

Indian J Med Res 85, May 1987, pp 522-530

Prevalence survey of filariasis in two villages in Chingleput district of Tamil Nadu

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Accepted October 24, 1986

A baseline survey of filariasis was conducted in two endemic villages in Chingleput district of Tamil Nadu, to obtain the prevalence rate of microfilaraemia and that of clinical filarial disease along with its various clinical patterns. Of the 2921 *de jure* population registered, in 2735 a comprehensive clinical examination for filariasis was carried out by a physician. In 2658 persons of those clinically examined, night blood samples were collected by finger prick. The results of the survey confirmed that the two village were highly endemic for filariasis, the prevalence rates of clinical disease and microfilaraemia being 20 and 12 per cent respectively. The endemicity rate was 31 per cent. Nocturnally periodic *Wuchereria bancrofti* was the only species identified. The major manifestations of clinical disease were lymphadenitis in the acute phase, hydrocele and oedema of the lower limbs in the chronic phase and involvement of the lower limbs in the elephantiasis phase. Among males with disease in the chronic phase, genital involvement was more than that of the lower limbs. The distributions of the patients by age in the three phases, although overlapping, suggested that the disease generally progressed with age from acute to chronic to elephantiasis phase. The microfilarial rate among persons with clinical disease was lower as compared to that among persons without disease. An entomological survey of one of the villages showed that *Culex quinquefasciatus* was the vector with high infection and infectivity rates.

Filariasis is widespread in India with 304 million of the population living in endemic areas¹. It is also an important public health problem in Tamil Nadu^{2,3}. To understand the course of infection and disease, longitudinal follow up of population cohorts in areas endemic for filariasis is needed. As a first step in this direction, a baseline survey was conducted in two endemic villages in Chingleput district of Tamil Nadu. The main objec-

tives of the survey were to obtain the prevalence rate of clinical filarial disease and its various clinical manifestations and the microfilarial rate. The present paper reports the results of the baseline survey.

Material & Methods

The baseline survey for filariasis was conducted in Thomur and Velama Kandigai villages in Poondi Panchayat

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Union of Thiruvallur Taluk, Chingleput district, Tamil Nadu about 60 km west of Madras. The survey was conducted from June, 1982 to January, 1983. The procedures adopted were briefly as follows. A complete census of each village was taken by a house-to-house visit and all persons registered. The entire *dejure* population, irrespective of age or sex, was eligible for a comprehensive clinical examination by a physician and parasitological examination. The clinical examination included inspection and palpation of the limbs, regional lymphnodes, distal lymphatic trunks and external genitalia along with pulmonary auscultation. Genitalia were examined only in males for operational reasons. The clinical disease was classified as follows :

Acute inflammation—Red streaks with tenderness (suggestive of ascending lymphangitis), scrotal lymphangitis, acute lymphadenitis, funiculitis, epididymo-orchitis.

Chronic lymphatic obstruction—Oedema of limb, thickening of scrotal skin, thickening and/or lymphvarix of spermatic cord, enlargement of testes, hydrocele.

Elephantiasis—Elephantiasis of limbs and genitalia (scrotal, penial).

All those suspected of having tropical pulmonary eosinophilia (TPE) as evidenced by history and/or chest signs were referred for chest X-ray and blood eosinophil counts.

From all those persons clinically examined, blood samples of about 60 cmm were collected by finger prick between 2200 h and 0100 h and thick blood smears of about 1 cm diameter were prepared.

The blood smears were stained⁴ and examined for microfilaria (mf) in a standardized manner by a trained and experienced technician. In all positive smears, the species of mf was identified.

The periodicity of the parasite was investigated on a sample of known mf positives using nuclepore filter (MFC)⁵ and it was established that the parasite is nocturnally periodic.

The diagnostic utility of diethylcarbamazine (DEC) provocation test⁶⁻⁸ was tested on a sample of known mf positives using MFC technique. The efficiency of detection of mf carriers, both in terms of rate and density, was found to be lower for the provocation test as compared to the conventional night blood test. Operationally also the provocation test procedure was found to be cumbersome under field conditions as has been reported also by Sasa⁹.

Entomological investigations were carried out in Thomur village by a team from the Vector Control Research Centre, Pondicherry. Estimates of entomological indices⁹ like mosquito species, infection and infectivity rates were obtained.

As the findings were similar in the two villages, the results have been combined and presented.

Results

Study population : The population studied and coverages obtained are shown in Table I. In all, 2921 persons were registered and high coverages were obtained, uniformly for all ages and both sexes, with overall coverages of 94 per cent for clinical

Table I. Population registered and coverages obtained

Age-group, yr	Sex	No. registered (<i>dejure</i>)	No. examined for clinical disease	No. from whom blood sample collected
0-24	M	771	716 (93)	694 (97)
	F	721	679 (94)	663 (98)
	T	1492	1395 (93)	1357 (97)
25-44	M	386	352 (91)	335 (95)
	F	401	389 (97)	380 (98)
	T	787	741 (94)	715 (96)
45+	M	299	281 (94)	275 (98)
	F	343	318 (93)	311 (98)
	T	642	599 (93)	586 (98)
Total	M	1456	1349 (93)	1304 (97)
	F	1465	1386 (95)	1354 (98)
	T	2921	2735 (94)	2658 (97)

Figures in parentheses show coverages (%) obtained

examination and 97 per cent for blood collection among those clinically examined.

Prevalence of clinical filarial disease :

Patients have been considered under three broad categories : acute disease, chronic disease and elephantiasis. Patients falling under more than one category have been considered under the more advanced phase. For example, a patient with acute lymphadenitis as well as hydrocele has been shown under chronic disease. Of the 2735 persons examined, 560 cases with clinical disease were found (Table II). Thus, 4.3, 11.2 and 5.0 per cent had clinical disease in the acute, chronic and elephantiasis categories respectively. It can be seen that three-fourths of the chronic disease in males was due to genital manifestations. A comparison of the prevalence of disease, other than genital, in males

with that in females (after adjusting for age) showed that it was higher in males in the acute phase ($P < 0.01$), similar in the two sexes in the chronic phase ($P > 0.5$) and higher in females in the elephantiasis phase ($P < 0.05$). It was seen that the prevalence of acute disease was mostly concentrated in the age group 5-34 yr (Fig. 1). The prevalence of chronic disease and that of elephantiasis steeply increased with age up to the age groups 25-29 and 50-54 yr respectively and then almost levelled off.

The distribution of patients in each of the three disease categories showed that although there was overlapping, the disease progressed with age from one category to the next (Fig. 2). Thus, 103 (88%) of the 117 acute cases, 286 (94%) of the 305 chronic cases and 120 (87%) of the 138 cases of elephantiasis were in the age

Table II. Prevalence of clinical disease, by sex

sex	No. examined	No. and % with disease			Total
		Acute	Chronic	Elephant.	
(a) Manifestations other than genital :					
Male	1349	80 (5.9)	49 (3.6)	48 (3.6)	177 (13.1)
Female	1386	31 (2.2)	47 (3.4)	84 (6.1)	162 (11.7)
(b) Genital manifestations* :					
Male	1349	20 (1.5)	232 (17.2)	18 (1.3)	270 (20.0)
Total	2735	117 (4.3)	305 (11.2)	138 (5.0)	560 (20.5)

* 14, 23 and 12 persons, who had manifestations other than genital, are included under (a) also in acute, chronic and elephantiasis categories respectively

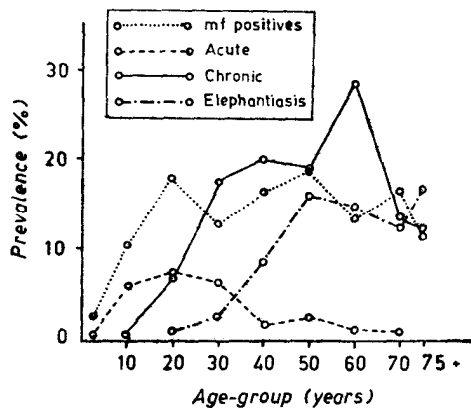


Fig. 1. Prevalence of microfilaraemia and clinical disease according to age.

groups 5-39, 15-64 and 35-74 yr respectively. The median age of the patients in the three categories was 19, 41 and 48 respectively and differed significantly from each other ($P < 0.001$; both by Mann-Whitney U test and t-test).

Manifestations of clinical filarial disease : Lymphadenitis was the predominant acute manifestation while hydrocele in males and lymphoedema in both sexes accounted for a large proportion of the chronic disease (Table III). Elephantiasis of limbs was more frequently seen than genital elephantiasis. The youngest person to have acute disease was 3 yr old while one with elephantiasis was 15 yr old. No case of chyluria was identified in the study population.

Tropical pulmonary eosinophilia : Out of 46 persons suspected and investigated for tropical pulmonary eosinophilia (TPE), in as many as 40 (87%) the absolute eosinophil count (AEC) was less than 1200 per cmm. Only 2 persons had a count of more than 2000, one of whom was also reported to have miliary mottling on X-ray.

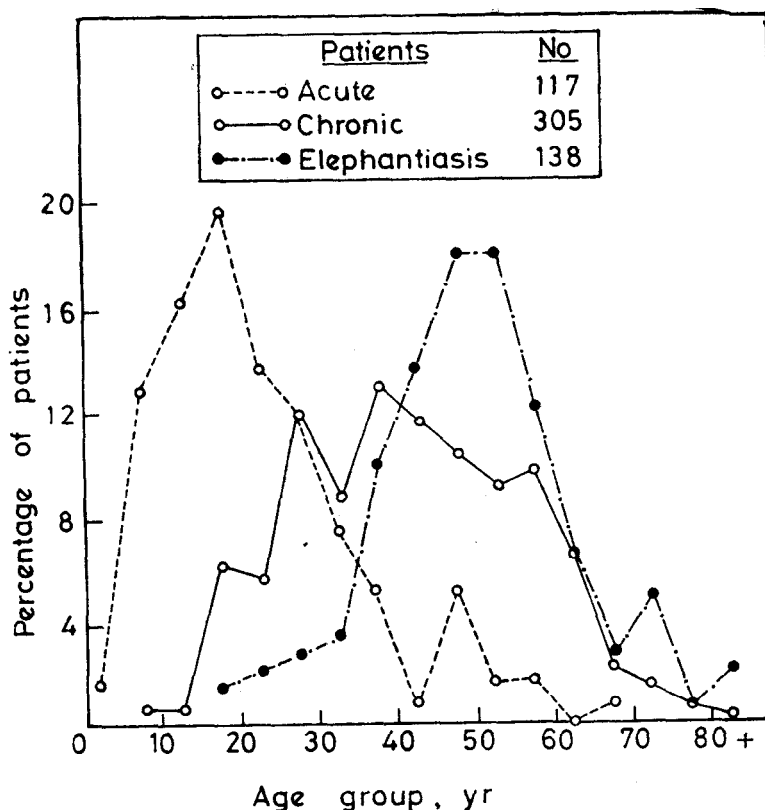


Fig. 2. Distribution of patients in acute, chronic and elephantiasis phases according to age.

Microfilarial rate : The mf rates, by sex, separately for persons with and without clinical disease are shown in Table IV. There were 321 persons positive for mf out of the 2658 persons examined; the overall mf rate being 12.1 per cent. It was 13.1 per cent in males and 11.1 per cent in females ($P>0.20$). The mf rate was 8.6 and 13.0 per cent among persons with and without clinical disease respectively ($P<0.001$).

A standardised comparison of mf rates among persons with and without clinical disease, separately for the three categories, has been presented in Table V. Age groups

in which most patients were present have been considered for the comparisons. Except for males with disease in acute phase, the mf rate among persons with clinical disease was much lower, as compared to that among persons not having clinical disease. In both the sexes, this difference was statistically significant in chronic and elephantiasis categories.

The mf rate, among persons without clinical disease, increased steeply with age up to the age group 15-24 yr and then almost levelled off (Fig. 1). The youngest person positive for mf was a 2 yr old boy.

Species of mf : *Wuchereria bancrofti* was

the only species identified in the study population.

Entomological survey in Thomur : *Culex quinquefasciatus* was found to be the predominant species. Of the 971 larvae collected, 966 (99.5%) were *C. quinquefasciatus*. While *C. quinquefasciatus* was the only mosquito collected biting man indoors, 22 of the 24 mosquitoes biting man outdoors were *C. quinquefasciatus*. All the adult *C. quinquefasciatus* mosquitoes were dissected and examined for filarial larvae. The infection and infectivity rates were 20 and 6 per cent respectively.

Table III. Pattern of clinical manifestations

Category of disease	Males	Females	Total
<i>Acute</i> :			
Lymphadenitis	66	23	89
Lymphangitis of limbs	0	8	8
Acute genital disease	20	NA	20
Total	86	31	117
<i>Chronic</i> :			
Limb Lymphoedema	26	47	73
Genital Hydrocele	131	NA	131
Others	78	NA	78
Both	23	NA	23
Total	258	47	305
<i>Elephantiasis</i> :			
Limb	36	84	120
Genital	6	NA	6
Both	12	NA	12
Total	54	84	138

NA, not applicable

Discussion

The results of the survey confirmed that the two villages were highly endemic for filariasis, the prevalence of clinical disease being 20 per cent and the mf rate, 12 per cent. The endemicity rate (*i.e.*, proportion of the population having mf and/or disease) was 31 per cent. In earlier surveys, the overall estimates of mf and disease rates for all the endemic areas of India were reported to be 7 and 5 per cent respectively¹. Similar estimates for endemic districts in Tamil Nadu were reported to be ranging from 0.5–11.2 per cent for mf and 0.2–8.0 per cent for clinical disease, with Chingleput district (study area) having the highest rates¹⁰. The mf and disease rates were found to be 13-15 per cent and 5-8 per cent in East Godavari

Table IV. prevalence of microfilaraemia

Sex	No. examined	+ve for mf
<i>(a) Irrespective of clinical disease</i> :		
Male	1304	171 (13.1)
Female	1354	150 (11.1)
Total	2658	321 (12.1)
<i>(b) Persons without clinical disease</i> :		
Male	918	128 (13.9)
Female	1194	146 (12.2)
Total	2112	274 (13.0)
<i>(c) Persons with clinical disease</i> :		
Male	386	43 (11.1)
Female	160	4 (2.5)
Total	546	47 (8.6)

Figures in parentheses are percentages

Table V. Comparison of mf rates among persons with and without clinical disease

Age group, yr	Comparison	Microfilarial rate (%)*		
		Males	Females	Total
5-39	No disease	16.2	13.1	14.7
	Acute disease	16.9 NS	5.9 NS	11.5 NS
15-64	No disease	18.9	14.7	16.8
	Chronic disease	9.2**	0.0**	4.6**
35-74	No disease	20.2	14.7	17.3
	Elephantiasis	4.6**	1.8**	3.1**

* Standardised rates (Direct method) calculated on the basis of the age-sex distribution of the *dejure* population; ** $P < 0.001$; NS, not significant

district, Andhra Pradesh^{11,12} and 15 and 22 per cent in Calcutta, West Bengal¹³. The results from the present survey are in agreement with the high endemicity reported in south India. The finding that the disease rate was higher than the mf rate agreed with the results from Calcutta¹³ but was in contrast to the findings of other studies referred to earlier. This difference could probably be due to the long standing (*i.e.*, more than 100 yr, as per the epidemiological classification of endemic regions¹⁴) endemicity of the disease in the study villages and the fact that the examination for clinical disease was complete and thorough

The major manifestations of clinical disease were lymphadenitis in the acute phase, hydrocele and oedema of the lower limbs in the chronic phase and lower limb involvement in the elephantiasis phase.. Genital involvement was more than that of the lower limbs among males with disease in the chronic phase. In the East Godavari study^{11,12}, the pattern of clini-

cal manifestations was in general similar to our findings except that the lower extremity involvement was more frequent than genital disease. Similar excess of limb disease was observed in Kerala¹⁵. However, one study from Calcutta¹³ and two others from Uttar Pradesh^{15,16} have reported a higher frequency of genital disease than limb disease among males. The preponderance of genital disease over limb disease is also reported from Africa^{17,18}. This geographical variation in the clinical presentations of bancroftian filariasis has been discussed in the Fourth WHO Expert Committee Report¹⁹. The more frequent involvement of genitalia as compared to limbs in our area could be due to (i) the susceptibility of the endemic population in our area may be different; (ii) the coverages for enumeration and clinical examination were uniformly high (>90%) for both sexes and all ages eliminating any selective effect of non-response, especially of the adult males in whom the prevalence of hydrocele was high; and (iii) in our study, all males

were specially examined for genital disease, in privacy, in a clinic set up in the village. Hence no patient with genital disease was missed or misclassified.

The distribution of patients in the three phases (acute, chronic and elephantiasis) suggested that the disease progressed with age. The Fourth report of the WHO Expert Committee has made similar observation¹⁹. It is generally believed that in areas endemic for filariasis the prevalence of TPE would be high²⁰. However, the results of the present survey showed that although the study area was highly endemic for filariasis, TPE was not a problem.

The mf rate among persons with clinical disease in acute phase, though lower than that in persons without clinical disease, was still high. But there was a dramatic decrease in the mf rate among persons with clinical disease in chronic and elephantiasis phases. This phenomenon has also been documented in the WHO report¹⁹. Probably, this decrease in the mf rate was due to the lymphatic obstruction which prevents the mf from reaching the blood stream or the death of the adult worm in these advanced stages of the disease²¹. One other possibility, that this decrease could be due to any previous treatment with DEC, was examined. Thirty five of the 299 patients in chronic phase and 63 of the 133 patients in elephantiasis phase gave a history of previous treatment. But, in each of the two disease categories, the mf rate was not significantly different in the groups with and without history of previous treatment.

The mf rate increased steeply with age up to 15-24 yr and then levelled off.

This finding is in conformity with the earlier reports^{11,19,22}.

The entomological findings showed that *C. quinquefasciatus* was the predominant vector and the infection and the infectivity rates were high indicating active transmission of infection. These results are similar to the findings reported from other areas of south India^{11,23}.

Acknowledgment

The authors thank Dr P.K. Rajagopalan and colleagues at the Vector Control Research Centre, Pondicherry, for cooperation. They also thank their field team, particularly the Technical Officers, Shri D.S. Anantharaman and Shri RS. Nagabhushana Rao, Shri A. Venkatesha Reddy and Shri G. Jayaraj deserve thanks for computational, technical assistance, respectively.

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