of Health, as well as the health departments of various Local Government Councils where nomadic Fulanis encamp, should integrate a good system of special visitation to the nomads by mobile health teams. In addition, there is need for seasonal and informal health education of nomads through Community Based Health Workers nearest to the encampment sites on human filariasis, as well as other occupational diseases affecting the Fulanis. This would be useful for proper diagnosis and early treatment of most diseases affecting the nomadic Fulanis of northern Nigeria.

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