

Assessment of the Impact of Morbidity Management and Disability Prevention for Lymphatic Filariasis on the Disease Burden in Villupuram District of Tamil Nadu, India

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Abstract

Background: The global program to eliminate lymphatic filariasis (GPELF) was started in 2003 with two strategies: the mass drug administration (MDA) to interrupt disease transmission and the morbidity management and disability prevention (MMDP) to provide the basic hygienic care to filariasis lymphedema patients. Among the two strategies, the MDA is well advanced and got the desired results, but the MMDP is lagging due to poor execution. **Objectives:** To assess the awareness of MMDP and ongoing morbidity management practices by lymphedema patients and to estimate the impacts of the MMDP on the prevalence and severity of lymphedema. **Materials and Methods:** This study was conducted among 100 lymphedema patients in 7 filariasis endemic villages of Villupuram district, Tamil Nadu, India through interviews using a structured, pretested questionnaire. The grading and adenolymphangitis (ADL) attack determination were done by a clinician. The impact was assessed in terms of changes in the lymphedema grades, frequency of ADL attacks, and changes in the burden. **Results:** Of the 100 patients, 70% were aware of the program and among them, only 48% were practising MMDP regularly (i.e. two times per day). The majority of them (80%) were taking treatment during ADL attacks. The overall lymphedema grades reversal and progression were observed in 13% and 52% of cases, respectively. **Conclusion:** This study has revealed that the second arm of the GPELF, “MMDP” has not yielded the desired results as evidenced by the incidence of frequent ADL attacks and advancement of lymphedema grades.

Keywords: Lymphatic filariasis, lymphedema, morbidity management and disability prevention

INTRODUCTION

Lymphatic filariasis (LF), leading morbidity causing parasitic disease, and the second common vector-borne disease after malaria, is widespread in tropics and subtropics, with 790 million people at risk and 20 million people suffering from chronic morbidity.^[1] This helminthic disease is caused by *Wuchereria bancrofti* accounts for 91% of the world's infection, and the remaining is caused by *Brugia malayi* and *Brugia timori*. Several species of mosquitoes were responsible for this disease transmission in different countries^[2,3] and *Culex quinquefasciatus* is the primary vector, which accounts for 99.4% of infection in India.^[4] The LF causes several clinical symptoms but two out of three infected people were asymptomatic, even when they have microfilaremia.^[5] The clinical manifestations of LF include; lymphedema of limbs/genitals, acute attacks, hydrocele,

chyluria.^[6] Even though LF does not cause mortality, it is considered the second disability causing disease.^[7] The acute adenolymphangitis (ADL) caused by LF is painful and frequent ADL attacks affect people's occupation, income, and production. Globally it is reported, 5.9 million disability-adjusted life years (DALYs) were lost due to LF.^[8] Hence, the World Health Organization targeted LF for elimination by 2020 and initiated the global program to eliminate LF (GPELF) with two aims, viz. Transmission control through mass drug administration (MDA) and

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reduce the suffering of people affected with different forms of lymphedema by Morbidity Management and Disability Prevention (MMDP).^[9] The key goal of MMDP is to offer basic leg hygiene and germ-free attention to LF patients suffering from different forms of acute and chronic lymphedema.^[10,11] In Tamil Nadu, the southern state of India, implemented MDA and MMDP by the National Vector Borne Diseases Control Program, through the Primary Health Centers (PHCs). After a decade, among the two strategies, the MDA is well advanced, but MMDP is lagging.^[12] Hence, this study is planned with the following objectives in the Villupuram district of Tamil Nadu: To assess the awareness of MMDP and ongoing morbidity management practices by lymphedema patients and to estimate the impacts of the MMDP on the prevalence and severity of lymphedema.

MATERIALS AND METHODS

A list of filarial lymphedema patients (439 cases) in 20 villages of Gingie, Thindivanam, and Vikravandi taluks of Villupuram district (11° 56' N 79° 29' E), Tamil Nadu was obtained from the previous research project (DEC-Ivermectin village-scale trials).^[13] A total of 310 patients could be traced and the patients who had migrated to other places, deceased between 2004 and 2015, were ascertained. A total of 7 villages (Kongarapattu, Permandur, Sithani, Thenkalavi, Nedi, Alagiramam, and Perani) consisting of 100 lymphedema patients was randomly selected from 20 villages and a questionnaire-based study is conducted in the period between March 2015 and May 2015. Agriculture is the main occupation of people living in these villages and PHCs are the primary option for their health issues.

Study design

This retrospective cohort study is planned among 100 lymphedema patients in selected villages. Ethical clearance was obtained from the ICMR-Vector Control Research Centre (VCRC) institutional human ethics committee for an interview and clinical examination and informed written consent was obtained from each study patient before an interview. The awareness and practices of MMDP were assessed and the impact was evaluated in terms of changes in the lymphedema grades and disease burden and frequency of ADL attacks.

Awareness and practice of MMDP and treatment-seeking behavior during ADL attacks were assessed and expressed in percentages through personal interviews with the study participants in their domestic settings, with a pretested, semi-structured questionnaire by the door-to-door visit between 4 and 8 PM. Clinical examination was done by a clinician for grading of lymphedema and to ascertain/diagnose ADL attacks. Present lymphedema grades of the study participants were reassessed and compared with their earlier lymphedema grades, diagnosed in 2004. Grade-wise incidence of ADL was calculated as, the number of patients with ADL attacks with a total number of patients in that particular grade of lymphedema. Grade-wise incidence of ADL attacks was

calculated only for the past year, considering the recalling capacity of the respondent.

Estimation of DALYs for LF was done using the sum of two components: “Years of Life Lost” (YLL) and “Years Lived with Disability” (YLD).^[14] YLL is considered as zero, as there is no mortality attributed to filarial lymphedema and YLD was assessed considering the following parameters: Age-wise- population, the prevalence of lymphedema, age at onset of lymphedema, duration of the disease, and disability weight of the disease condition.^[15] The average age at onset of lymphedema was taken from an earlier study on brugian filariasis: Grade-I (recent edema), was 29 years whereas Grade-II (persistent edema without skin change) was 34 years and Grad-III and IV (persistent edema with skin change) was 44 years.^[16] Duration of disease was based on life expectancy in years for Tamil Nadu state (Census of India, 2011). Prevalence is approximately incidence multiplied by duration. Disability weight is a weight factor that mirrors the severity of the disease on a scale ranging from 0 (perfect health) to 1 (equivalent to death). The disability weight in this study was taken from the Global Burden of disease studies by Murray and Lopez in 1996;^[14] 0.067 for 0–4 years; 0.08 for 5–14 years; 0.113 for 15–44 years; 0.128 for 45–59 years, and 0.119 for above 60 years of age.

World Health Organization grading of lymphedema^[17]

- Grade-1: Mostly pitting edema, spontaneously reversible on elevation
- Grade-2: Mostly nonpitting edema, not spontaneously reversible on elevation
- Grade-3: Gross increase in the volume of irreversible edema with skin folds
- Grade-4: Irreversible edema with dermatosclerosis and papillomatous lesions.

RESULTS

Out of 100 lymphedema cases reexamined, the majority (67%) was females and 33% were male. Among the respondents, 41% of cases belonged to the 45–59 age group [Table 1] and 44%, had Grade-2 lymphedema. About 80% of the respondents had received the morbidity management kit containing soap (1) and towel (1) for maintaining leg hygiene (once every year).

Awareness and practising of morbidity management

It was observed that 70% ($n = 70$) of the respondents were aware of the MMDP program. Among those who were aware of the MMDP program, 78% ($n = 55$) and 22% ($n = 15$) attributed the source of awareness from the information provided by state government health staff and ICMR-VCRC respectively. Further, 73% ($n = 73$) of patients practised leg hygiene (cleaning of the affected leg). The remaining 27% of people did not practice MMDP at all. Among the patients practising MMDP, 34.2% ($n = 25$) practised MMDP twice/day as instructed, and the remaining 65.8% ($n = 48$) of cases practised MMDP once/day as a part of their daily bathing [Table 2].

Treatment seeking behavior

This study reveals that 80% of cases with ADL attacks approached health-care facilities and the remaining did home remedies. Among those who approached health-care facilities, 65% ($n = 52$) of patients approached Govt. hospitals and the remaining preferred private clinics/hospitals. It was observed that few patients ($n = 7$) were taking penicillin/fluorocid injection, monthly once to prevent ADL attacks. During our interview, some LF patients said that they do not have access to any treatment source and most of the PHCs were too far from their villages. Even PHCs within 2–3 km distance are also inaccessible by them.

Changes in grades of lymphedema and Severity of disease

It was observed that from the total of 24 Grade-I patients, only 20.8% ($n = 5$) of cases remained in the same grade, but 41.6% ($n = 10$), 25% ($n = 6$), and 8.3% of cases advanced to Grade-II, III and IV respectively. Out of 44 Grade-II lymphedema cases reported in 2004, only 6.8% ($n = 3$) reversed back to Grade-I and 31.8% ($n = 14$) remained in the same grade. However, 43.2% ($n = 19$) and 18.2% ($n = 8$) of cases advanced to Grade-III and IV, respectively. Among 19 Grade-III lymphedema cases, 47.4% ($n = 9$) of cases remained in the same grade and 15.8% ($n = 3$) of cases reversed back to Grade-II, but 36.8% ($n = 7$) of cases advanced to the higher grade. Similarly, out of 13 Grade-IV cases, 53.8% ($n = 6$) of cases remained in the same grade, and the remaining 46.2% ($n = 7$) reversed back to Grade-III [Table 3]. These findings suggest that the impact of MMDP is felt on higher grades only. During our clinical examination, we found the discoloration of nails and skin texture fibrosis in different grades of lymphedema patients [Table 3]. The average frequency of ADL attacks among LF patients varied from 2 to 4.8 attacks/year in different grades [Table 4].

Changes in disease burden

DALYs for the current study calculated and compared with earlier unpublished data. It was observed that females had a higher burden of lymphedema in both 2004 and 2014. In 2004,

DALYs per 1000 population was 128.9 (90.9 in females; 38 in males) and it was reduced to 58 (39.2-female; 18.8-male) in the year 2014. This may be due to less/no recruitment of new lymphedema cases.

DISCUSSION

The earlier studies conducted for the past twenty years mainly focused on LF transmission control and very little attention was given to MMDP practices.^[18] The MMDP plays an important role in the transition of lymphedema grades and the frequency of ADL attacks. The transition of the grades from a higher grade to a lower grade or a lower grade to a higher grade may be due to the practice or nonpractice of MMDP, respectively. A well-planned morbidity management practices (proper limb hygiene, the elevation of the affected limb, pressure garment, proper foot-ware, and treatment for entry lesions) is expected to have a positive impact on ADL attacks (frequency and duration), odor, grades of lymphedema, flexibility, and range of motion, chronic inflammatory changes, and limb volume.

The effects of MMDP in this study area have given varied results: (1) about 70% of study patients were aware of the program, but do not practice regularly/properly (i.e. Twice per day). This has resulted in an average of 2 to 4.8 ADL attacks per year in different grades of lymphedema. The incidence of ADL is a sensitive indicator of proper morbidity management and limb hygiene. ADL attacks were observed in the study area despite the implementation of GPELF and NPELF for more than 10 years. Scarification of skin is the risk factor for ADL attacks other than proper limb hygiene.^[19] The MMDP practices/follow-up is not regular by patients/provider. This information was collected from patients during the discussion. The treatment-seeking behavior in the study area revealed 80% of patients were reported visiting hospitals for medical care during ADL attacks and the patients prefer both government sources and private health-care facilities. All the health-care providers offer chemotherapy alone and because of that patients

Table 1: Age- and gender-wise grades of lymphoedema cases in the year 2004

Age group	Grade-1		Grade-2		Grade-3		Grade-4		Total
	Male	Female	Male	Female	Male	Female	Male	Female	
15-44	3	5	8	9	0	0	0	1	26
45-59	4	10	7	13	1	3	1	2	41
60+	1	1	2	5	3	12	3	6	33
Total	8	16	17	27	4	15	4	9	100

Table 2: Grades wise patients practising/nonpractising morbidity management and disability prevention

Grades	Number received MMDP kit	Number of patients practising MMDP (once/day)	Number of patients practising MMDP (twice/day)	Number of patients not practising MMDP
Grade-I	13	11	5	8
Grade-II	38	21	8	15
Grade-III	17	10	5	4
Grade-IV	12	6	4	3

MMDP: Morbidity management and disability prevention

Table 3: Transition of lymphedema grades and clinical findings in the year 2004 and 2015

Number of lymphedema cases in the year 2004	The transition of lymphedema grades in the year 2015				
	Normal (%)	Grade-1 (%)	Grade-2 (%)	Grade-3 (%)	Grade-4 (%)
Grade-1-24	1 (4.2)	5 (20.8)	10 (41.6)	6 (25)	2 (8.3)
Grade-2-44	0	3 (6.8)	14 (31.8)	19 (43.2)	8 (18.2)
Grade-3-19	0	0	3 (15.8)	9 (47.4)	7 (36.8)
Grade-4-13	0	0	0	6 (46.2)	7 (53.8)
Discoloration of nails (%)	0	0	70.37	77.5	100
Skin texture fibrosis (%)	0	12.5	62.96	47.5	100

Table 4: Frequency of acute adenolymphangitis attacks in study patients

Lymphedema grades (2015)	Number of lymphedema patients	Number of patients experienced ADL attack	Average number of ADL attacks experienced per year
Normal	1	1	2
Grade-I	8	7	3.2
Grade-II	27	24	4.8
Grade-III	40	33	4.2
Grade-IV	24	21	4.7

ADL: Acute Adenolymphangitis

were not aware of the importance of MMDP. Whenever they visit hospitals the health care providers should explain the importance of simple techniques such as limb elevation, limb hygiene, and prevention of entry lesions.^[20] A study in Odisha stated that most of the clinicians do not advise patients to do MMDP practices and the importance of basic hygienic care when patients visiting hospitals during ADL attacks.^[21] Another study in Sri Lanka reported that there is a lack of facilities in the PHCs to take care of lymphedema patients.^[22] The present study suggests that awareness among the patients is high (70%). However, the supply of the kit is only once a year, and replenishment of materials and follow-up of the patients is lacking.

Similarly, the burden of the disease has reduced significantly as evidenced by the reduction in DALYs. However, the second arm of the program, “*Morbidity Management and Disability Prevention*” has not yielded the desired results as evidenced by the incidence of ADL attacks and advancement of lymphedema grades. The reasons may be as follows.

- MMDP is limited to line listing of patients and distribution of soaps and towels to chronic patients once a year by the PHCs just before MDA
- The PHCs are overloaded with diverse health programs and almost cannot do anything more than line listing of cases and distribution of soap, towels for leg hygiene
- Simple leg hygiene alone will not prevent ADL attacks in rural areas. Agricultural laborers have to work hard in the field and they also get injuries during the work. These two factors trigger the frequency of ADL attacks
- The effect of leg hygiene is very less on agricultural laborers who have to spend most of the day in mud, dust, silt, and water

- LF patients with lower grades of edema are sidelined when it comes to the distribution of accessories for leg hygiene or financial assistance scheme for LF patients. Both are given only to patients with higher grades (Grade III, Grade IV) of edema.

CONCLUSION

The shortcomings of the MMDP can be solved by proper planning and distribution of MMDP kits. The MMDP kits should be distributed every month along with some antibiotic ointments like Whitefield ointment and local analgesic tablets, i.e. Paracetamol. There should be at least one PHC/MMDP care unit for two villages to take care of lymphedema patients or else ambulance service should be made available to lymphedema patients since they cannot walk long distance. The ICMR-VCRC has a filaria clinic separately and the staff assigned for only taking care of lymphedema patients. Most of the patients consult physicians during ADL attacks and whenever patients visit the ICMR-VCRC clinic, they not only provide drugs for ADL attacks, the MMDP and their importance are also explained. Hence, there should be a separate unit to take care of filarial lymphedema patients, instead of merging MMDP to PHCs. Most of the patients in this study area were agricultural labors working very hard in the field for their income and it leads to ADL attacks when they are getting an injury or entering mud in the affected area leads to form infection. Hence, the state government should arrange financial assistance for their daily subsistence.

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Conflicts of interest

There are no conflicts of interest.

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