



AN EPIDEMIOLOGICAL STUDY OF LOWER LIMB LYMPHATIC FILARIASIS IN NORTHERN INDIAN POPULATION

General Surgery

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ABSTRACT

Background/Objective: Lymphatic filariasis is a neglected tropical disease that can cause permanent disability through disruption of the lymphatic system. The objective of this study was to study the epidemiological profile of lower limb lymphatic filariasis in northern Indian population. **Methods:** This was a cross-sectional study. Patients of age 15-75 years, lower limb lymphatic filariasis with Grade I, II, III lymphoedema and a clinical diagnosis of lymphatic filariasis were included in the study. Particulars of patient like age, sex, residential address, economic status, occupation and nature of work were noted. History of lower limb infection, diabetes, trauma, previous radiation therapy, metastatic disease, any previous lower limb surgery was noted to rule out any secondary cause of lymphoedema other than lymphatic filariasis. **Results:** About one fourth of patients were between 41-50 years (23.4%). More than half of patients were males (63.6%) and belonged to rural area (63.6%). Left lower limb swelling clinical diagnosis was among more than half of patients (55.2%). More than one third of patients had grade II disease (39.6%). History of fever with chills was most common comorbid condition (69.5%). The duration of disease was ≥ 10 years among 88.7% of rural patients. There was significant ($p < 0.01$) association of various socio demographic characteristics of the patients with disease duration. There was significant ($p < 0.05$) association of grade, limb volume, history of previous surgery and history of diabetes with duration of diabetes. **Conclusion:** Increased awareness about the disease and basic limb care practices and proper medications is required and should be instituted at the early stage of the disease to prevent the progression of the disease.

KEYWORDS

Epidemiology, Lymphatic filariasis (LF), Lymphoedema.

INTRODUCTION

Though lymphatic filariasis (LF) 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^[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^[3,4].

Long-term infection can cause deterioration of the lymphatic system, characterized by severe swelling of the limbs (lymphoedema) and later elephantiasis or lymphoedema of the scrotum (hydrocele). Community level transmission of infection can be interrupted by mass treatment with recommended oral regimens of the anthelmintic medicines albendazole, either alone or with ivermectin, or diethylcarbamazine citrate and albendazole, or a combination of all three, depending on the setting^[5].

These medicines are given in mass public health campaigns or, in certain settings, through salt fortification with diethylcarbamazine citrate. Treatment of at least 65% of the total population in endemic areas for at least 5-7 consecutive years through annual or biannual mass drug administration (MDA) is recommended by WHO, to reduce the reservoir of microfilaremia and antigenemia among humans, with the ultimate goal of interrupting transmission to eliminate lymphatic filariasis as a public health problem^[6,7].

WHO has recommended guidelines by which national elimination of lymphatic filariasis as a public health problem can be validated, and national programmes are requested to submit dossiers to document baseline prevalence, programme interventions and monitoring

activities, prevalence during surveillance after MDA, and availability of care for people with lymphatic filariasis^[8].

Occurrence of acute painful attacks in the form of acute filarial lymphangitis (AFL) or acute dermato-lymphangio-adenitis (ADLA) is common among LF patients which creates additional burden. The strategies of Global Programme to Eliminate Lymphatic Filariasis (GPELF) focus on interruption of LF parasite transmission and morbidity management to reduce the disability^[9,10].

The present study was designed to study the epidemiological profile of lower limb lymphatic filariasis in northern Indian population.

MATERIAL AND METHODS

This was a cross-sectional study conducted in the Department of General Surgery, King George Medical University, Lucknow. The study was approved by the Ethical Committee of the Institute (Ref. code 97th ECM II B-Thesis/P69) and the consent was taken from each participant before enrolling in the study. The objective of the study was well explained to all the participants.

Patients of age 15-75 years, lower limb lymphatic filariasis with Grade I, II, II lymphoedema and a clinical diagnosis of lymphatic filariasis were included in the study. Patients with acute attacks of acute adeno lymphangitis and chronic hydrocele were excluded from the study.

METHODS

The patients who came in OPD or Emergency department were clinically evaluated with history and physical examination of lower limb swelling and clinical diagnosis of lower limb lymphoedema was made.

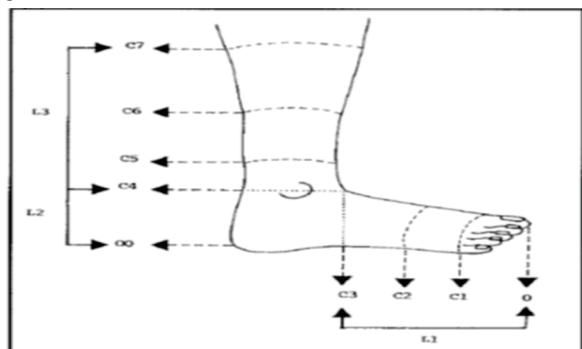
Particulars of patient like age, sex, residential address, economic status, occupation and nature of work were noted. History of lower limb infection, diabetes, trauma, previous radiation therapy, metastatic disease, any previous lower limb surgery was noted to rule out any secondary cause of lymphoedema other than lymphatic filariasis.

ELISA and card test for each patient was advised to detect the presence of filarial disease as a causative factor for lower limb lymphoedema. MR lymphangiography was also advised to detect the causation of

lymphoedema. The study participants were physically examined for lymphoedema, local swelling and tenderness.

Examination of pitting/non pitting oedema, skin texture, ulceration, etc. and measurement of circumference of the lower limb using measuring tape was done at the following predefined points was done [1].

C1- base of metatarso-phalangeal joints; C2-10 cm from tip of great toe; C3-mid-tarsal line through most proximal part of dorsum of foot; C4-line through midpoint of lateral malleolus; C5 -10 cm from level of ground; C6 -20 cm from level of ground; C7 - 30 cm from level of ground.



Mean of C1 to C7 was determined separately for both the affected and normal limb and termed as affected mean circumference (AMC) and normal mean circumference (NMC) respectively [12].

Using affected mean circumference (AMC) and normal mean circumference (NMC), the change in limb circumference and limb volume was derived and was categorized as <20%, 20 to 40% or >40% to determine the severity of lymphedema.

Statistical analysis

The results are presented in frequencies, percentages and mean±SD. The Chi-square test was used for comparisons. The p-value<0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

About one fourth of patients were between 41-50 years (23.4%). More than half of patients were males (63.6%) and belonged to rural area (63.6%). Farmer occupation was 26.6%. More than half of patients (66.9%) had field work nature of work (Table-1).

Table-1: Demographic profile of patients

Demographic profile	No. (n=154)	%
Age in years		
≤20	15	9.7
21-30	29	18.8
31-40	33	21.4
41-50	36	23.4
51-60	27	17.5
>60	14	9.1
Mean±SD (Range)	41.27±14.71 (15-75)	
Gender		
Male	98	63.6
Female	56	36.4
Domicile		
Rural	96	62.3
Urban	58	37.7
Occupation		
Student	20	13.0
Job	27	17.5
Self-employed	21	13.6
Housewife	31	20.1
Labor	10	6.5
Farmer	41	26.6
Other	4	2.6
Nature of Work		

Fieldwork	103	66.9
Office work	5	3.2
Housework	46	29.9

Left lower limb swelling clinical diagnosis was among more than half of patients (55.2%) followed by right lower limb swelling (33.8%) and bilateral lower limb swelling (11%). More than one third of patients had grade II disease (39.6%) followed by grade I (30.5%) and grade III (29.9%). The duration of disease was ≥10 years among 34.4% patients (Table-2).

Table-2: Distribution of patients according to disease characteristics

Disease characteristics	No. (n=154)	%
Clinical Diagnosis		
Left lower limb swelling	85	55.2
Right lower limb swelling	52	33.8
Bilateral lower limb swelling	17	11.0
Grade		
Grade I	47	30.5
Grade II	61	39.6
Grade III	46	29.9
Duration of disease		
<1 years	36	23.4
1-<5 years	41	26.6
5-<10 years	24	15.6
≥10 years	53	34.4

History of fever with chills was most common comorbid condition (69.5%) and ulceration was second most common comorbid condition (31.2%). History of Infection was third most common comorbid condition (29.2%) (Table-3).

Table-3: Distribution of patients according to comorbid conditions associated with lower limb lymphoedema.

Comorbid conditions#	No. (n=154)	%
History of Infection	45	29.2
History of previous surgery	29	18.8
History of trauma	24	15.6
Metastatic Spread	0	0.0
History of diabetes	16	10.4
Ulceration	48	31.2
History of fever with chills	107	69.5

#Multiple response

Table-4 shows the comparisons of various socio demographic characteristics of the patients with disease duration. The duration of disease was ≥10 years among 88.7% of rural patients. However, the duration of disease was <1 year among 63.9% of urban patients. There was significant (p<0.01) association of various socio demographic characteristics of the patients with disease duration (Table-4).

Table-4: Comparisons of various socio demographic characteristics of the patients with disease duration

	<1 year (n=36)		1-<5 years (n=41)		5-<10 years (n=24)		≥10 years (n=53)		P-value
	n	%	n	%	n	%	n	%	
Resident									
Rural	13	36.1	19	46.3	17	70.8	47	88.7	<0.001*
Urban	23	63.9	22	53.7	7	29.2	6	11.3	
Occupations									
Student	10	27.8	7	17.1	2	8.3	1	1.9	0.008*
Job	9	25.0	7	17.1	4	16.7	7	13.2	
Self-employed/B usiness	5	13.9	3	7.3	3	12.5	9	17.0	
Housewife	5	13.9	7	17.1	6	25.0	13	24.5	
Labour	2	5.6	2	4.8	4	16.7	3	5.7	
Farmer	4	11.1	14	34.2	5	20.8	18	34.0	
Other	1	2.7	1	2.4	0	0.0	2	3.8	
Nature of work									
Fieldwork	16	44.4	22	53.7	14	58.3	45	84.9	0.005*

Office work	2	5.6	1	2.4	1	4.2	1	1.9	
Housework	18	50.0	18	43.9	9	37.5	7	13.2	
Economic status									
Lower	15	41.7	25	61.0	20	83.3	43	81.1	<0.001*
Middle	21	58.3	16	39.0	4	16.7	10	18.9	

[†]Chi-square test, *Significant

Table-5 shows the comparisons of associated problems of the patients with disease duration. Grade II disease was most common among whom the duration of disease was ≥ 10 years (49.2%). Grade I disease was most common among whom the duration of disease was < 1 year (47.2%). Grade III disease was most common among whom the duration of disease was ≥ 10 years (35.8%). Limb volume $< 20\%$ was in 63.4% among duration of disease was $1- < 5$ years and $> 40\%$ was 58.5% among whom duration of disease was ≥ 10 years. The history of infection was highest among whom duration of disease was $5- < 10$ years (45.8%). There was significant ($p < 0.05$) association of grade, limb volume, history of previous surgery and history of diabetes with duration of diabetes.

Table-5: Comparisons of associated problems of the patients with disease duration

	<1 year (n=36)		1-<5 years (n=41)		5-<10 years (n=24)		≥10 years (n=53)		lp-value
	No.	%	No.	%	No.	%	No.	%	
Grading									
Grade I	17	47.2	16	39.0	6	25.0	8	15.1	0.046*
Grade II	11	30.6	13	31.7	11	45.9	26	49.2	
Grade III	8	22.2	12	29.3	7	29.1	19	35.8	
Limb volume									
<20%	22	61.1	26	63.4	6	25.0	4	7.5	<0.001*
20-40%	12	33.3	12	29.3	10	41.7	18	34.0	
>40%	2	5.6	3	7.3	8	33.3	31	58.5	
History of infection									
Present	8	22.2	13	31.7	11	45.8	13	24.5	0.195
Absent	28	77.8	28	68.3	13	54.2	40	75.5	
History of previous surgery									
Yes	5	13.9	3	7.3	6	25.0	15	28.3	0.049*
No	31	86.1	38	92.7	18	75.0	38	71.7	
History of trauma									
Present	5	13.9	6	14.6	7	29.2	6	11.3	0.244
Absent	31	86.1	35	85.4	17	70.8	47	88.7	
History of diabetes									
Present	0	0.00	3	7.32	4	9.76	4	7.55	0.044*
Absent	36	100.00	38	92.68	20	48.78	49	92.45	
Ulceration									
No	28	77.8	28	68.3	13	54.2	37	69.8	0.291
Yes	8	22.2	13	31.7	11	45.8	16	30.2	
History of fever with chills									
Present	21	58.3	30	73.2	15	62.5	41	77.4	0.218
Absent	15	41.7	11	26.8	9	37.5	12	22.6	
Smear for M.F.									
Negative	26	72.2	28	68.3	16	66.7	36	67.9	0.982
Positive	8	22.2	11	26.8	8	33.3	17	32.1	
Not done	2	5.56	2	4.9	0	0.0	0	0.0	

[†]Chi-square test, *Significant

DISCUSSION

Lymphatic filariasis (LF) is an important public health problem worldwide. Globally it is ranked as second leading cause of chronic disability amongst other causes. An estimated 120 million people are infected and 1.3 billion are at risk of infection worldwide. Estimated 40 million people suffer disabling clinical manifestations^[24]. Nearly one third of the affected people are living in India. Changes in the lymphatic system due to the infection leads to varying clinical manifestations like lymphedema, hydrocele, chyluria, elephantiasis and others^[9,25]. The clinical manifestations of the disease usually appear many years after the initial infection and the disease does not cause immediate mortality.

In this study, most of patients belonged to age range of 41-50 years

(23.4%) with a mean age of 40 years. The gender distribution of the patients showed that 63.6% patients were male and 36.4% patients were female with the male/female ratio of 1.75. A total of 96 patients (62.3%) were residing in rural areas where male patients were mostly engaged in fieldwork (66.9%) like farmers and laborer and majority of affected females were housewives (20.1%). A previous study observed that the filarial lymphoedema is clinically evident or patients reported for treatment only during middle age and more than 80% of the patients were beyond 45 years of age irrespective of the gender^[23]. 47.8% and 44.3% of male and female filarial LE patients were from above 60 years of age that 87% and 86.6% patients presented with unilateral LE among males and females respectively

Most of the patients included in our study had unilateral lower limb swelling (left side > right side) and mainly presented in grade 2 (39.6%) and grade 3 (29.9%) disease harboring disease for many years. In our study, we found a positive correlation between duration of disease and stage of the disease and the socio economic levels. The delayed presentation and hence worsening of the course of the disease (grade 2 and 3) was more commonly seen in patients coming from rural areas, having lower socio economic status. These group of patients had nature of work as field work, mostly being farmers. Increased age and increased duration of disease increased the risk of worsening of the disease^[11]. The longer duration of disease is associated with recurrent attacks of adeno lymphangitis resulting in progression of chronic lymphoedema that finally progresses to elephantiasis^[12]. This previous study stated that foot care instituted at an early age helped in prevention of acute inflammatory attacks and arresting the development of future lymphoedema^[13].

History of fever with chills was present in 69.5% of patients. Fever mostly occurred secondary to bacterial infection that is common in patients of filariasis which causes acute suffering^[14]. The previous study reported 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^[23]. In this study, more than one third of patients had grade II disease (39.6%) followed by grade I (30.5%) and grade III (29.9%). 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%). A previous study showed the 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%)^[23].

Pervious study concluded that Lymphatic filariasis affects the economic activity of the productive age group decreasing their working hours, changing jobs and stopping work^[15]. In our study, $> 40\%$ limb volume was positively correlated with duration of disease. This group of patients mostly belonged to lower socio economic status and were unaware of basic lymphoedema limb care practices like limb elevation, limb massage, regular washing of limb and use of compression stockings and mostly used locally available traditional medications which proved to be ineffective and lead to progression of the disease, both in terms of grading and limb volume. Lower socio economic status, lack of education and social stigma regarding the disfiguring nature of disease prevented most of these patients to seek early tertiary care treatment. It was also shown in the study that patients were too embarrassed to travel to government clinics, especially female patients^[16]. The patients were mostly unaware of effective lymphoedema management methods as they were not provided proper information by local clinics. Most patients consulted spiritualists or treated themselves with herbal preparations or analgesics or got their limb surgery in local clinics by untrained professionals. Paucity of female doctors and various other social constraints prevented most of Indian young women to seek timely treatment. Lack of awareness, distance and problem of transportation to a health facility and perceived severity of disease and dissatisfaction with previous treatment, all lead to worsening of disease states^[17]. A previous study concluded that the patient's characteristics, education and lymphoedema grade had significant influence on number of foot care practices adopted^[18].

Our study was also supported by the study in which showed that patient's poverty limits their ability to effectively cope with various stages of disease and start timely treatment^[19]. These endemic areas patients, under the effect of poverty mostly received help from traditional local available pharmacists, sorcerers, herbalists or they self-treated with herbal preparations, burial of the leg, scrubbing the surface of the foot with ants, bloodletting, and scarification^[20,21,22].

Hence, basic formal education is required to create awareness to institute about foot care practices at early stage of the disease. The use of antibiotics and maintenance of hygiene plays a crucial role in reducing burden associated with the disease.

CONCLUSION

Increased awareness about the disease and basic limb care practices and proper medications is required and should be instituted at the early stage of the disease to prevent the progression of the disease.

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