Prevalence Study of Bancroftian Filiariasis in Puerto Limón, Costa Rica

Puerto Limón, the major port on Costa Rica’s Atlantic coast, is an endemic focus of bancroftian filariasis. The prevalence of the disease in this area is due mainly to the 1871 immigration of Jamaican blacks who came to work on construction of the railway between Puerto Limón and San José.

Information about the endemic area of this human parasitosis was not very precise, even though it had been the subject of studies by Butts in 1947, Lieske in 1954, and Brenes in 1979. In 1976 the Department of Malaria of the Ministry of Health of Costa Rica began a study of the prevalence of the disease, the findings of which are summarized below.

The eight sectors of the city were studied by random sampling. Of 4,021 persons examined (14 per cent of the population) using the Knott technique (1 ml of blood), 78 or 2 per cent had patent parasitemia—a rate of 2.4 per 1,000 population. The parasitemia varied according to age group, with the 1-9 year old cohort showing the lowest rate of infection (0.2 per cent); the 10-19 and the 40-49 age groups showed the highest incidences (3.7 per cent and 2.7 per cent, respectively). According to the distribution by sex, the rate of infection was higher in males (2.4 per cent) than in females (1.4 per cent); as regards race, whites had an infection rate of 0.8 per cent and blacks 5.4 per cent.

Later, 938 volunteers from various sectors of the city were examined and 16 (1.7 per cent) showed patent parasitemia. Also examined were 1,196 persons living in “positive blocks” (where carriers had been detected by random sampling), and 39 (3.3 per cent) were found to have filaremia.

In order to study the periodicity of Wuchereria bancrofti, observations were made for 24 consecutive hours on 17 cases of microfilaremia. This investigation showed the nocturnal periodicity of W. bancrofti in Puerto Limón, inasmuch as the microfilariae are observed as of 18:00 hours. Between 21:00 and 05:00 hours, there are high levels of parasitemia: the highest values are obtained at 01:00 hours, but there is a complete absence of parasitemia during the rest of the day.

For 30-minute periods between 07:00 and 09:00 hours, there was an intradomiciliary sweep for mosquitoes, in order to determine the index of natural infection in the various stages of larva development. After the captured mosquitoes had been classified, their wings and feet were removed, and the head, thorax, and abdomen dissected in saline solution; they were then microscopically examined to determine the larval stages of filaria.

A total of 3,101 Culex pipiens fatigans mosquitoes were caught in 140 houses in the urban area, giving a domiciliary index of 98 per cent. Of 2,714 C. p. fatigans
females dissected, 162 (6.0 per cent) were infested with first and second stage larvae, and only 2 showed third stage larvae.

Precipitin tests were performed on 754 female mosquitoes in order to determine their source of food. It was observed that 643 (85 per cent) reacted to human antiserum, while the remaining 111 reacted to antiserum of various domestic animals.

Once the study had been completed in the city of Puerto Limón, the attempt was made to see how far the filarial infections extended into the rest of Limón Province. A group of 13 rural towns in the vicinity of Limón were investigated between 1979 and 1980. These towns had a total population of 12,576 inhabitants, 3,438 (27 per cent) of whom were examined. Only 3 cases (0.1 per cent), all of whom came from Limón, showed microfilaremia.

In the same 13 towns, 986 female *C. p. fatigans* from 186 houses were dissected, but none showed larval stages of filaria.

The absence in rural areas of microfilaremia cases and of mosquitoes infected with larval stages of filaria suggests that the problem of bancroftian filariasis in Costa Rica is limited to the urban area of Puerto Limón, where two sectors (Roosevelt and Cieneguita) showed a frequency of 3.5 per cent, while in the rest of the city it was less than 2.3 per cent (Figure 1).

Figure 1. Percentage of bancroftian filariasis infection in urban areas of Puerto Limón, Costa Rica.

Future control measures should be guided by the information obtained as a result of this research. However, other work needs to be done, such as assessing the validity of serodiagnostic tests and their usefulness as epidemiological means in low transmission areas such as Puerto Limón. Longitudinal studies are also necessary to evaluate the measures applied to combat the vector and the parasite, and those directed at improving the environment.

(Source: Semana Epidemiológica 10 (25), 1983. Division of Epidemiology, Ministry of Health, San José, Costa Rica.)

Editorial Comment

Human filariasis is an infection caused by various species of nematodes and transmitted through bites of various species of mosquitoes. There are hundreds of species of filariae in the world, but only seven cause infection in humans: *Wuchereria bancrofti, Brugia Malayi, Onchocerca volvulus, Loa loa, Dipetalonema perstans, Dipetalonema streptocerca, and Mansonella ozzardi.*

The species found in the Americas are: *W. bancrofti*, agent of lymphatic filariasis; *O. volvulus*, the cause of oncocercosis; *D. perstans*, similar to the one found in Africa; and *M. ozzardi*, found only in the Americas. A new species has recently been described in Venezuela: the *Microfilaria bolivarensis*.

Bancroftian filariasis is found in the Region in localized endemic foci, particularly in the coastal areas of Costa Rica (Puerto Limón), Colombia, Venezuela, Guyana, Suriname, French Guiana, and Brazil, and in the Caribbean islands. In the absence of clinical manifestations, the disease may go unnoticed, or may evolve into adenolymphangitis and elephantiasis of the legs and scrotum.

The study done in Costa Rica is a contribution to understanding the infection in that country. However, epidemiological studies are needed to determine the real frequency of filariasis in the Americas, which is so far unknown, due in part to the lack of a standardized methodology for collecting pertinent information. Measures for controlling the infection are based primarily on mass administration of diethylcarbamazine. Actions to combat the principal vector, *Culex pipiens fatigans*, are not always effective because of the rapidity with which the mosquito develops resistance to insecticides and because of the difficulties involved in wiping out the breeding grounds of larvae.