A FIELD SURVEY ON THE ROLE OF LOW-DENSITY MICROFILARAEIA
CASES IN THE TRANSMISSION OF FILARIASIS

by

Zhong-Xing Li and Zhong-Jun Shi
Department of Epidemiology, Institute of Parasitic Diseases
Chinese Academy of Preventive Medicine
Shanghai, People’s Republic of China

In former filariasis endemic areas, where the disease has been basically controlled, a few cases of low-density microfilaraemia remain. A survey was carried out in Deqing County, Zhejiang Province, from September 1981 to 1986 in order to determine whether such cases play a role in the continuation of transmission.

METHODS AND RESULTS

The survey area, Deqing County, was formerly an endemic area of brugian filariasis. The microfilaraemia rate in inhabitants was 18.3% in 1951; *Anopheles sinensis* was the vector. Following 10 courses of mass treatment with diethylcarbamazine (DEC) using different dosage schedules, the microfilaraemia rate dropped to 0.2%. The survey area covers the two villages of Mingxin and Xinfu with populations of 1406 and 87 respectively, the latter being a solitary islet in a lake.

Microfilaraemia rate

A millipore membrane filtration method requiring 1 ml of venous blood was used in parallel with two thick blood smears which were each prepared from 60 μl of ear-lobe blood. The microfilaraemia rate for both methods was 0.5%, the microfilaria (ml) density of the five positive cases being 1-8 mf/60 μl of blood (mean 4.2 mf/60 μl). Three of these five cases were former positive cases, while two were newly detected ones. All five cases were left untreated but had undergone reexamination in 1982 and 1983 when 120-240 μl of capillary blood and 1 ml of venous blood from each case were pooled for millipore membrane filtration; four of the five cases reverted to negative, while the fifth finally became negative in 1985. Another positive case was detected in Xinfu village in 1982 with a microfilaria density of 2 mf/60 μl of blood, but reverted to negative in 1983. In 1983 and 1986, 936 and 929 people respectively were examined (ear-lobe blood) for microfilaraemia, but no positive cases were detected.

Natural infection of *A. sinensis*

*Anopheles sinensis* were collected from various habitats for individual dissection. Two infected mosquitoes were found among the 5484 specimens captured from households and traps in 1981-1982.
Intensity of infection was extremely low, being 1.1 mf/mosquito. Moreover, in other studies, it had already been noted that only 30% of the infective larvae were released during the feeding of an infected mosquito, of which 10% could invade the definitive host (Zuelke, 1973; Ho & Jung, 1965); in other words, only 3% of the released larvae had the chance of entering the host body, of which only a few would develop into adults. From the transmission dynamics point of view, infected mosquitoes carrying very few infective larvae have no practical significance in the transmission of filariasis.

From the above, it is clear that the threshold of microfilaremia at which transmission is interrupted is mainly determined by the microfilaremia rate and the microfilaria density, the latter factor appearing to be the most important. It is suggested that the treatment of persons with low-density microfilaremia (with 5 mf/60 µl of blood) in areas with low microfilaria rates (<1%) need not be considered as essential.

ACKNOWLEDGEMENTS

We wish to express our sincere thanks to Dr A. Davis, Director, Parasitic Diseases Programme, World Health Organization and Dr A.S. Dissanaike, Medical Officer, Filarialis Unit, Parasitic Diseases Programme, World Health Organization, for their critical review of this manuscript. We are also grateful to Mr Runlin Yao, Mr Henghua Shi, Mrs Xinfu Luo, Mrs Yizhen Yuan, Mrs Jinshui Zhou and Mr Zechi Chen, for their technical assistance.

RESUME

ENQUETE DE TERRAIN SUR LE ROLE DES CAS DE MICROFILAREMIE DE FAIBLE DENSITE DANS LA TRANSMISSION DE LA FILARIOSE

Dans les régions qui étaient auparavant des foyers d’endémie filarienne, et où la maladie a été dans l’ensemble maîtrisée, il reste quelques cas de microfilaremie de faible densité. On a effectué une enquête dans le comté de Deqing, province du Zhejiang, de septembre 1981 à 1986 pour déterminer dans quelle mesure ces cas jouent un rôle dans le maintien de la transmission. Les résultats des recherches parasitologiques et entomologiques effectuées deux années de suite ont révélé qu’après la mise en place des mesures d’intervention, le taux moyen de microfilaremie dans la population est descendu à environ 0,5 % et la densité moyenne de microfilières (mf) à environ 4,2 mf/60 µl de sang, dans les régions où la filariose brugianne était auparavant endémique. Bien qu’on ait observé un nombre considérable d’Anopheles sinensis s’attaquant à l’homme, on n’a trouvé de larves infestantes que chez deux moustiques sur les 5486 qui ont été disséqués, et aucun cas nouveau de microfilaremie n’a été décelé au cours des examens de suivi effectués en 1983 et 1986, ce qui indique que la transmission avait déjà été interrompue. Au cours d’une infestation expérimentale d’A. sinensis, on a laissé deux lots de 107 moustiques chacun se nourrir sur deux volontaires ayant des microfilaremies de 3 à 5 mf/60 µl de sang. Lors de la dissection des moustiques, on a observé que, bien que le taux d’infestation ait atteint 16,8 %, l’intensité de celle-ci était extrêmement faible (à savoir 1,1 larve par moustique). Du point de vue de la dynamique de la transmission, les moustiques qui portent très peu de larves infestantes n’ont pratiquement aucun rôle dans la transmission de la filariose. Il semble donc que le traitement des personnes ayant des microfilaremies de faible densité (5 mf/60 µl de sang) dans les régions à faible taux de microfilaremie (<1%) ne doive pas être considéré comme indispensable.
REFERENCES


