

STUDIES ON FILARIASIS IN THE PACIFIC :  
4. THE APPLICATION OF THE MEMBRANE FILTER CONCENTRATION TECHNIQUE TO A SURVEY OF *WUCHERERIA BANCROFTI* FILARIASIS IN KEPU DISTRICT, JAKARTA, INDONESIA

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### INTRODUCTION

The first observations on filariasis in Jakarta were made by Flu (1929) who reported finding microfilariae in 9 of 73 (12.3%) nocturnal blood samples. Little or no further work was done until 1956 when Joe and his colleagues (1958) reinvestigated the status of periodic *Wuchereria bancrofti* in the Rawasari District and the Kampung Baru-Rawakerbo area. The surveys, carried out by examination of 20 c.mm blood, revealed a mf rate in the two locales of 7.8% and 11.8% respectively. A 1971 survey of 145 people carried out by the Filariasis Division of the Directorate for Communicable Disease Control (CDC) gave a 3.5% mf rate (Joesoef, 1972). Edeson (1973) quotes a reported 27% mf rate in 'Djakarta town' obtained from an earlier CDC survey. It is thus evident that Bancroftian filariasis is endemic in varying degree, in a number of areas of Jakarta.

In recent years, Jakarta, in common with many other cities of Southeast Asia, has experienced a rapid growth in size and population. This rapid growth and concomitant decrease in the level of environmental sanitation has led to conditions favourable for the breeding of *Culex fatigans*, the local vector of *W. bancrofti*. The danger

of increased filarial endemicity to increases in populations of tropical cities has recently been discussed by Gratz (1973). The World Health Organization Vector and Rodent Control Research Unit in Jakarta as well as other concerned bodies have recognized the potential health hazard of this situation and have planned an epidemiological/control project in Jakarta similar to that carried out in Rangoon (Williams, 1968). This present study was designed to provide base-line epidemiological information for a nominated model study area, the Kepu District. In other surveys which have employed membrane filter concentration (MFC) as the diagnostic method, a relatively large proportion of the population in hypoendemic and hyperendemic settings of non-periodic Bancroftian filariasis were found to have low-density microfilaraemias (Desowitz *et al.*, 1973; Desowitz and Hitchcock, 1974). In view of this, the MFC was used in the present study and as such represents the first application of the methods to a survey of periodic Bancroftian filariasis in an urban setting.

### MATERIALS AND METHODS

Kepu District, the site of the study, is located near Kemayoran Airport. It is a crowded area of some 25,000 people. Most of the housing is of a shanty type,

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bordered by open drains in which *C. fatigans* breed prolifically.

A 1 ml venous blood sample for MFC and 20 c.mm finger-prick blood for a stained thick film were taken from 373 residents 5 years of age and older. All blood samples were obtained between 2000 and 2300 hours. MFC was performed according to the method described by Desowitz and Southgate (1973).

RESULTS

The results of the survey are summarized in Table 1. It will be seen that for all age

groups examined the mf rate was approximately 30%, although somewhat lower in the 5-9 year old and higher in the 15-20 year olds. For all age groups a significant proportion of the microfilaraemias were of low density, detected only by MFC. The number of low grade infections were greatest in the youngest (71.4% for 5-9 year olds) and older groups (62% and 66% for 21-50 and >50 year olds respectively) but even in teen age groups they constituted about one half the total number of microfilaraemias.

Although the MFD<sub>50</sub> and median mf density has been calculated for each age

Table 1

Showing the microfilaria rate and density of various age groups in the population of Kepu District, Jakarta.

Age (yrs)	Sex	No. examined	No. mf positive (MFC)	% mf positive (MFC)	% total infections of low-density (MFC-detected only)	MFD <sub>50</sub> /ml	Median mf density/ml
5-9	M	25	2	8.0	71.4	5.8	11.0
	F	16	5	31.2			
	Total	41	7	17.0			
10-14	M	30	12	40.3	51.5	6.0	15.0
	F	45	13	28.9			
	Total	75	25	33.3			
15-20	M	27	12	44.4	46.4	22.0	37.5
	F	43	16	37.2			
	Total	70	28	40.0			
21-50	M	76	25	32.9	62.2	3.4	4.0
	F	73	20	27.4			
	Total	149	45	30.2			
>50	M	12	3	25.0	66.6	1.0	4.0
	F	9	3	33.3			
	Total	21	6	28.6			
Total	M	170	54	31.7	59.4	6.1	11.0
	F	186	57	30.6			
	Both Sexes	356	111	31.2			

Table 2

The mf density of each MFC positive in Kepu District, Jakarta.

Age group (yrs)	Sex	Individual microfilaraemias (mf/ml) as detected by MFC
5-9	M	1, 20
	F	1, 6, 11, 32, 147
10-14	M	1, 1, 1, 2, 2, 15, 15, 18, 20, 59, 72, 95, 111
	F	1, 1, 1, 1, 1, 3, 11, 66, 197, 222, 567, 1420, 2085
15-20	M	1, 1, 1, 2, 2, 2, 334, 764, 1233, 1850, 1998
	F	1, 1, 1, 2, 5, 16, 30, 45, 50, 154, 164, 173, 494, 796, 863, 1406
21-50	M	1, 1, 1, 1, 1, 1, 1, 2, 2, 4, 5, 12, 15, 28, 34, 36, 54, 641, 916, 1233, 1899, 1973, 2121, 2244, 4732
	F	1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 3, 3, 5, 16, 52, 110, 641, 1228, 1998
50	M	1, 1, 1,
	F	1, 95, 229

group (Table 1), these figures do not reflect the large quantitative variation found in each group. Table 2 presents the individual mf counts per ml blood for each age group. The log probit graph would indicate that the densities, for each age group, do not follow a normal distribution.

#### DISCUSSION

The results of this survey would indicate that filariasis is highly prevalent in the Kepu District of Jakarta. There is also evidence that the infections are generally acquired at a relatively early age and by 10-14 years the infection rate becomes stabilized at approximately 35%. However, for all age groups at least half of the microfilaraemias are of low density, diagnosed by MFC only.

Clinical assessment of the Kepu population has not been carried out as yet and the impact of filariasis on the health of this community is not known. In any event, the high mf rate in conjunction with the dense vector population, and the persistence of the environmental conditions sustaining vector breeding, constitutes a potentially dangerous combination. In many respects the situation in

Kepu District exemplifies that of other rapidly growing urban centres of Southeast Asia and other areas of the tropical world where *C. fatigans*-transmitted Bancroftian filariasis is present. Hopefully the information gained from the planned longitudinal clinical and epidemiological studies as well as the measures taken to control transmission in Kepu District will be of value to other urban endemic areas.

#### SUMMARY

A blood survey for filariasis was carried out in the Kepu District of Jakarta. Examination of stained 20 c.mm finger-prick blood thick films and membrane filter concentration (MFC) of 1 ml venous blood. The youngest age group examined, 5-9 years old revealed a mf rate of 17% of which 71% were of a low density character detected by MFC only. The mf rate appears to remain relatively constant from the 10-14 year old group onward, approximately 35%, but at all age groups at least half the infections were of low density. The highest mf rate and density was observed present in the 15-20 year old group.

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