

Original article

A study on “clinical epidemiology of filarial lymphedema patients attending filariasis clinic in Pondicherry”

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ABSTRACT

Introduction: lymphatic filariasis (LF) is a vector-borne disease of the tropical and sub-tropical countries due to infection by filarial worms, which invade the lymphatics of humans initiating pathological changes leading to various clinical sequela, one major sequel of infection is lymphoedema of the limbs.

Methods: The study was carried out among the filarial lymphoedema patients attending Vector Control Research Centre & National vector Borne Disease Control Programme (NVBDCP) Clinic at Pondicherry.

Results: The study showed that. Unilateral LE was predominant and more than 40% of the patients are from 60 + age group. LE grade was clinically assessed based on the four stage WHO criteria 1982. Over all, prevalence of LE Grade of lower extremities was Grade I 14.5%, Grade II 37.5%, Grade III 22.5% and Grade IV 25.15% and 52.1% and 76.2% were obese among male and female LE patients respectively. Frequency of more than 3 ADLA episodes was higher among grade III lymphoedema patients requiring antibiotic prophylaxis.

Conclusion: Prevalence of Intertrigo and frequent ADLA episodes were higher in grade III LE patients. In total 9/143 (6.29%) of LE patients had more than 3 ADLA Episodes in 1 year and these patients require antibiotic (penicillin/doxycycline prophylaxis).

1. Introduction

1.1. Epidemiology of filariasis

Though lymphatic filariasis is caused by *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*, bancrofti infection is the most common in tropical and sub-tropical countries. Pathological changes in lymphatic vessels trigger the onset of lymphoedema subsequently to various clinical manifestations.^{1,2} Hydrocele and lymphoedema of the extremities are the two major clinical manifestations and 78 developing countries are identified as endemic countries. It is estimated that more than 25 million and 15 million people are affected by hydrocele and lymphoedema respectively and more than 40% of these cases are from India Globally, India, Indonesia, Nigeria, and Bangladesh contribute about 70% of the infection. In India, more than 630 million people from 21 States including 5 Union Territories are at risk of getting infected and 225 districts are identified as endemic districts and MDA is being implemented in these districts.^{2–6} Pani. *et.al.*⁷ observed lymphoedema is common among females and also difference in clinical manifestations in those affected with Brugian filariasis.

Filarial patients also endure certain acute manifestations that

include Acute Dermato-Lymphangio-Adenitis (ADLA) and Acute Filarial Lymphangitis (AFL) in endemic areas and it has been established by bacteriological and immunological studies that secondary bacterial infections play a major role in ADLA and AFL.^{3,8,9} ADLA is important cause of suffering and economic loss in filariasis-endemic areas. Fungal infection in toe web space (interdigital skin lesions) are also frequently observed in filarial lymphoedema patient, which could serve as portal of entry for pathogenic bacteria and therefore considered as the major predisposing factor for ADL.^{3,10,11} Lymphoedema is transient in early stages and gets established in late second decade of life. With repeated skin infections followed by fibrotic changes, different secondary manifestations such as skin thickening nodule formation and warty growths get established.^{9,10}

Though most of the studies report on these major clinical manifestations, the finer details such the proportion of advanced stage 3 and 4 stages, various secondary clinical manifestations, ADLA frequencies in different grades of lymphoedema, intertrigo prevalence and risk factors are not reported from various regions.^{10,11} The present study focused on studying the detailed clinical features of filarial lymphedema patient reporting to the exclusive filariasis clinics in Pondicherry. and studying the determinants for clinical staging of the filarial lymphoedema of the

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lower extremities.

2. Methodology

2.1. Study sites and the study population

The study was carried out among the filarial lymphoedema patients attending Vector Control Research Centre (VCRC) & National vector Borne Disease Control (NVBDCP) Clinics at Pondicherry during the period between March and June 2017 of study.

The target population was 150–200, LE patients of lower extremity based on the availability of the patients, and their willingness to participate in the study.

2.2. Inclusion and exclusion criteria

Patient reporting to VCRC & NVBDCP for filarial lymphoedema during study period were considered for the study. Patients from all the genders aged 18 years and above were registered and examined. Patients less than 18 years of age, patients not willing to provide written consent and insane persons were excluded from the study.

2.3. Study design, type and settings

Cross sectional descriptive clinical study was carried out among the patients attending the exclusive filariasis clinic at VCRC and NVBDCP. Patients mainly from Pondicherry and three adjacent districts Cuddalore, Thindivanam and Villupuram were included.

2.4. Tools for data collection

Clinical report form (CRF), Thermometer, Measuring Tape, torch, plastic scale, weighing machine, sphygmomanometer, Mouth mirror, The Study information sheet and written consent form, including the consent in local language.

Source of funding

Human Resource development unit of VCRC, ICMR Pondicherry provided funding through intramural budget.

2.5. Ethical clearance

Institutional Human Ethics Committee, VCRC approved the study including the information sheet and consent form (Project ID IHEC/0117/A)

2.6. Parameter of the study

Two set of parameters were included: 1. Socioeconomic status, 2. Clinical profile.

2.7. Data collection procedures

Patients attending VCRC and NVBDCP Clinics for morbidity management and disability prevention (MMDP) services were enlisted in order of the patient's Id number of the respective clinic. In NVBDCP clinic MMDP services are provided on every Monday and Friday and in VCRC clinical services are provided on every Monday and Wednesday. The investigator approached all these patients and explained them about study details with the support of technical staff of VCRC. In addition, patients, available in the list were also contacted through phone and depending on their willingness and convenience, a team from Clinical Epidemiology unit visited the house hold of the patients to complete the clinical report form.

2.8. Information sheet & consent

Information sheet provided all the required information in terms of purpose of the study, time involved to collect the data, clinical examination details, details in the clinical report, risks and benefits to the patients participating in the study. Information sheet also provided the details of the patients rights, protection of the identity and the data provided by the patients. Patients were also informed that they may withdraw from the study without affecting their routing services available in exclusive filariasis clinic. Once the patients understood the details and if volunteered to participate signature was obtained from the patients as well as from one witness.

2.9. Clinical report form (CRF) consisted of two parts

2.9.1. Part 1

2.9.1.1. Socio-demographic data. In first part of the CRF, information on patient's socio-economic status, history of co-morbidity, treatment history for filarial lymphoedema and difficulties in getting treatment were collected and recorded on the basis of structured proforma. The data collection was done through pre-tested clinical report form by interview in exclusive filariasis clinics and also by door to door visits during March to June 2017. This part of study covered the following Socio demographic characteristics of the lymphoedema patients, gender, age, marital status, education, occupation, income and duration of stay in Pondicherry.

2.9.2. Part – 2

2.9.2.1. Clinical examination. In the second part of the Study, clinical examination of patients was carried out by the investigator under the supervision of the Clinician/Research Guide at VCRC Clinic, on every Monday and Wednesday. For this study, WHO (1992) described four staging method was followed, In brief, Grade I pitting oedema that is completely reversible on elevation, Grade II pitting/non pitting oedema partially reversible, Grade III non pitting oedema that is not reversible, with thickening of skin, Grade IV - non pitting oedema that is not reversible with thickening of skin along with nodular and other secondary skin lesions. In addition, detailed assessment in skin and nail condition was carried out and 1–4 scores were assigned for each parameter.

2.9.2.1.1. Skin assessment. Skin assessment was done by grading the characteristics such as colour, texture, moisture by present or absent for the characteristics such as skin fold, ulcer, wart, nodule and pitting. For the skin colour scoring was given compared to the contra-lateral limb on unilateral lymphoedema cases or compared to the exposed part of the upper arm as 0, 1, 2, 3, where 0 means normal, 1 mild dark, 2 moderate dark, 3 very dark, Texture: 0 normal, 1 mild thickness, 2 moderate thickness, Moisture: 0 normal compare to forearm, 1 mild dryness, 2 moderate dryness without scaling, 3 very dry with scaling, 4 cracks and oozing or lymphorrhea.

2.9.2.1.2. Intertrigo. Intertrigo was defined as presence of ulcer on toe web space/s for not less than 2 weeks duration. The following scoring system was adapted for inter-trigo characters: Depth: 0 normal, 1 shallow, 2 deep (1–2 cm), 3 very deep (more than 2cm); Itching: 0 nil; 1 mild, 2 moderate, 3 intense, Pain: 0 nil; 1 mild, 2 moderate, 3 intense; Discharge: 0 nil, 1 mild, 2 moderate, 3 severe, 4 severe & foul smelling.

2.9.2.1.3. Nail assessment. Visual examination of nail assessment of both the leg has been done and given scoring on the basis of discolorations and cracks of nail.

2.9.2.1.4. ADLA history. History of ADLA episodes with adenitis for last 1 year was obtained by patients recall and recorded in CRF form.

2.9.2.1.5. Limb circumference and volume measurement. **Circumference measurements:** Length measurements L1, L2, L3 and circumference measurements at levels C1 to C7. The position of C2 was 10 cm from 0 (tip of great toe), the positions of C5, C6 and C7 were at 12, 20 and 30 cm from level of ground (00), respectively. The levels of

C1, C3 and C4 were different in each patient depending on anatomical variations.

2.9.2.1.6. *Volume measurement.* Volume measurement was carried out by water displacement for both the legs and the difference between normal and affected limb was computed as lymphoedema volume.

2.9.2.1.7. *Treatment history.* Treatment of lymphoedema has been recorded on the basis of duration of oedema reporting. And difficulty in reporting for LE treatment was assessed.

For this interview and clinical examination, it took 20 min for each patient. All the data was filled in CRF form, entered in excel sheet and converted into SPSS for data analysis.

3. Data analysis

Sociodemographic history and clinical examination data were recorded in pretested proforma (Annexure iv). The structured data was entered in a Windows excel. and data converted into SPSS file and analysed.

4. Results

The result of this study is documented as mentioned below. The finding of the study is expressed in Tables and figures with suitable explanation. In total, 385 patients attending the VCRC and NVBDCP Clinic were enlisted and 268 patients were approached. 155 patients given written consent were interviewed and examined clinically, of which 143 and 12 patients were found to have filarial lymphoedema and non-filarial lymphoedema respectively. Table 1 shows the socio-economic details of the filarial lymphoedema patients recruited in the study. It is observed that the proportion of the patients who did not have education was more among female LE patients compared to male LE patients (32% vs 13%) and less than 15% and 10% of male and female patients had higher secondary education respectively. It is noted that only 13% and 10.3% male and female patients were engaged in agriculture and more than 50% of the patients in all gender were engaged in urban occupation. Majority of the LE patients was under BPL

Table 1
Socio-demographic details of filarial lymphoedema patients (N = 143).

| S.No | Variable | Category | Male (N = 46) N (%) | Female (N = 97) N (%) |
|-----------------------------|--------------------|---------------------|---------------------------|-----------------------------|
| 1 | Marital status | Married | 39 (84.8) | 71 (73.2) |
| | | Single | 5 (10.9) | 3 (3.1) |
| | | Widow/Widower | 2 (4.3) | 23 (23.7) |
| | | Separated/divorced | 0 (0) | 0 (0) |
| 2 | Educational status | Uneducated | 6 (13) | 31 (32) |
| | | 1-8th | 20 (43.5) | 42 (43.3) |
| | | 8th – 10th | 12 (26.1) | 14 (14.4) |
| | | Hsc | 6 (13) | 7 (7.2) |
| | | UG | 1 (2.2) | 1 (1) |
| | | PG | 1 (2.2) | 2 (2.1) |
| | | 3 | Occupational status | No work |
| Agriculture + Manual labour | 6 (13) | 10 (10.3) | | |
| Transport + travelling | 3 (6.5) | 4 (4.1) | | |
| Industry | 1 (2.2) | 1 (1) | | |
| Office work + Computer | 1 (2.2) | 2 (2.1) | | |
| Retired/housework | 10 (21.7) | 31 (31.9) | | |
| 4 | Income | Other work | 25 (54.3) | 44 (45.4) |
| | | < 3000 | 83 (58%) | |
| | | 3001–6000 | 25 (17.5%) | |
| | | 6001–9000 | 15 (10.5%) | |
| | | 9001–12000 | 5 (3.5%) | |
| 5 | House type | > 12000 | 15 (10.5%) | |
| | | Concrete roofed | 105 (73.4%) | |
| | | Tiled roof/asbestos | 26 (18.2%) | |
| | | Thatched | 8 (5.6%) | |
| | | Any other | 4 (2.8%) | |

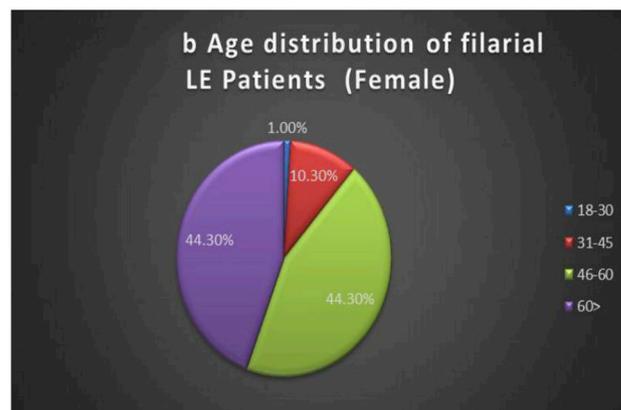
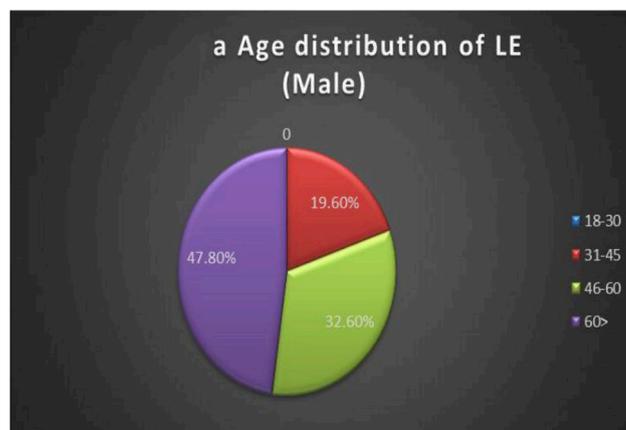


Fig. 1. 1a.1b: Age distribution of Male and Female.

(less than Rs 3000 per month) category (58%) and it was observed the proportions of lower middle-income group was 17.5% and middle-income group was 10.5% and only 3.5% and 10.5% of LE patients were having higher income in the range of Rs 9001–12000 and more than Rs 12,000 per month. However, more than 70% of filarial LE patients were living under concrete roof houses and only 5.6% of the patients were living under thatched roof houses.

Age wise distribution of filarial lymphoedema cases is displayed in Fig. 1a and b and it is observed that the filarial lymphoedema is clinically evident or patients report for treatment only during middle age and more than 80% of the patients were beyond 45 years of age irrespective of the gender. 47.8% and 44.3% of male and female filarial LE patients were from above 60 years of age.

Table 2 depicts the gender wise localization of lymphoedema among the patients reported for treatment. It is observed that 87% and 86.6% patients presented with unilateral LE among males and females respectively. LE grade was clinically assessed based on the four stage WHO criteria 1982. Over all, prevalence of LE Grade of lower extremities was Grade I 14.5%, Grade II 37.5%, Grade III 22.5% and Grade IV 25.15% (Fig. 2). Though similar trend was observed in male and female patients, Grade III LE was little higher among female patients (19.5% vs 26.8%) (Fig. 3).

Table 2
Gender wise distribution of LE cases by localization (n = 143).

| Gender | Unilateral N (%) | Bilateral N (%) | Total N (%) |
|--------|------------------|-----------------|-------------|
| Male | 40 (87%) | 6 (13%) | 46 (100%) |
| Female | 84 (86.6%) | 13 (13.4%) | 97 (100%) |
| All | 124 (86.7%) | 19 (13.3%) | 143 (100%) |



Fig. 2. Proportions of LE grade of lower extremities.

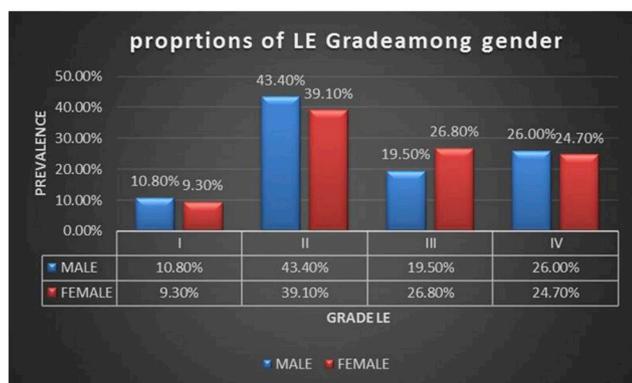


Fig. 3. Proportions of LE Grade among gender.

We also elicited the most common co-morbidity among LE patients reported for treatment. History of co-morbidity was collected and also relevant treatment was verified and recorded. It is observed that both hypertension and diabetes mellitus was much higher among female LE patients, 17.4 vs 39.2% for hypertension and 10.9% vs 22.7% for diabetes mellitus.

BMI was calculated based on the revised consensus guidelines for India. In this study, it is observed that 19.6% of male LE patients and 11.3% of female LE patients were overweight and 50% and 76.3% were obese among male and female LE patients respectively (Table 3).

Acute Manifestations of filariasis: History of ADLAEpisode was recorded by recall and it was observed that 64 (44.8%) LE patients endured at least one episode of ADLA during the last year. 6.3% and 38.5% of LE patients reported more than 3 episodes and 1-3 ADLA episodes during last one year respectively. Frequency of ADLA episodes was significantly higher in grade 3 and 4 lymphoedema (Table 4). Similarly, 4.3%, 19%, 28.6% and 74.4% of grade 1,2,3 and 4 had intertrigo respectively (Table 5). It is observed that in spite of implementing

Table 3 Comorbidity among LE patients (n = 143).

| Condition | Male n = 46 (%) | Female n = 97 (%) |
|------------------------|-----------------|-------------------|
| Hypertension (HT) | 8 (17.4%) | 38 (39.2%) |
| Diabetes mellitus (DM) | 5 (10.9) | 22 (22.7%) |
| Chronic Venous Disease | 0 | 0 |
| Varicose vein | 0 | 1 (1%) |
| Renal diseases | 0 | 0 |
| Others | 0 | 2 (2.1%) |
| BMI | | |
| < 18.5% | 1 (2.2%) | 0 |
| 18.5–22.9% | 13 (28.3%) | 12 (12.4%) |
| 23–24.9% | 9 (19.6%) | 11 (11.3%) |
| > 25 | 23 (50%) | 74 (76.3%) |

Table 4 ADLA prevalence by LE grade (last 1-year episode).

| LE Grade | ADLA EPISODE/YEAR | | | ALL |
|----------|-------------------|------------|-----------|-----|
| | 0 | 1–3 | > 3 | |
| I | 14 (66.6%) | 6 (28.6%) | 1 (4.8%) | 21 |
| II | 31 (62%) | 16 (32%) | 3 (6%) | 50 |
| III | 19 (57.6%) | 10 (30.3%) | 4 (12.1%) | 33 |
| IV | 15 (38.5%) | 23 (58.9%) | 1 (2.6%) | 39 |

Table 5 Intertrigo prevalence by filarial LE grade (n = 155 LE leg).

| LE Grade | Present | Absent | Total |
|----------|------------|-------------|-------|
| I | 1 (4.3%) | 22 (95.7%) | 23 |
| II | 11 (19%) | 47 (81%) | 58 |
| III | 10 (28.6%) | 25 (71.4%) | 35 |
| IV | 29 (74.4%) | 10 (25.6%) | 39 |
| ALL | 51 (32.9%) | 104 (67.1%) | 155 |



Fig. 4. Patients with clinical signs of ADLA.

MMDP in this area, LE patients continue to endure ADLA with routine clinical features (Fig. 4).

5. Discussions

Filariasis is known to be endemic in Puducherry since 1957. The earliest filarial survey in Puducherry conducted in 1989 revealed 6.6% disease rate. However, these areas are not under filariasis surveillance even until implementing MDA in 2004. As it is small area with little above 900 thousand population, after five rounds of MDA, elimination level of 1% mf rate was achieved. The programme now depends only on self reporting of cases to NVBDCP clinics.

On successful elimination of the filariasis it is expected that the grade 3 and 4 lymphoedema cases to be high due to reduction in incidence of lymphoedema and this phenomenon is expected to occur only after two decades of achieving 1% mf rate in the community.

The present study was undertaken in institutional set-up and we observed that the grade 2 lymphoedema constituted 37.5% as assessed based by four stage WHO (1982) grading system, we also observed 22.5% and 25% grade 3 and 4 lymphoedema respectively. Similar trend was observed in male and female patients.

In present study 47.8% and 44.3% of the male and female filarial LE

patients were from above age 60 years of age. One of the studies conducted in tertiary care centre, Kerala showed the similar results and 72.8% of the lymphoedema cases were from 60 to 85 years age group.¹² The chronic disease prevalence also showed age dependency in the present study similar to the observation made in other States Mangalore,¹³ Uttar Pradesh,¹⁴ Andhra Pradesh¹⁵ as well as earlier study conducted 30 years back in Pondicherry.⁷ The study also revealed that the lymphoedema patients continue to have frequent ADLA attacks in spite of the availability of antimicrobial therapy in the programme. The prevalence and the frequency of ADLA continue to be higher in grade 3 and 4 lymphoedema. Intertrigo continue to be the risk factor for ADLA attacks as shown earlier.¹⁶

Present study showed 76% of female patients above 25 years of age were obese, whereas 52.1% of male were obese in that group. Several studies have shown that overweight and obesity is a major impediment for economic and social achievements and also the major risk factor for the establishment of the secondary lymphoedema of the lower extremities. It is established by several studies that obesity is a major risk factor for the development lymphoedema following breast cancer treatment.¹⁷ Prevalence of hypertension and type II diabetes, a state of hyperglycaemia is higher among those with higher weight.^{18,19} It is observed that both Hypertension and diabetes mellitus was much higher among female LE patients 17.3 vs 39.1% for HT and 10.8 vs 22.6% for DM.

The findings from this study indicate that the epidemiological profile of the filarial lymphoedema patients attending the MMDP clinic continue to be same at the time of implementing MDA. Though the programme has achieved transmission control, the MMDP component has not been implemented with full spirit. The resources have to be reorganized to implement the MMDP programme or else it will take long time for the country to get the WHO certification.

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Declaration of competing interest

The authors have none to declare. The support for this manuscript is from Vector control research centre-ICMR, Puducherry, India.

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