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Lymphatic Filariasis Elimination in Kerala: A Success Story

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A B S T R A C T

National Filaria Control Programme has been running in the country since the year 1955 with the strategy of parasite detection, treatment and vector control mainly in urban areas. In the year 1997, the fiftieth World Health Assembly Resolution listed Lymphatic Filariasis (LF) for elimination by 2020 which now has been aligned with Sustainable Development Goal to be achieved by 2030. India also started its campaign to eliminate LF in 2004. The main strategy of the elimination programme is the Annual Mass Drug Administration (MDA) to progressively reduce and ultimately interrupt LF transmission. The other pillar of the strategy is morbidity management and disability prevention. Kerala state also started its LF elimination campaign in 11 endemic districts out of a total of 14 districts. The average population coverage during MDA in Kerala was reported to be more than 90% from 2004 to 2013, however, drug compliance during independent assessment was reported to be 40%-60% which improved in subsequent years due to a multipronged approach. The main reason of low consumption was the fear of side effects and the same was resolved through massive IEC activities highlighting its benefits compared to side effects, which are mostly self-limiting. The innovative strategic approach of extending the MDA period from 3 days to 3 weeks was undertaken to ensure that all the target population was covered. The results have been encouraging as compliance improved to above 65% and many districts have been validated for having achieved the elimination threshold through successfully clearing transmission assessment survey (TAS).

Keywords: Mass Drug Administration, Elimination of Lymphatic Filariasis Transmission Assessment Survey, Lymphatic Filariasis

Introduction

Lymphatic filariasis (LF) has been a major problem in Kerala since ancient times. Clarke, as early as 1709, described the elephantoid legs in Cochin as 'Malabar Legs'.¹⁻³ It is probably the earliest reference to this disease in Kerala.

The other references to the prevalence of this disease in Kerala can be traced from the travelogues and memoirs of some foreign travellers and settlers in this country. Of these, the observations made by Jacobus Canter Visscher, a Dutch Chaplain who lived in Cochin (now Kochi) between 1717 and 1723 AD, are of particular interest. The disease

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was then known as 'Cochin Leg'. It was Dr Day, the then State Physician of Kochi during the early part of the 18th century, who gave some details regarding the prevalence of the disease. According to him, about 5% of the population in Kochi town was affected by this disease.⁴ The disease prevailed largely in the low-lying, water-logged swampy tracts lying between the backwaters and the sea.⁵

Historical Background of Filariasis Control in Kerala

MOT Iyengar, the Medical Entomologist of the erstwhile Travancore State (now part of Kerala) conducted the first detailed epidemiological studies on lymphatic filariasis from 1931 to 1934.⁶ These studies revealed the prevalence of two filarial infections, namely *Wuchereria bancrofti* and *Brugia malayi*, in this region. As per the recommendations of Iyengar, the Maharaja of Travancore established a filariasis control unit at Cherthala. The average endemicity rate in Cherthala taluk was as high as 48.1% at that time. Subsequently, the survey conducted in 1954 by Singh et al., in two towns of Ernakulam and Mattancherry of Travancore-Cochin state, revealed endemicity rates of 10.6% and 21.7% respectively. The prevalence of both *bancroftian* and *brugian* infection was recorded.^{7,8} The unit established in Cherthala was the first unit established in Kerala exclusively for the control of lymphatic filariasis. The main objective of the unit was to control Brugian filariasis by removing the pistia plants and other aquatic vegetation from the water bodies. Subsequently, filariasis control units were established in Thiruvananthapuram, Kollam, and Alappuzha in the state.⁹

Establishment of National Filariasis Control Programme (NFCP) Units in Kerala

The government of India launched the National Filariasis Control Programme (NFCP) in 1955¹⁰ considering lymphatic filariasis as a major public health problem. The programme commenced in Kerala in January 1956 initially with 6 control and 2 survey units, protecting a population of 19 lakhs. Later, 16 control units, 2 survey units, and one filaria control work unit were established at Cherthala for *Brugia malayi* control. Extensive filaria surveys and other control activities were carried out following national guidelines resulting in a considerable reduction in the burden of filariasis in the state. In 2010, the NFCP units in the state were renamed as District Vector Control Units (DVC Units) and were reallocated to ensure one such unit in each district for entomological surveillance, filaria surveys, vector control activities, MDA etc.

Lymphatic Filariasis Elimination in Kerala

Lymphatic filariasis is targeted for global elimination. The resolution to eliminate it by the World Health Assembly in 1997¹¹ led to the development of strategies¹² and formulation of the Global Programme to Eliminate

Lymphatic Filariasis¹³ (GPELF) in 2000. The main intervention strategies adopted were:

- Transmission Control - Interruption of transmission through annual mass drug administration (MDA) with diethylcarbamazine citrate (DEC) in combination with albendazole to the eligible population in districts where the prevalence of microfilaria is equal or more than 1%.
- Morbidity Management and Disability Prevention (MMDP) - Alleviation of sufferings and prevention of disability by home-based for persons with lymphoedema and through surgical intervention for hydrocele cases.

Mass Drug Administration (MDA) Strategic Approach for Transmission Control

For operationalisation, MDA activities were divided into pre-MDA and MDA. Pre-MDA activities included the indentation of required drugs through the Government of India, enumeration of the population to be covered under MDA, sensitisation and capacity building of all service providers, and conducting a microfilaria survey following national guidelines. During MDA, the first 2 days were utilised for conducting group gatherings at all levels (village, panchayath, block panchayath, district, and state) with the help of community leaders. These gatherings were useful for health education and improved drug compliance. During the next two days, volunteers visited institutions, offices, shops, markets etc., and administered the tablets to those who did not participate in group gatherings. During the next 3 days, volunteers visited the houses as a mop-up operation to motivate and administer the drugs to those who had not received them. Mop-up rounds were further extended during the next one week to cover those who did not receive the tablets. In the third week, health workers visited the houses to ensure drug consumption. The MDA was thus extended for three weeks in Kerala as a local innovation instead of following the national three-day norm of MDA.^{14,15} During the entire 3 weeks, booths were kept open in all health institutions to provide health education and drug administration. Private hospitals and medical colleges also participated during MDA. Practitioners of the Indian system of medicines viz., Ayurveda and homoeopathy also supported the MDA programme, though initially, it was a challenge to convince them. The medical and nursing students were also mobilised to organise a campaign in medical colleges to cover patients, staff, and visitors. Special campaigns were organised in tribal areas and urban slums. Duplication of drug consumption and double counting were avoided during reporting.

Current Situation of Lymphatic Filariasis Elimination in Kerala

It is worth mentioning that prior to GPELF, the piloting of MDA¹⁶ was done in India including two districts of Kerala,

namely Alappuzha and Kozhikode, in 1997. However, with the national launch of MDA in 2004, all 11 endemic districts of Kerala were brought under the programme along with other districts in LF endemic states.¹⁷⁻²⁰ Implementation of MDA in 11 endemic districts of Kerala has led to a reduction in the average microfilaria rate from 0.8% in 2004 to 0.1% in 2014. With several challenges and issues, the efforts yielded encouraging results in nine districts, namely Thiruvananthapuram, Kollam, Alappuzha, Kottayam, Ernakulam, Thrissur, Kozhikode, Kannur, and Kasaragod.²¹ In some pockets of Malappuram and Palakkad districts, the microfilaria prevalence remained 1% above the threshold level which was later achieved with the intensification of social mobilisation and political advocacy to improve drug compliance by the community. The earlier monitoring guidelines of WHO²² were revised according to which, the target of achieving drug compliance above 65% of the population of the district and microfilaria prevalence below 1% are prerequisites for undergoing validation tests through Transmission Assessment Survey (TAS).²³⁻²⁵

Transmission Assessment Survey (TAS)

The validation tests through TAS are conducted among children of 6-7 years of age to assess whether the level of current transmission is below the threshold beyond which the transmission may not be possible and disease will cease to be a public health problem in due course. TAS was conducted in Alappuzha, Ernakulam, Kollam, Kottayam, and Thrissur districts in 2015. In the Alappuzha district, both *Brugia malayi* and *Wuchereria* infections were prevalent hence, TAS was conducted for both these infections. Three more districts namely Kannur, Kozhikode and Thiruvananthapuram were subjected to TAS in 2016 whereas, in Kasaragod district, TAS was conducted in 2017. All the above nine districts passed the first TAS and MDA was stopped. Post-MDA surveillance activities were carried out in these districts as envisaged in the national guidelines.^{24,25} TAS-2 was also cleared by these 9 districts. Alappuzha district which requires validation for two parasites, namely *W. bancrofti* and *B. malayi* also cleared TAS-2. Of the nine districts, seven namely, Thiruvananthapuram, Kollam, Kottayam, Ernakulam, Thrissur, Kozhikode, and Kannur have cleared TAS-3. Alappuzha and Kasaragod districts are yet to clear TAS-3. Palakkad and Malappuram districts later became eligible to conduct the first TAS.

Morbidity Management and Disability Prevention

The second pillar of strategy^{26,27} was also intensified in Kerala. Line listing of lymphoedema and hydrocele cases and the management activities are continuing. National Training on Morbidity Management and Disability Prevention (MMDP) training was conducted for 6 batches of doctors and staff nurses. MMDP clinics were started in 37 institutions in all

11 endemic districts and currently, 84 MMDP clinics have been established in the general hospital, district hospitals and taluk hospitals in the state. Morbidity management kits are made available to all the patients registered in these clinics. Training to Health Workers and ASHAs for home-based morbidity management is also continued at the district/ sub-district levels.

Synchronising with Sustainable Development Goal (SDG)

In the pursuit to achieve the goal of elimination and meet the SDG goal, the Kerala Government constituted 18 expert committees in 2016 to set state-specific achievable targets by 2020. For this purpose, the Kerala Government declared the following 4 missions called 'Nava Kerala Mission' based on the targets of SDG:

- Ardram Mission - directly related to health – Patient-friendly hospital initiatives
- Life Mission - Safe housing for all
- Education Mission - Smart classrooms
- Haritha Kerala Mission - Green and sustainable environment

The focus on LF elimination was prioritised under SDG No. 3 which highlighted "Good Health and Well Being – Ensure healthy lives and promote wellbeing for all at all ages" especially, under its target 3.3 which envisaged ending the epidemics of AIDS, TB, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases by 2030. In pursuit to achieve the said goal, Kerala Government reinforced the elimination of lymphatic filariasis from Kerala with the objectives of reducing the microfilaria rate below 1% in all endemic districts and ensuring the availability of recommended minimum package of care for all patients with lymphoedema, acute attack, and hydrocelectomy by the year 2020 and sustain the achievements. Owing to the COVID-19 pandemic, the set targets could not be completely achieved by 2020. However, all the major targets such as bringing the microfilaria rate below 1% in all the endemic districts, and scaling up of morbidity management and disability prevention activities were fulfilled by 2020. Post-MDA activities such as microfilaria survey among 5–9-year-old children, administration of treatment to all positive cases, entomological surveillance, determination of infection rate, infectivity rate, mean mosquito infectivity, and migrant screening were also intensified.

Observations

In Kerala, pre-MDA microfilaria survey after 2013 MDA was stopped in the 5 districts namely Alappuzha, Kollam, Kottayam, Ernakulam, and Thrissur as these were subjected to TAS. The pre-MDA survey in the remaining 6 districts continued till 2016 - the year of TAS eligibility of these

districts. All the districts covered under MDA in Kerala are shown in Figure 1.

The reported coverage was above 65% throughout, however, there has been a big gap between actual drug compliance and coverage of drug distribution in the initial years. The main reason for suboptimal drug consumption was the fear of the side effects of DEC.^{19,20,28,29} The compliance was improved after the initial 2-3 years and the impact was visible on microfilaria prevalence. The average microfilaria prevalence showed a decline from 0.85 in 2004 to 0.12 in 2014 though a slight increase was noticed in 2015-16 but less than the target of 1% (Figure 2). The districts of Kerala qualifying for TAS cleared it successfully, though the first successful TAS in the country was reported in Goa in 2013.³⁰

A line list of clinically manifested cases began in each district in 2004 and the same was updated every year. The state has line listed 20008 lymphoedema cases. Hydrocele

operations for 5753 cases were done till 2020 and 3408 hydroceles are still on the list (Table 1).

Though the incidence of lymphatic filariasis could be reduced considerably over the years, the state is now facing a peculiar phenomenon of the reintroduction of the disease. The large-scale influx of migrants from other states, especially from endemic states coupled with the abundance of the potential vector, *Cx. quinquefasciatus* constitutes a real challenge for sustaining elimination. It is estimated that there are over 25 lakhs of migrants in Kerala. Most of them are dwelling in major cities and other urban areas where the density of *Cx. quinquefasciatus* is very high. In 2014, out of 469 mf carriers detected in random surveys, 281 were migrants which constituted 60% of the total. The migration of the human population is an important factor responsible for the rapid increase of *W. bancrofti* infection in the expanding towns as described by WHO.³¹

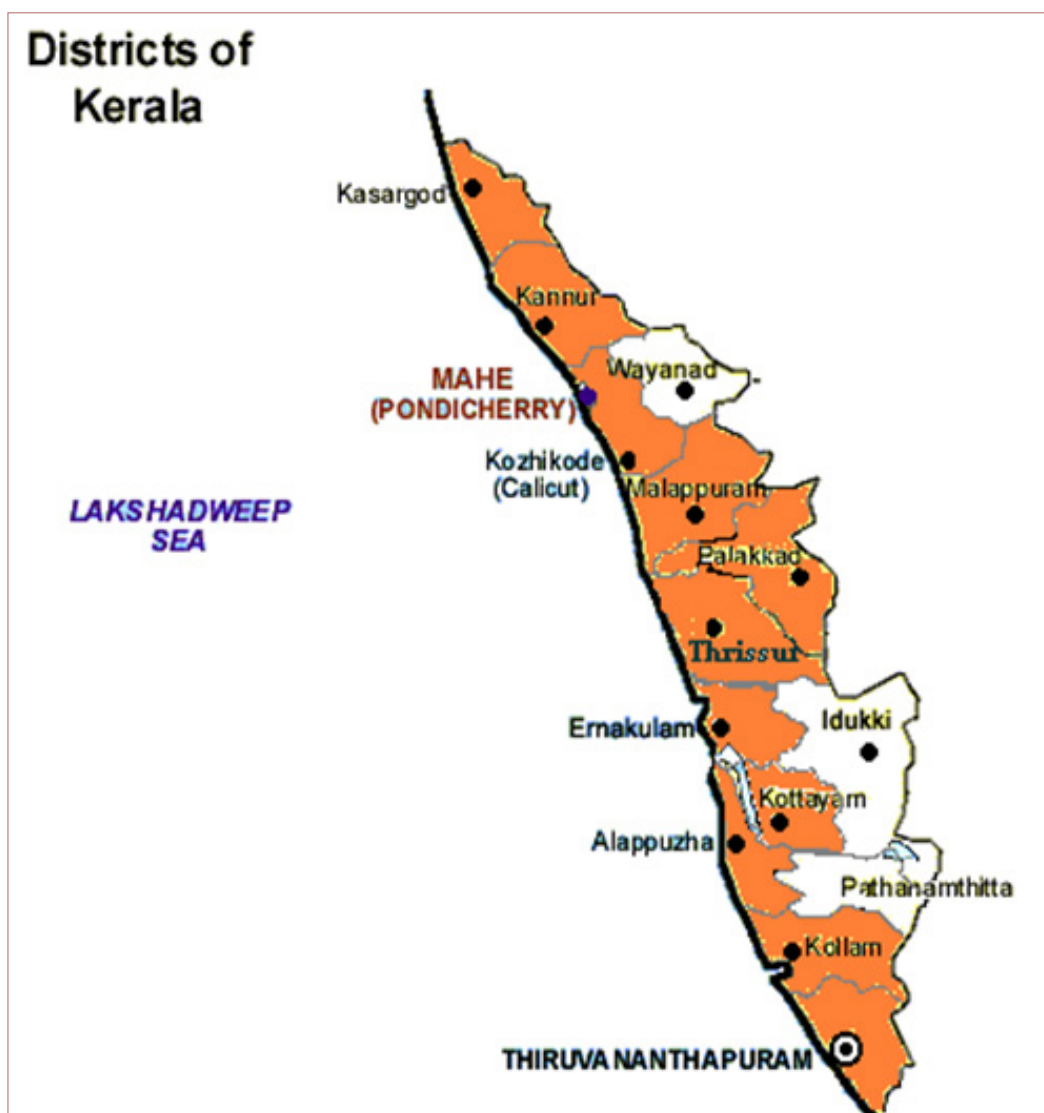


Figure 1. Kerala Map showing LF Endemic Districts

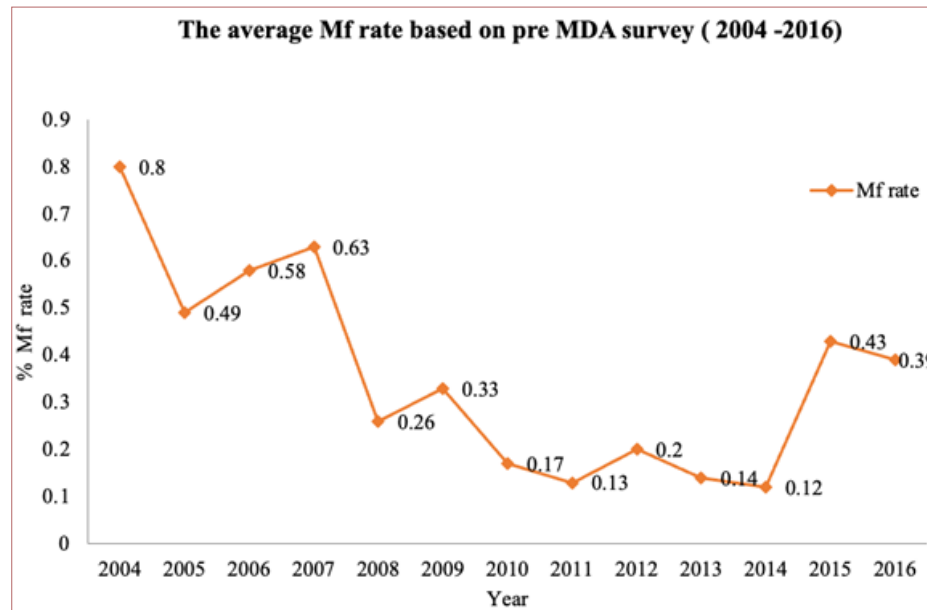


Figure 2. Microfilaria Prevalence in LF Endemic District of Kerala

Table I. Line List of Lymphoedema and Hydrocele Cases till 2020

S. No.	Name of Districts	No. of Line Listed Total Lymphoedema Cases	No. of Line Listed Total Hydrocele Cases	No. of Hydrocele Operations
1.	Thiruvananthapuram	1683	1400	1737
2.	Kollam	332	199	275
3.	Pathanamthitta	12	45	0
4.	Alappuzha	5893	98	759
5.	Kottayam	296	290	377
6.	IDK Idukki	2	2	0
7.	Ernakulam	3236	404	403
8.	Thrissur	799	149	134
9.	Palakkad	1162	398	540
10.	Malappuram	1771	214	467
11.	Kozhikode	3477	315	595
12.	Wayanad	15	4	0
13.	Kannur	610	63	281
14.	Kasaragod	720	93	185
	Total	20008	3408	5753

Discussions and Conclusion

The current situation warrants an effective mechanism for the systematic screening of migrants and the administration of full treatment to all positive cases. It is equally important to conduct parasitological surveys among the resident population on a regular basis. Periodical entomological surveillance needs to be carried out on a random basis with a

focus on the erstwhile endemic areas. Xenomonitoring may be a choice for detecting the infection in pooled mosquitoes which will help to find out the active/ residual foci so that all vector control measures along with chemotherapy may be initiated to liquidate them in order to prevent the re-establishment of transmission which is also a time taking phenomenon in LF because it is a poorly transmitted disease, unlike malaria. Vector control activities, especially

anti-larval measures, as recommended in NFCP need to be continued for sustaining the achievements gained through hard work and earnest efforts over the years as per the WHO guidelines of 2013³² though initially it was not suggested due to the cost-effective factor and sustainability of vector control in LF control or elimination.^{12,33,34}

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NB: This line list data is dynamic.

Conflict of Interest: None

References

1. Ives E. A voyage from England to India. London: Dilly; 1773. [Google Scholar]
2. Clark J. Observations on the diseases in long voyages to hot countries, and particularly on those which prevail in the East Indies. London: Wilson and Nicol; 1775. [Google Scholar]
3. Aiya VN. The Travancore State Manual. Trivandrum. Vol. II. Travancore Government Press; 1906. 570 p. [Google Scholar]
4. Innes CA. Malabar Gazetteer. Vol. I and II. Kerala Gazette Department; 1908.
5. Menon CA. The Cochin State Manual; 1911.
6. Iyengar MO. Studies on the epidemiology of filariasis in Travancore. Ind Med Res Mem. No. 30. 1938. 179 p. [Google Scholar]
7. Krishnaswami AK, Raghavan NG, Singh J. Filariasis in Travancore-Cochin state. I. Ernakulam and Mattancherri. Indian J Malariol. 1956 Sep;10(3):219-38. [PubMed] [Google Scholar]
8. Singh J, Krishnaswami AK, Raghavan NG. Filariasis in Travancore-Cochin State. II. Shertallai Taluk. Indian J Malariol. 1956 Dec;10(4):317-25. [PubMed] [Google Scholar]
9. Government of Kerala. Filariasis in Kerala. Trivandrum: Government Press; 1961. 27 p.
10. Sharma RS, Biswas H, Saxena NB. Operational Manual on National Filaria Control Programme. Delhi: National Malaria Eradication Programme; 1995. 152 p.
11. Fiftieth World Health Assembly. Elimination of lymphatic filariasis as a public health problem. Resolution of the World Health Assembly; 1997. p. 27-8. [Google Scholar]
12. Ottesen EA, Duke BO, Karam M, Behbehani K. Strategies and tools for the control/elimination of lymphatic filariasis. Bull World Health Organ. 1997;75(6):491-503. [PubMed] [Google Scholar]
13. Ottessen EA. The global programme to eliminate lymphatic filariasis. Trop Med Int Health. 2000;5(9):591-4. [PubMed] [Google Scholar]
14. National Vector Borne Disease Control Programme. Operational Guidelines on Elimination of lymphatic filariasis, India. Directorate of National Vector Borne Disease Control; 2005.
15. National Vector Borne Disease Control Programme. Guidelines on elimination of lymphatic filariasis, India; 2009.
16. Biswas G, Raina VK, Rao CK. Revised strategy for the control of lymphatic filariasis in India, New Delhi. Delhi: National Institute of Communicable diseases and National Malaria Eradication Program; 1996.
17. Srivastava PK, Dhillon GP. Elimination of lymphatic filariasis in India – a successful endeavour. J Indian Med Assoc. 2008;106(10):673-4, 676-7. [Google Scholar]
18. Srivastava PK, Dhariwal AC, Bhattacharjee J. Status of lymphatic filariasis in India. Health Action. 2013:19.
19. Srivastava PK, Bhattacharjee J, Dhariwal AC, Krishnamoorthy K, Dash AP. Elimination of lymphatic filariasis - current status and way ahead. J Commun Dis. 2014;46(2):85-94. [Google Scholar]
20. Dhariwal AC, Srivastava PK, Bhattacharjee J. Elimination of lymphatic filariasis in India: an update. J Indian Med Assoc. 2015;113(12):189-90.
21. DHS, Kerala (2008-2014). NVBDCP Reports. Forthcoming.
22. World Health Organization. Monitoring and epidemiological assessment of the programme to eliminate lymphatic filariasis at implementation unit level. 2005.
23. World Health Organization. Global programme to eliminate lymphatic filariasis: monitoring and epidemiological assessment of mass drug administration–TAS. 2011.
24. National Vector Borne Disease Control Programme [Internet]. Elimination of lymphatic filariasis. National

- Guidelines for Transmission Assessment Survey; 2013 [cited 2023 Jan 12]. Available from: <https://nvbdcp.gov.in/WriteReadData/l892s/TAS-National-Guidelines-2013-14.pdf>
25. Srivastava PK, Sharma SN, Bhattacharjee J, Dhariwal AC, Krishnamoorthy K. A tool for monitoring epidemiological impact of Mass Drug Administration (MDA) in the elimination of lymphatic filariasis- an Indian experience. *J Commun Dis.* 2014;46(2):1-6.
 26. World Health Organization. Lymphatic filariasis: progress of disability prevention activities. *Wkly Epidemiol Rec.* 2004;79:417-24. [PubMed] [Google Scholar]
 27. Srivastava PK, Dhariwal AC. Progress towards morbidity management under elimination of lymphatic filariasis programme in India. *J Indian Med Assoc.* 2010;108(12):854-62. [Google Scholar]
 28. Regu K, Ali MK, Rajendran R, Koya SM, Ganesh B, Dhariwal AC, Lal S. Mass drug administration against lymphatic filariasis: experiences from Kozhikode district of Kerala State. *J Commun Dis.* 2006;38(4):333-8. [PubMed] [Google Scholar]
 29. Showkath AM, Regu K, Rajendran R, Mohanan MK, Ganesh B. Awareness of health personnel about lymphatic filariasis and mass drug administration in Kerala state. *J Commun Dis.* 2008;40:37-40. [PubMed] [Google Scholar]
 30. Srivastava PK, Krishnamoorthy K, Govenkar S, Perni S, Delvi S, Subramanain S, Dhariwal AC, Bhattacharjee J, Dash AP. Elimination of lymphatic filariasis in Goa: first successful Transmission Assessment Survey in India. *J Commun Dis.* 2014;46(2):7-16.
 31. World Health Organization. Expert committee on filariasis (*Wuchereria* and *Brugia* infections). Technical Report Series No. 233. 1962. 49 p.
 32. World Health Organization [Internet]. Lymphatic filariasis: practical entomology. A handbook for National Elimination Programmes; 2013 [cited 2023 Jan 12]. Available from: http://apps.who.int/iris/bitstream/10665/87989/1/9789241505642_eng.pdf?ua=1
 33. Reuben R, Rajendran R, Sunish IP, Mani TR, Tewari SC, Hiryan J, Gajanana A. Annual single-dose diethylcarbamazine plus ivermectin for control of bancroftian filariasis: comparative efficacy with and without vector control. *Ann Trop Med Parasitol.* 2001;95(4):361-78. [PubMed] [Google Scholar]
 34. Krishnamoorthy K, Rajendran R, Sunish IP, Reuben R. Cost-effectiveness of the use of vector control and mass drug administration, separately or in combination, against lymphatic filariasis. *Ann Trop Med Parasitol.* 2002;96(2):S77-90. [PubMed] [Google Scholar]