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[Case file No 19657/DGAFMS/DG-3C]

DGAFMS MEDICAL MEMORANDUM NO. 124

FILARIASIS

1. Introduction

Filariasis is a disease of great public health importance in the country and second only to malaria among mosquito borne diseases. Filariasis is a chronic disease and has got social, economic and physical consequences. Acute attacks of filariasis cause temporary disability. Chronic manifestations are irreversible.

2. Filariasis control in the armed forces is based on the National Filariasis Control Programme, keeping in view the special needs of the Armed Forces.

3. Epidemiology

There are two major types of Filarial infections prevalent in India, namely Bancroftian filariasis due to W. bancrofti and Malayan filariasis due to B malayi. The bancroftian infection is much more prevalent. The other is considerably less prevalent. Besides prevalence of two types of filarial infection in the country, there exists a diurnally subperiodic form of bancroftian filariasis in Andaman & Nicobar Islands precisely in Car Nicobar, Chowra, Noncowry group of Islands. No vector has been incriminated but Aedes (Finlaya) niveus is suspected to be the vector of the diurnal form In most countries where the disease is prevalent, the maximum incidence is between ages 25 and 35. Sex, race and occupation do not appear to have any influence on the incidence. Climate has an influence on the vector, parasite relationship and consequently on the endemicity in an area. The reservoir of infection is the infected person with circulating microfilariae.

4. Geographical Distribution of the Disease in India

The disease is endemic all over India except in Jammu and Kashmir, Haryana, Punjab, Himachal Pradesh, Delhi, Chandigarh, Rajasthan, Nagaland, Manipur, Tripura, Meghalaya, Sikkim, Arunachal Pradesh, Mizoram. The lymphatic filariasis is also prevalent in the Union Territory of Dadra & Nagar Haveli. The extent of the problem in rural areas is more, although the intensity of transmission is higher in urban areas.

5. Transmission of the Disease

Both types of Filariasis are mosquite borne. The vector for W. bancrofti infection is *C. quinquifasciatus* and for B. malayi infection Mansonia mosquitoes. In India, the reservoir of infection is wholly human for both types of the diseases. The element of zoonosis unlike in Malaya, is not present in India. For both the types of infections (bancroftian & malayan filariasis) in the mainland, the parasites exhibit nocturnal periodicity. Malayan filariasis shows limited foci only in Assam, Andhra Pradesh, Madhya Pradesh, Orissa, Tamil Nadu & West Bengal. The only state where the infection stretches over 1800 km in 5 coastal districts is Kerala. Total population living in B. Malayi endemic area is 3 million. The transmission is suspected to occur throughout the year in a number of endemic areas. It seems prudent to accept 34.0 per ten man-hours as the density level below which no transmission of Bancroftian filariasis may be possible. This level of density and above has to be sustained throughout the transmission season for maintenance of the infection in any area. In highly filarial areas the density figures should be many times higher.

6. Bionomics of C. Quinquifasciatus

C. quinquifasciatus is an ubiguitous mosquito and is present almost all over the country. High humidity and insanitary disposal of waste water of all kinds, favour its breedings. Maximum breeding of culex quinquefasciatus is found in water collections with high organic pollution and a PH range of 6.0 to 7.0. Rapid industrialisation and urbanisation, which pay scarce attention to the essential needs of sewerage

and drainage, have led to production of ideal breeding sites in all parts of the country. This mosquito is hardy and has a high biting affinity to man. Its biting time extends throughout the night. It rests on walls not so much as it does on hanging clothes, dark corners, underneath furniture, inside empty pots and the like. Its amenability to control with residual insecticides is therefore limited. This is further aggravated by its having developed resistance to DDT and other available insecticides in many parts of India. The eggs of culex quinquefasciatus are laid in rafts containing 150—400 eggs which hatch within 24—48 hrs. at an optimum temp. of 25 to 30°C. Average longevity for vector females varies from 15—45 days with much variation in different seasons. For purposes of oviposition, C. quinquifasciatus prefers waters with high organic content.

7. Bionomics of Mansonia Mosquitoes

In India B. Malayi is transmitted by *Mansonia annulifera* and Mansonia uniformis. The gravid females in case of Mansonia mosquitoes lay eggs in the form of a cluster on the under surface of leaves of floating water plants like *Pistia stratiotes* Eichhormia speciosa and *Salvinia auriculata.* The cycle from eggs to adult stage takes about 21—24 days depending upon climatic factors (Mansonia). These specific breeding sites are to be found in Kerala, the home of coir industry. Coir is rotted in such ponds. The mosquito lays its eggs in a cluster on the under surface of the leaf of the water plant. The larvae and the pupae are unique in that they do not come to the surface. As such oiling and insecticidal application to the water surface are not applicable to the control of breeding of these mosquitoes. The life cycle takes about 22 to 33 days (egg 5 days; larva 14—25 days; pupa 4-5 days). The adults feed freely both in houses and in the open. After feeding they may rest indoors. They are susceptible to DDT and other residual insecticides.

Control Measures

8. General Considerations

(a) In a disease like filariasis the success of control depends ultimately on the measure of willing and intelligent

co-operation by the public. The importance of Health Education cannot be overemphasised. Age-old prejudices and wrong beliefs have to be overcome by effective health education methods. Unless this is done, the local people will not be forthcoming in sufficient numbers for the detection of the reservoir of infection in the community. This difficulty is further aggravated by the fact that the collection of blood smears has to be done at night. It should therefore, be obvious that the civil health authorities have to contend with considerable difficulties in the determination of the quantum of infection present in the community.

(b) It is possible for an organised community like the Armed Forces for screening of personnel stationed in endemic areas and if found infective can undertake Hetrazon treatment and subsequent follow up. The control measures may be augmented by adopting biological control measures like introduction of the fish like *Gambusia affinis* etc.

(c) Prolonged stay in a filarious area is necessary for the infection to become apparent or for disease processes to manifest themselves. The course of filarial infection is prolonged and the disease is a chronic one. Even in a community placed on treatment, microfilaria take about 5 years to disappear after prevention of re-infection. Thus the anti-mosquito measures have to be carried out continuously for 5 or more years before the results could be patent in the community.

(d) Symptoms appear about 24 months after infection. Minor symptoms are (i) fever lasting 2-3 days, (ii) Lymphangitisparts affected are arms, forearms, legs and thighs; less frequently the scrotum, spermatic cord resulting in hydrocele (iii) pruritus seldom either in gland area or generalised (iv) pain-confined to affected parts, (v) splenomegaly—very rare. Major symptoms are (i) Adenopathysize—varies from that of a pea to an orange, (ii) Eosinophilia—varying from mild to very severe type, (iii) Broncho-pulmonary symptoms. Diagnosis at (1) Stage of invasion-no test, (2) Symptomless carrier stage-blood test—thick film made from 20 cubic mm of blood drawn during night, (3) Acute stage—clinical diagnosis—fever etc., (4) Chronic stage—specific tests. The

best approach to control filariasis is to detect microfilaria carriers as early as possible and render them free from infection.

9. Filaria Survey and Treatment

(a) As per current instructions Filaria surveys are to be carried out every year. In this, the following categories of personnel are to be subjected to systematic nocturnal blood examination (both thick and thin smears) for the detection of filarial infection.

(i) Troops, families of service personnel and defence civilians, located in known filarial areas once a year.

(ii) All recruits/cadets on joining the Training Centre.

(b) All cases found to be harbouring filarial infection should be treated with DEC as per the following regime :—

Day 1 : 50 mg : O.D.

Day 2 : 100 mg : O.D.

Day 3 : 100 mg : B.D.

If there is no adverse reaction [*See* para 9 (c) below].

Day 4 : 200 mg BD × 10 days.

Admission in the hospital is not mandatory unless otherwise warranted. A subsequent follow up for one year will be necessary as only 90% of the cases treated could be expected to clear with the suggested course. For the purpose of this followup, blood will be examined once a month. It is important that the blood slide is taken during the state of relaxation between 2100 and 2400 hours. A further course of treatment will be given, if during the follow up, the case turns positive for micro filaria, and a fresh follow up for one more year will start after completion of treatment.

(c) *Side Reactions of Treatment.* There are two groups of side reactions—general or local, both with or without fever. It is generally agreed that these side-reactions are less likely, to occur and are less severe in Bancroftian filariasis. General reactions are headache, body aches, dizziness, loss of appetite, malaise, nausea, urticaria, vomiting and at times bronchial asthma. Local-reactions are lymphadenitis, funiculitis, epididymitis, orchitis, lymphangitis, abscess formation, ulceration and transient lymphaedema. Both general and local reactions will disappear spontaneously and usually it is not necessary to interrupt treatment. Symotomatic treatment of side-reactions with antihistamines and analgesics may be useful.

(d) **Results of Treatment**

The following results can be expected from treatment with DEC :—

(i) Elimination of, or reduction in the level of microfilaremia.

(ii) Reduction in the frequency of, or complete prevention of further attacks of acute filariasis.

(iii) Reversal of lymphoedema, some early chyluria, some early hydrocele and some chronic lymphoedema.

(e) Filaria surveys are carried out under arrangements of the SEMOs/SMOs (Equivalent appointment in the Navy and Air Force) Filaria survey should include detection of microfilaria carriers and vector studies. A filaria register is to be maintained by all units/establishments as per Appendix 'A'.

(f) Results of the filaria surveys are to be sent to the respective service HQrs once a year on the format given as Appendix 'B'.

(g) **Toxicity of Hetrazan**

Many unpleasant reactions have been observed following the administration of the drug. Varying number of cases show reactions within 24 to 48 hours of taking the drug. The

death of the microfilariae in the system is believed to be one of the factors responsible for such reactions which range from slight indisposition, headache and feverish feeling to prostration and high fever. Occasionally cases of severe body pains, abdominal cramps, gastrointestinal upest accompanied by choleraic symptoms have also been reported.

10. Control of the disease is discussed under personal protection Anti-larval measures such as Source Reduction & Chemical Control; and the Anti-adult mosquito measures.

(a) **Personal Protection Measures**

The personal protection measures are exactly the same as against malaria, namely-proper use of mosquito-net, protective clothing and use of DMP. Every individual must be in possession of a mosquito net kept in good repair at all times and he will sleep at night time within the mosquito net which must be properly tucked in. It must be remembered that this protection is as effective as it is simple. Night duty personnel, will apply DMP on exposed parts of the body as a repellent against mosquito bites. Re-application of DMP is necessary every 2-3 hours.

(b) **Anti-Larval Measures**

Sheet-anchor of the control programme is the anti-larval measures.

Source Reduction

Senitary disposal of waste water and proper water management are necessary for reducing the vector density.

(i) *Sewage Disposal*

Improperly maintained septic tanks are the favourite breeding places for the vector mosquito (C. quinqurifasciatus). Therefore due attention to their construction and maintenance has to be paid. In case of mansonoide mosquitoes breeding, it is best controlled by removing the supporting aquatic vegetation from all water collections.

Chemical Control

(ii) *Use of Larvicides/Herbicides*

Following larvicides may be judiciously used; Abate. It is supplied as 50% emulsion concentrate 2.5 ml is mixed in 10 litres of water for spray over the water collections. The diluted emulsion must be used on the same day as otherwise it would break up and lose its efficacy.

Fenthion (Baytex). It is supplied as Baytex 1000 i.e., 1000 gm of fenthion per litre. It is a 100% concentrate; 5 ml of baytex (100% EC) is diluted in 10 litres of water. The diluted emulsion should be shaken very well and must be used on the same day as otherwise it may break up and lose efficacy. *Dosage.* Any of the above larvicides are used at the rate of 170—225 litres per hectare (15—20 gallons per acre) of water surface. For drains the dosage is one litre per 50 linear metres. For containers the dosage is 20 ml per sq. mt.

Mosquito Larvicidal Oil (MIO). It is used directly as a larvicide.

Frequency. Weekly application. *Equipment.* Knapsock or hand compression sprayer should be used. Discharge rate should be 30 to 40 Oz per minute. *Phenoxylene* 30 *or* shell week killer D may be used. as a herbicide in mansonoia breeding places.

(c) **Anti-Adult Mosquito Control Measures**

As already mentioned destruction of the adult mosquito vector by indoor spray of residual insecticides is impossible as far as bancroftian filariasis is concerned. On the other hand the mansonia vector of Malayan Filariasis is amenable to control with DDT/HCH/Malathion and other conventional residual insecticides. Fogging and ultralow-volume applications, by malathion and synthetic pyrethroids have been used for mosquito control.

(d) **Biological Control**

The only available and effective agents for the biological control of filarial vectors are larvivorous fish. They can be used in favourable ecological situation where they may reduce the population density of mosquito larvae.

Date : 24 March 1993.

(PK CHAKRABARTI)
Lt Gen
Director General Armed Forces Medical Services

Appendix 'A'

UNIT FILARIAL REGISTER

DETAILS OF ALL RANKS & THEIR FAMILIES FOUND POSITIVE FOR MICROFILARIA

S. No.	Service No. Rank & Name	Relation if families	Unit	Age in years	Sex	Native — District/ State	Duration of stay at present location	Place of treatment & date of completion of treatment	Nature of reaction if noticed during treatment	Due date for monthly follow up. Positive result of MF examination	Remarks
1	2	3	4	5	6	7	8	9	10	11	12

Appendix 'B'

PART I
FILARIAL INFECTION AND DISEASE LOAD
RESULTS OF FILARIAL SURVEY FOR THE YEAR

Station :

Category	No of person examined	Number showing Micro-Filaria Infection	Number showing manifestation of Filarial disease (Hydrocele, Lymphangitis etc.)	Total number with Micro-Filaria Infection & disease	Filarial Endemicity Rate in Percentage	Remarks
1	2	3	4	5	6	7
Officers						
Officers Families						
5—15 Years						
15 Years & Above						
JCOs/OR						
JCOs/OR Families						
5—15 Years						
15 Years & Above						
Civilians						
Civilans Families						
5—15 Years						
15 Years & Above						
Total						