

Review Article

Lymphatic Filariasis: Progress Towards Elimination

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Abstract

Preventive chemotherapy (PC) is now a widely used strategy to treat populations at risk of helminthic diseases to prevent its transmission and to reduce morbidity among those affected by it. PC is now elimination/control strategies for lymphatic filariasis (LF), soil-transmitted helminthiasis (STH) namely, hook worm infestation, ascariasis and trichuriasis, onchocerciasis, schistosomiasis and also trachoma a bacterial infection. Mass drug administration (MDA) and morbidity management are the major public health measures required for elimination of LF. Annual progress on elimination interventions of LF is submitted by the endemic countries to the WHO. Notable progress and achievements have been made by few countries in LF elimination. Many countries are on a path towards LF elimination by 2020. Few countries are yet to initiate campaigns towards elimination. Countries claiming LF elimination are to be validated by the WHO and should meet the eligible requirements. Sustenance of the claim post-elimination assessed by transmission assessment surveillance (TAS) is a challenge. For those countries that are still in the earlier phase of elimination campaign, alternative faster approaches to achieve it are an immediate need and a challenge to the programme strategists.

Key words: Lymphatic filariasis (LF), elimination, transmission assessment surveillance (TAS), mass drug administration (MDA), preventive chemotherapy (PC), morbidity management and disability prevention (MMDP)

Introduction

Lymphatic filariasis (LF) is a vector-borne chronic disease affecting all ages and is associated with impairments, social discrimination and economic problems in the affected people and their care givers. Around 120 million people living in 73 endemic countries in tropical and subtropical areas are infected with LF. LF is the most common cause of disability and accounts for 2.8 million DALYs. Lymphoedema of the limbs, hydrocele and recurrent painful debilitating acute attacks of adenolymphangitis (ADL) are the most common clinical manifestations of the disease (Fig 1). Around 40 million people are estimated to suffer from clinical LF disease. Around 25 million men have hydrocele and 15 million women have lymphoedema of the leg.



Fig 1. Lymphoedema of legs

Infection by the nematode worm *Wuchereria bancrofti* is the most common cause for LF in India which is usually acquired in childhood and the disability is manifested in the later life. Though majority of the infected people are asymptomatic all of them have sub-clinical lymphatic damage. The fecund female worm lives in the lymphatics and releases microfilaria (larva) which periodically circulates in the blood (Fig 2). The larva if ingested by mosquito vectors then matures to become infective and is further transmitted to new hosts when feeding. The mosquito of the ge-

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Fig 2. Microfilaria

nus *Culex* commonly transmits LF in India (Fig 3). Transmission of LF in a community is influenced by the infection prevalence, microfilaria density in the blood, mosquito density and frequency of human-vector contact.



Fig 3. *Culex* mosquito

The policy to initiate steps to eliminate LF as a public health problem comes from the world health assembly 1997 resolutions. Consequently in the year 2000 WHO launched the global programme to eliminate lymphatic filariasis (GPELF). The elimination strategy essentially are interrupting transmission through mass drug administration (MDA) and controlling morbidity through morbidity management and disability prevention (MMDP).

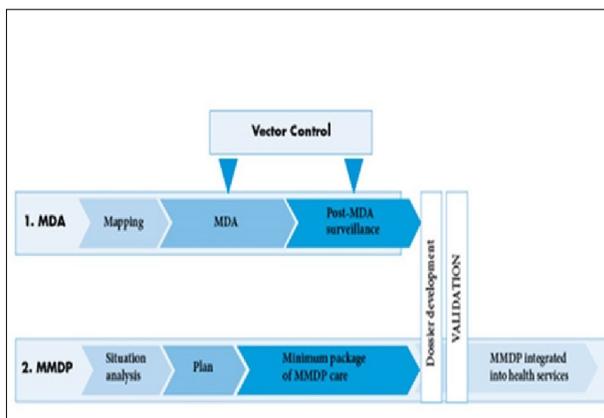


Fig 4. GPELF strategy

MDA campaigns to interrupt LF transmissions in the endemic countries have an impact on the prevention of 97 million cases and avert economic losses of more than 100 billion US dollars. Globally there is poor progress made towards elimination due to poor implementation and lack of investments in the program in many countries.

Mass drug administration (MDA)

Under the GPELF the first strategy of transmission interruption process involves mapping the LF endemic districts and implementing the WHO recommended preventive chemotherapy (PC) to the eligible persons. This MDA strategy to treat the entire at-risk population is being carried out annually in all the 255 LF endemic districts of India (Fig 5).

A single dose of diethylcarbamazine citrate (DEC) (6mg/kg body weight) with albendazole (400 mg) together is being administered annually for a minimum of five years to achieve a coverage of at least 65% of at-risk population. Elsewhere in areas co-endemic for onchocerciasis, ivermectin plus albendazole are used. Such treatment effectively reduces microfilariae from the bloodstream and hence its transmission to mosquitoes. As the adult worms are alive for many years at least five MDA rounds are recommended to reduce LF infections in the community to levels below a threshold and hence interrupt its transmission cycle. Vector control measures are initiated to enhance the LF elimination efforts by reducing the mosquito density and preventing human-mosquito contact.

Morbidity management and disability prevention (MMDP)

This second strategy is implemented through primary health care as a package to manage lymphedema, hydrocele and to prevent new cases of disease and made available in all LF endemic areas to the known patients (Fig 6). This package of care includes a) Individual treatment to destroy any remaining adult parasites and microfilaria. b) Surgery for hydrocele. c) Treatment for episodes of adenolymphangitis (ADL). d) Management of lym-



Fig 5. Mass drug administration campaigns

phoedema to prevent both progression of disease and episodes of ADL. The basic management of lymphoedema involves simple self-care hygiene and exercise measures which must be continued throughout the patients' lives.

Global progress towards elimination by 2020 (Map 1)

Among the 73 WHO identified LF endemic countries mass treatment is in progress in 45 and 10 have not initiated the MDA campaign (Table 1). LF was declared to have been eliminated as a public health problem by China and the Republic of Korea. An estimated 36 million cases of hydrocoele and lymphoedema remain. Around 57% of the population requiring prevention treatment live in the WHO South-East Asia region. Since the year 2000, a cumulative total of 6.2 billion treatments have been delivered to >820 million people at least once. In 2015, national programmes targeted 698.3 million people for treatment during MDA. Compared to the year 2014 the coverage of the total population requiring MDA in the year 2015 was 58.8%, which is an improve-

ment. There is a need for scale-up of MDA to the required 65%. The countries of Senegal, Timor Leste, Democratic Republic of Congo (DRC), Ethiopia, Indonesia, Nigeria and Zambia have expanded MDA into new endemic IUs for the first time resulting in an additional 48 million more persons treated than in 2014. Currently 26.3% of the global population requiring MDA is living in IUs where MDA has not been implemented in 2015. The estimated risk population to be administered with MDA declined to 947 million in 2015 from 1.410 billion in 2011. In 2015 TAS were implemented in 18 countries covering 339 IUs.

Progress in South-East Asia region

MDA is required among 501.1 million persons living in 6 of the 9 endemic countries. India has achieved 100% geographical coverage and MDA was continued in 2015 and 2016 where necessary. There are many challenges faced in meeting the eligibility criteria for TAS. TAS has been completed and MDA stopped in 72 of 255 endemic districts in India. Maldives and Sri Lanka have submitted dossiers to validate their claim of achieving the criteria for elimination as a public health problem. Thai-



Fig 6. Morbidity management and disability prevention (MMDP)

land is in post-MDA surveillance and successfully passed TAS in all the IUs. Bangladesh completed the additional MDA rounds recommended in the districts yet to clear TAS. Timor Leste restarted MDA in all the 13 districts treating 0.8 million and achieving 100% geographical coverage. National LF MDA campaign, BELKAGA, was implemented in Indonesia and achieved geographical coverage of 70.6%. Myanmar and Indonesia are yet to initiate MDA in all endemic IUs.

Validation of LF elimination claim

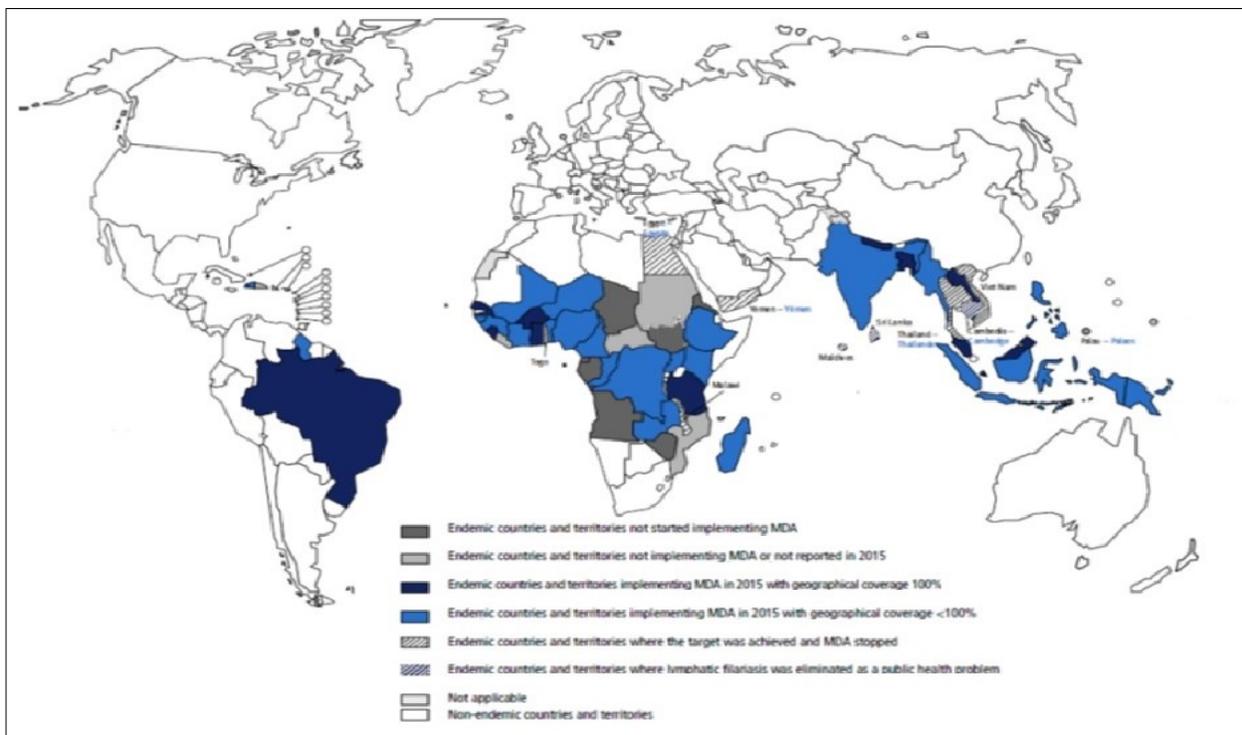
As per the framework for the control, elimination and eradication of neglected tropical diseases (NTDs) WHO uses a standardized process to validate the claim by an endemic country of successfully eliminating LF through MDA campaign. The applications for validation of the elimination claim should include supporting data of endemicity for implementation unit (IU), results of MDA implemented, monitoring data, epidemiological data from sentinel sites, results from transmission assessment survey (TAS) prior to stopping MDA and subsequent TAS during post-MDA surveillance, data supporting availability and provision of

the basic recommended package of care for LF patients. There should have been 100% geographical coverage of MDA implementation in the endemic areas. MDA campaign should be stopped once the infection reduces below the transmission threshold level and which should further be sustained for four more years. The recommended minimum package of care to manage morbidity and prevent disability (MMDP) should be made available in all the areas where patients are distributed to alleviate their suffering.

Emerging challenges in GPELF

Transmission assessment surveys (TAS)

TAS report is passed, means the number of children testing positive for LF infection was less than the allowed critical cut-off value. It is a number reflecting the prevalence below which transmission cannot be sustained. A total of 14 countries have observed unsuccessful TAS results. It means the number of children testing positive for LF infection failed to be less than the critical cut-off value. A failed TAS indicates persistent transmission after MDA. All regions have observed at least 1 country where at least one IU has failed TAS. Three



Map 1. Lymphatic filariasis endemic countries and status of MDA- 2015

Table 1. Mass drug administration (MDA) implementation for LF by WHO region, 2015

| WHO region | No. of LF endemic countries | No. of Countries initiated | No. of countries implemented MDA in 2015 | No. of countries stopped MDA nationwide | Programme coverage (%) |
|-----------------------|-----------------------------|----------------------------|--|---|------------------------|
| Africa | 35 | 26 | 20 | 02 | 82.99 |
| Americas | 04 | 04 | 03 | 00 | 63.94 |
| Eastern Mediterranean | 03 | 03 | 00 | 02 | 00.00 |
| South-East Asia | 09 | 09 | 06 | 03 | 78.87 |
| Western Pacific | 22 | 21 | 06 | 11 | 66.79 |
| Total | 73 | 63 | 39 | 18 | 79.64 |

countries have failed TAS during post-MDA surveillance. Persistent transmission has been noted in areas of high-endemicity prior to MDA, with low MDA coverage, with mobile populations and where *Brugia malayi* is the causal parasite.

Transitioning to soil transmitted helminths (STH) control

Drugs used for LF MDA campaign are also effective for treating soil transmitted helminths infections. Millions of preschool and school-aged children are being treated during the MDA for LF. All of these children have received albendazole and in some regions also ivermectin. The opportunity to treat STH infections in the targeted age groups will be lost as TAS is passed and MDA campaign is stopped. Countries that have stopped MDA are in the transition from community MDA for LF to targeted PC for STH to cover the lost contribution. Hence many countries are scaling up child deworming programmes.

Outlook towards 2020

Progress and achievements have been made in LF elimination in the past 15 years. Around 60% of the endemic countries that have achieved 100% geographical coverage by 2015 are on the path to stop MDA nationally by 2020. Then surveillance (TAS) for at least 4 years after stopping MDA is required before validation that infection levels are sustained below the elimination thresholds. There is also an increasing trend by the countries now to report on MMDP as it is required for to meet validation criteria. Intensified efforts will be

required by the 29 countries where MDA is still required for LF elimination. A consistent delivery and high coverage in each MDA round are required for elimination. Research is in progress to find the potential of alternative strategies, like biannual MDA or combining all three MDA medicines to reduce the time needed for elimination.

Conclusions

Preventive chemotherapy as a strategy to treat populations at risk of LF has made impact on the health of large sections of population globally. PC for LF also has benefitted in improving the health of children by controlling STHs. Many challenges exist in achieving the GPELF by 2020. WHO plays a major role in validating the member countries claim of LF elimination. Operational research is needed in improvement of transmission assessment surveillance, to know the possible reasons for the failed TAS results and also to identify alternative strategies for interrupting transmission of LF. Information on occurrence of soil transmitted infections in areas where MDA is discontinued is required to find the impact of MDA and to suggest the frequency of ongoing PC required for their control.

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