WORLD HEALTH ORGANIZATION
REGIONAL OFFICE FOR THE WESTERN PACIFIC

REPORT

SEMINAR ON CONTROL OF BRUGIAN FILARIASIS

Kuala Lumpur, Malaysia

1-5 July 1985

Manila, Philippines

July 1986

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REPORT

SEMINAR ON CONTROL OF BRUGIAN FILARIASIS

Spnsored by the

WORLD HEALTH ORGANIZATION REGIONAL OFFICE FOR THE WESTERN PACIFIC

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NOTE

The views expressed in this report are those of the participants in the seminar and do not necessarily reflect the policies of the Organization.

This report has been prepared by the Regional Office for the Western Pacific of the World Health Organization for governments of Member States in the Region, for those who participated in the Seminar on Control of Brugian Filariasis, which was held in Kuala Lumpur, Malaysia from 1 to 5 July 1985, and for the members of the WHO Western Pacific Advisory Committee on Medical Research.

CONTENTS

1. OPENING CEREMONY

The Regional Seminar on Control of Brugian Filariasis was held at the Institute for Medical Research in Kuala Lumpur, Malaysia, from 1 to 5 July 1985. The participants who attended the seminar are listed in Annex 1.

The seminar was opened by Dato Chin Hon Ngian, the Honourable Minister of Health, Malaysia. A message from Dr Hiroshi Nakajima, Regional Director, WHO Regional Office for the Western Pacific, was read by Dr S. Endo, WHO Representative and Programme Coordinator, Malaysia. Dr Lim Teong Wah, Director, Institute for Medical Research, welcomed the participants to the seminar.

During the opening session, Dr Chin noted that filariasis was a serious global problem and that 367 million people at risk in the Western Pacific Region were living in endemic areas and exposed to infection. Of these, an estimated 11 million had been identified as having filariasis. He pointed out that the Institute for Medical Research, as a WHO Regional Centre for Research and Training in Tropical Diseases, had been playing a constructive role in training and research in the field of filariasis.

In his welcome address, Dr Nakajima thanked the Government of Malaysia for its generosity in accepting to act as host of the seminar. He pointed out that a WHO study group on filariasis had been held in Kuala Lumpur in 1955 and a joint WPRO/SEARO working group on brugian filariasis in 1979. Approximately 90.2 million people in the world were affected by lymphatic filariasis due to Wuchereria bancrofti and Brugia malayi. In view of current problems and to highlight current experience gained from operational control projects for bancroftian filariasis, it was felt that there was a need to convene the present seminar.

Dr Chee Chin Seang of Malaysia was elected Chairman and Dr Mesulame V. Mataitoga of Fiji Vice-Chairman. The Rapporteur was Dr Kim Dong-Chan of the Republic of Korea.

The agenda as given in Annex 1 was approved.

2. OBJECTIVES

The objectives of the seminar were as follows:

(1) to review national filariasis control programmes, including problems encountered;

(2) to update participants on current laboratory and field techniques;

(3) to present information on new control strategies involving the new drug regimen with diethylcarbamazine (DEC);

(4) to disseminate new information on recent data on entomological and vector control activities available in Malaysia and elsewhere; and

(5) To consider the primary health care approach and community participation in the control of brugian filariasis.

3. PRESENT STATUS OF THE FILARIASIS PROBLEM IN ENDEMIC COUNTRIES IN THE REGION

3.1 Filariasis in China

Filariasis is considered one of the five major parasitic diseases in China and the national filariasis control programme has made significant advances in controlling the disease since 1956.

Both Wuchereria bancrofti and Brugia malayi are endemic; both are nocturnally periodic; and a total of 864 counties or cities in 15 of 30 provinces prior to the filariasis control programme were subject to filarial infections. W. bancrofti and B. malayi are found together in 13 provinces and W. bancrofti only in two provinces. Most infected areas are in central and south China. Prior to control, over 17 million people had bancroftian filariasis and 8 million people brugian filariasis. Over 5 million had symptoms of the disease. Over 52% had microfilarial rates below 5 Mf, 40% 6-20 Mf, 7% 21-30 and 1% 31 or more Mf.

Important vectors for bancroftian filariasis are Culex pipiens pallens and Culex quinquefasciatus. Infection rates as high as 50% and 33%, respectively, have been recorded for these species. Vectors of brugian filariasis are Anopheles sinensis and An lesteri anthrophophagus with infection rates of as high as 41% and 61%, respectively. These species are highly susceptible to laboratory or artificial infections. Aedes togoi is also a vector for both W. bancrofti and B. malayi in some areas of China.

The national filariasis control programme was initiated in 1956. Antifilarial institutions were established and training programmes and extensive surveys were conducted. Control measures were undertaken with emphasis on eradication. Between 1956 and 1980, over 465 million persons were examined for bancroftian filariasis and 96 million were examined for brugian filariasis. Diethylcarbamazine (DEC) was used in treating 51 million cases of W. bancrofti and approximately 7 million for B. malayi infection. A total of 21.3 million microfilarial positive and symptomatic patients were considered cured of the infection. Among the 864 endemic counties and cities, the infection rates for 708 decreased to below 5% and, by 1984, 25 million patients were treated and considered cured. As of 1984, 586 counties and cities had controlled filariasis with infection rates reduced to below 1%. At present, there is an estimated 5 million cases to be treated. Essentially, three DEC treatment programmes were used. In the first programme, selective treatment was done whereby all Mf positive patients were given 3-4 gm DEC for 3-7 days for W. bancrofti infection and 1-2 gm for 2-4 days for B. malayi. In the second programme, continued selective and mass treatments were given. All Mf positive patients were treated as above, followed by mass treatment of the entire population. In W. bancrofti areas, almost all persons above five years of age were given 3-0-4.2 gm of DEC and those in Brugia malayi areas were given 0.5-1 gm in two or three courses.

The third method was selective treatment followed by mass treatment with DEC medicated table salt. Patients were selectively treated and DEC-medicated table salt distributed to the village populations. A total of 3 gm of DEC was mixed with 1000 gm of salt. This was done for six months in W. bancrofti areas and three to four months in Brugia malayi areas. The mean daily intake per person was 50 mg and the total amount was 4.5, 6.0 and 9.0 mg, respectively, for three, four and six months.

Side effects, mostly fevers, were observed in patients given large dosages of DEC over a short period. Some side effects could be reduced by 0.5g paracetamol every four hours for 2-3 days. More reactions were seen in persons with high densities of Mf, especially those with B. malayi

At the same time as the DEC treatment control programme, attempts were made to reduce the vector population. Emphasis was placed on improving the rural health sanitation and the environment and human protection methods such as mosquito net and repellents. House spraying with DDT or other residual insecticides was also carried out. This was often done in conjunction with the treatment programme.

Although the filariasis control programme has been successful, the disease still remains a concern to public health authorities. The ultimate goal is eradication, but problems exist in the control of vector mosquitos such as An sinensis, which is exophilic by nature. Furthermore, the control of An lesteri anthropophagus needs improvement especially in mountainous areas. Insecticide-resistant strains of C. pipieus pullosis and Cu quinquefaciatus are also difficult to control. Clinically, it remains difficult to treat patients with elephantiasis and chyluria and surveillance methods need refinement.

A question posed was whether the B. malayi in China is similar to that in South-East Asia. It was suggested that a strain of the parasite be sent to Dr J.W. Mak at the Institute for Medical Research in Kuala Lumpur for study.

3.2 Filariasis in Fiji

The filariasis control programme in Fiji commenced in 1969 using diethylcarbamazine (DEC), which was given as a mass treatment at the dosage of 5mg/kg weekly for six weeks, followed by 22 monthly doses. The whole country (population 683 000) was covered stepwise in five stages in five years. The mass treatment was supplemented with environmental sanitation and vector control activities. The effect of treatment was remarkable with a reduction of the microfilaria prevalence rate from 10-30% to less than 1% in most areas. However, recent blood surveys conducted in several islands have revealed a clear resurgence of filariasis.

A pilot study, on a district scale, with 200 000 people involved is currently being carried out. This pilot control project funded by WHO has recently been set up to study different mass treatment regimens with DEC, viz. annual single-dose treatment with 6mg/kg for four years and the 6 weekly doses at 5mg/kg followed by 22 monthly doses (total 140 mg/kg). In addition to the comparison of the effect, particular attention will be paid to the attitude and the behaviour of the people toward the different regimens.

A health education programme constitutes a major part of the project. This component is considered to be especially important when clinical manifestations are reduced by the treatment and the people tend to show less interest in participating in the programme. The control of vector mosquitos through a source reduction method will be another major component of the project.

Under the concept of primary health care, the filariasis control programme will confirm to the government policy of attaining total community coverage, encouraging active community participation, making a multi-sectoral approach and utilizing appropriate technology and local resources.

3.3 Brugian filariasis in the Republic of Korea

It has recently been observed that the prevalence of mirofilaraemia in the known endemic areas has significantly decreased. Comparing the microfilaria rate by age group, two distinct patterns have been noted between the mainland and Cheju Island. Anopheles sinensis has been recognized as the vector of B. malayi infection in the mainland, whereas Aedes togoi has been recorded as the vector on Cheju Island.

Prevalence of the infection on Cheju Island has successively decreased to a significantly low level following the mass and selective treatment conducted since 1968. Referring to the data collected since 1964 by Nam Cheju Gun Health Centre, the prevalence rates have sharply decreased from 16.1%-20.7% in 1964-1976 to 2.5% in 1973. Since then, the prevalence rates have remained around 2% till 1984. In a survey conducted in 1985, based on the examination of 120 cmm blood sample of 664 persons from five sample villages, the prevalence rate was 0.9%. However in the mainland, the prevalence level has decreased significantly to a very low level since 1973 even in an area where none of the control measures has been carried out. In an area of Yonju, where no Chemotherapy had been conducted, the prevalence level of 13.1% in 1973 had decreased to 2.2% in 1980 with a reduction rate of 83.2% for the period. Assumptions were once made that the endemicity of filariasis in the country probably had a peak with active transmissions in the past decades and has now turned into a very low state of transmission. Man is the only natural host of filariasis malayi in the country. Since the early 1970s, a low dosage of 0.5 1,2,4 and 6 mg of DEC/kg body weight once daily for five consecutive days or with a gradual increase of daily dosage after several days of initial administration, totalling 37.5 mg/kg in a course, has been used.

The following are considered to be the factors which have influenced the reduction of the prevalence rate of filariasis malayi infections: (1) mass treatment conducted in the endemic areas in the past some ten years, (2) improvement of environmental hygiene through reconstruction of villages and houses, (3) improvement of awareness and behaviour of the local people in relation to the prevention of mosquito bites through the use of mosquito nets and insecticides, (4) improvement of the socioeconomic and living standards, and finally, (5) the seasonal barrier to the mosquitos presented by the cool and cold seasons.

3.4 Filariasis in Malaysia

Brugia malayi continues to be the predominant species in Peninsular Malaysia, Sabah and Sarawak. Of the two forms, the subperiodic form, which nas animal reservoirs, is the most difficult to control. It has been decided, therefore, that the main objectives of the control programme are to eradicate the periodic form but to reduce the subperiodic form until the microfilaria rate is less than 5%.

The overall prevalence of B. malayi is estimated to be 6%, although rates as high as 37.5% have been recorded in Sabah. Around 6 million persons in Malaysia are exposed to the risk of infection.

Only the rural form of Wuchereria bancrofti is present but seems to be a problem in Banggi Island in the northern coast of Sabah. It is also present among the aborigines in Peninsular Malaysia.

Fifteen control teams, each of which includes a medical assistant, work in Peninsular Malaysia. Their main objectives are to carry out blood and clinical surveys after a population census. They treat with DEC through either mass drug administraton in areas with microfilaria rates over 5% or through selective treatment in areas with a microfilaria rate of less than 5%. Follow-up is usually done after three to five months. In 1984, 1316 out of 59,813 persons examined showed microfilaria (2.2%).

The treatment schedule is 6mg/kg DEC in six doses spread out over two weeks with a week's gap between the first and second doses.

In addition to the vector reported previously (Mansonia spp. for the subperiodic form and Mansonia spp as well as Anopheles campestris for the periodic form), Coquilletidia crassipes has been incriminated as a vector but is considered to play a minor role in tranmission.

3.5 Filariasis in the Philippines

W. bancrofti is the predominant species with B. malayi only present in pockets in Palawan, Sulu, Agusan del Norte and Samar.

Vectors include: B. Malayi - Mansonia bonneae and M. uniformis
W. bancrofti - Aedes poecilius and An. barbirostris
with C. quinquefasciatus may also play a minor role.

Control - Intensive case finding and treatment were carried out in 1980 and 4000 positives were found among 450 000 examined of whom only around 800 were treated (due to financial constraints and a shortage of DEC). Furthermore, case finding has been difficult in many areas. The infectivity rate among vectors has been between 0.95%-2.1%; malathion spraying is done in only a few provinces (for Ae. poecilius.

Treatment consists of 6mg/kg/bw for 12 days. The drug is distributed by barangay health workers in conjunction with health education and community participation.

3.6 Filariasis in Samoa

Only W. bancrofti is present. The control activities consist mainly of annual single doses of 6 mg/kg/bw with follow-up blood testing after six months. An assessment of the impact of the two years mass drug administration (MDA) was made by WHO consultants, an epidemiologist and a statistician. The results showed that the MDAs using diethylcarbamazine at a dosage of 6 mg/kg body weight given once a year had significantly reduced the prevalence rate of infection from 5.6% to 3.1% and the microfilarial density from 20.2/60^{3}cm to 9.8/60^{3}cm.

The vectors are Aedes polynesiensis and Ae. samoanus

In 1981, a new filariasis control programme was implemented employing a new scheme for mass drug treatment, using diethylcarbamazine (DEC) at a dosage of 6 mg/kg body weight given only once per year for four consecutive years. The first annual mass drug administration was carried out between in June 1982 and the second one in June 1983. The third mass drug administration is scheduled to take place in October 1985. An evaluation of the coverage achieved by the MDAs showed that about 85% of the population was treated in 1982 and 1983. These two MDAs reduced the microfilarial prevalence rate from 5.6% to 3.1% in the standardized population.

3.7 Filariasis in Viet Nam

Between 1960 and 1975 blood was taken (60mm^3) from 90 545 people of fifteen provinces and cities representative of all of north Viet Nam. From 1976 to 1983, 37 738 people from five plains provinces were examined.

Through these studies, three regions have been identified according to the prevalence of microfilaeremia. In the plains region, mainly in the Red River Delta, the prevalence rate is over 5%. Periodic Brugia malayi predominates, the principal vector being Mansonia annulifera. Cats are also infected. In the midland and coastal region, the rate is from 1% to 5%; W. bancrofti is more common, the main vector being Culex quinquefaciatus

Since 1980, pilot studies involving 6000 people have achieved a marked fall in both prevalence and Mf density, especially in the treatment of W. bancrofti. In these pilot studies, environmental sanitation measures and vector control have been employed together with the various schemes for DEC administration. The most effective mass drug treatment has been 6 mg/kg body weight for three consecutive days, once a year, for two to three years.

4. UPDATE ON LABORATORY AND FIELD TECHNIQUES IN FILARIASIS

A series of papers were presented on laboratory and field methods in the study of filarial disease. Techniques of blood meals in mosquitos were outlined; methods of studying the cytogenetics and isoenzymes of Brugian malayi elucidated the value of the mass dissection of mosquitos for

filarial larvae. Presentation was made on the bionomics of mosquitos and age determination of vectors and the identification of filarial larvae. Techniques of mosquito colonization were discussed together with methods of mosquito trapping, collecting and handling. Current diagnostic methods were presented, both parasitological and immunological. Methods of treatment were discussed in detail for both brugian and bancroftian filariasis and the drugs used in the past and possibly for the future were reviewed. Methods of vector control were reported in conjunction with this drug treatment control method and data collected in the field and in control programmes were analysed. The use of insecticide-impregnated mosquito nets with large holes was recommended for further testing in the field. Discussions were also held in the utilization of primary health care programmes in the control of filariasis and the integration of laboratory and field research in the control of the disease.

5. FILARIASIS MANUAL FOR FIELD WORKERS

At the interregional seminar on brugian filariasis, held in Kuala Lumpur in 1979, it was recommended that a manual for field workers of filariasis should be prepared. The manual was prepared and reviewed at the meeting. The manual was discussed in detail and recommendations were made. It was recommended that as the manual would be of valuable assistance to workers in the field, Headquarters should prepare the manual for distribution to the regional offices, especially those areas endemic for filariasis.

6. CONCLUSIONS AND RECOMMENDATIONS

(1) Until more effective drugs become available, in areas where there is no animal reservoir, it may be possible to target for eradication using the recommended total dose of 36mg/kg body weight for brugian infection (WHO Expert Committee Reference 4, 1984); where zoonotic infections exists, the overall aim should be to progressively reduce infection and transmission. This may be attempted through spaced DEC drug administration and vector control. The annual spaced, low dosage regimen as used against the South Pacific form of Wuchereria bancrofti is less likely to be effective against brugian infection because of a number of factors, e.g. the shorter pre-patent period of the parasite and zoonotic transmission. It is also recommended that other spaced dosages at shorter intervals, e.g. three monthly at 6 mg/kg body weight, single-dose, be tried.

(2) In view of the fact that present information suggests that there are various forms of Brugia malayi in man from different parts of Asia, differing in periodicity, sheath-casting and presence or absence of reservoir hosts, adult and larval forms of the parasite from different geographical areas should be sent to the WHO Collaborating Centre for Taxonomy and Immunology of Filariasis and Screening Clinical Trials of Drugs against Brugian Filariasis at the Institute for Medical Research, Kuala Lumpur. In the meantime, studies should be conducted to determine

the significance of epidemiological variations associated with these forms. In this connection, the term "zoonotic filariasis" should not be confined solely to the subperiodic forms of the parasite.

(3) The present available parasitological diagnostic tests, in spite of their shortcomings, should continue to be used until such time as more specific and sensitive diagnostic methods, applicable in the field, become available. However, no efforts should be spared to refine the currently available methods.

(4) Chemoprophylaxis may be useful and the results of such a chemoprophylactic trial with diethylcarbamazine in Indonesia (for brugian filariasis) and India (for bancroftian filariasis) should be awaited.

(5) The prospects of vector control in the near future seem promising. However, operational field research in brugian filariasis vector control should be encouraged, especially research on the use of treated mosquito nets for adult mosquitos and Bacillus sphaericus for mosquito larvae.

(6) In formulating a national policy for the filariasis control programme, vector control should be a component of the programme with emphasis on community participation. Furthermore, as an adjunct to the chemotherapy programme, vector control measures such as improvement of hygiene and sanitation, alteration of the environment and methods of minimizing man-vector contact should be implemented through community participation and support.

(7) Mass dissections, blood meal precipitin tests, flight range and larval biology studies should be encouraged in order to provide essential information for evaluating and strengthening filariasis control programmes.

(8) Filariasis control personnel should continue to undergo training at national research institutions and observe national control programmes to exchange information and to obtain current information on new techniques and approaches.

(9) The role of nongovernmental organizations in the control of brugian filariasis should be encouraged. The community as a whole must accept some responsibilities and be actively involved in the control of brugian filariasis. This will require a strong and dynamic health education programme leading to better understanding of the nature and causes and means of controlling the disease.

(10) Since chemotherapy remains the principal method of control, and in view of the success achieved in some endemic countries using primary health care strategies, efforts along this line should be further enhanced.

(11) The proceedings are to be published by the Institute for Medical Research.

(12) A meeting should be held again on brugian filariasis in 1988 in order to monitor progress in national control programmes.

ANNEX 1

PROVISIONAL AGENDA

MONDAY (1 July 1985)

0800 : Registration of Participants

0930 : 1. OPENING CEREMONY

1.1 Welcome Address by Director IMR
1.2 Message from Regional Director WPRO
1.3 Address and official opening by the Hon'ble Minister of Health

1000 : Refreshments

1.4 Group Photograph

1030 2. ADOPTION OF AGENDA AND INTRODUCTION TO SEMINAR

2.1 Self-introduction
2.2 Election of Chairman, Vice-Chairman and Rapporteur
2.3 Adoption of Agenda
2.4 Background and Objectives of Seminar by Operational Officers

3. COUNTRY REPORTS ON FILARIASIS

3.1 Presentation of Country Reports (15 minutes for presentation and 5 minutes for questions)

1200 : Lunch Break

1330 : 3.1 Country Reports (continued)

1445 : Coffee Break

1550 3.1 Country Reports (continued)

1630 : Adjourn

TUESDAY (2 July 1985)

0830 : 4. UPDATE ON LABORATORY & FIELD TECHNIQUES IN FILARIASIS

4.1 Laboratory Techniques

4.1.1 Techniques & use of bloodmeal identification (Patricia Lim K.C.)

4.1.2 The application of cytogenetics in the study of vectors of filariasis (Yong, H.S. & Chiang, C.L.)

Annex 1

0945 : Coffee Break

1000 : 4.1.3 The application of isoenzyme characterisation in the study of filarial vectors and parasites (Yong, H.S. & Mak, J.W.)

4.1.4 Mass dissection of mosquitoes (Cheong, W.H.)

4.1.5 Physiological aging techniques of mosquito vectors and their significance (Cheong, W.H.)

4.1.6 The identification of filarial larvae (Mak, J.W.)

1200 : Lunch Break

1330 : 4.1.7 Current diagnostic methods in filariasis (Mak, J.W.)

4.1.8 Colonisation of mosquito vectors of filariasis (Chiang, G.L. & Cheong, W.H.)

1500 : Coffee Break

1515 4.2 Field Techniques

4.2.1 Mosquito collection and trapping methods (Cheong, W.H.)

4.2.2 TDR activities and with WHO funding for HQ-supported research (Dr S. Dissanaike)

1630 : Adjourn

WEDNESDAY (3 July 1985)

0830 : 5. CURRENT CONCEPTS IN CHEMOTHERAPY OF FILARIASIS

5.1 Country Presentation

5.1.1 Samoa (Dr E. Kimura and Mr G. Spears)

0945 : Coffee Break

1000 : 5.2 Current chemotherapy and chemoprophylaxis of Lymphatic Filariasis (Mak, J.W.)

1100 : 5.3 Vector Control in Sarawak (Chang Moh Seng)

1200 : Lunch Break

1330 : 6. CONTROL OF VECTORS

6.1 Review of Status of Control of Filarial Vectors (Yap, H.H.)

Annex 1

6.2 Bionomics of Mansonia and other mosquito vectors (Chiang, G.L./Cheong, W.H.)

1550 : Coffee Break

1515 : 7. EPIDEMIOLOGICAL ASSESSMENT

7.1 Review and Assessment of the Filariasis Control Programme in Samoa (Dr E. Kimura and Mr G. Spears

1630 : Adjourn

THURSDAY (4 July 1985)

0830 : 7.2 Data analysis and interpretation (Lye, M.S.)

0945 : Coffee Break

1000 : 8. PHC AND COMMUNITY PARTICIPATION IN FILARIASIS

8.1 Community participation in filariasis control programme (Self, L.)

1100 : 9. INTEGRATION OF LABORATORY AND FIELD RESEARCH IN THE CONTROL OF LYMPHATIC FILARIASIS (John H. Cross)

1200 : Lunch Break

1330 : 10. GENERAL DISCUSSIONS

1500 : Coffee Break

1515 : 10. General Discussions (continued)

1630 : Adjourn

FRIDAY (5 July 1985)

1830 : 11. FORMULATE CONCLUSIONS

0947 : Coffee Break

1000 : 12. FINALIZE CONCLUSIONS

1530 : 13. CLOSING CEREMONY

ANNEX 2

PROVISIONAL LIST OF PARTICIPANTS, TEMPORARY ADVISERS, OBSERVER, SECRETARIAT, CONSULTANTS AND RESOURCE PERSONNEL

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