

# Prevalence of Lymphatic Filariasis in an Endemic District of Nepal

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## Abstract

This lymphatic filariasis (LF) prevalence study was carried out at two sentinel sites, Mahendranagar and Nagrain Village Development Committees (VDCs), in one of the endemic districts, Dhanusha, in the Terai plain region of Nepal, during June-July 2002. A total of 1,085 finger prick thick blood smear samples were collected from volunteers at two sentinel sites, 468 from Mahendranagar and 617 from Nagrain VDCs, from 22.00-02.00 hr, and were examined for presence of helminthic parasite *Wuchereria bancrofti*, as per standard protocol. Twenty-five out of 468 samples (5.3%) collected from Mahendranagar were found to be microscopically positive for *W. bancrofti*, while only 14 out of 617 samples (2.3%) from Nagrain VDC were found to be positive for this filarial parasite. The prevalence of microfilaremia in Mahendranagar was higher than in Nagrain VDC. The surveillance result showed that, though the participation of males and females was almost equal, the prevalence was found to be higher in females. The prevalence data may be useful in planning for the elimination of LF, as per the WHO goal to eliminate LF by the year 2020.

**Keywords:** lymphatic filariasis, epidemiology, prevalence, Nepal, *Wuchereria bancrofti*, microfilaria

## Introduction

Lymphatic filariasis is endemic in 80 countries and more than 1.1 billion people worldwide are estimated to be at risk [1]. Approximately 120 million people in tropical and subtropical areas of the world are infected. Of these infections, 90% are caused by *Wuchereria bancrofti*, and 10% by *Brugia malayi* (limited to Asia and parts of the Pacific) [2]. Almost 25 million men suffer from genital disease (most commonly hydrocele); an estimated 15 million people have lymphedema or elephantiasis of the leg. The magnitude of infection in children has become better understood over recent years; indeed, most

infections appear to be acquired in childhood, with a long period of sub-clinical disease that progresses to the characteristic overt clinical manifestation of adults [3-4].

The WHO [4-5] has estimated the burden of the disease as 4,918,000 disability-adjusted life years (DALYs), the highest of all tropical diseases after malaria. Furthermore, a recent study suggests that in India alone, economic losses due to lost man-days of work and decreased productivity approach US\$1 billion annually [6].

By the end of 2001, a total of 25,479,136 people had received mass drug administration in 22 countries participating in the Program to Eliminate Lymphatic Filariasis (PELF). This is a marked increase compared to the year 2000 when only 12 countries participated and 3 million people at risk were covered [4].

Nepal is a sovereign, independent and

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democratic landlocked country situated between India in the south, east and west and China in the north. The kingdom of Nepal is divided into 75 districts. Each district is comprised of Village Development Committees (VDCs) and municipalities. There is high morbidity due to various diseases, including communicable diseases, parasitic diseases and malnutrition. In Nepal, very few surveys of lymphatic filariasis have been undertaken so far. Jung [7], in a cross-sectional survey, found the prevalence ranging from 0-17.8% in nine different sites of central Nepal. Pradhan *et al* [8], in a study in Gokarna VDC, Kathmandu, found an endemicity rate of 24.6%. Bista *et al* [9], in a situation analysis study during 1995-1999, recorded lymphatic filariasis at 13.2-23.4% in different regions of Nepal. Recently, Sherchand [10-11], on epidemiological mapping of lymphatic filariasis in 37 districts, found 11 districts above 20%, 15 districts with 6-19% and seven districts with 1-5% antigenemia. The disease is more prevalent in Terai areas than in the hills.

Thus, based on the public health importance of lymphatic filariasis, the WHO has made a global call for the elimination of LF by 2020, following which government of Nepal has also expressed commitment towards it and has put forward its effort for lymphatic filariasis elimination to 2015.

The Government of Nepal has expressed a commitment to work for the LFE following WHO's Global and Regional calls of LFE by the year 2020 [12]. A tentative plan of action for the elimination of LF in Nepal is in place. To action this, and to prioritize the districts for the implementation of LFE, it becomes crucial to know the exact prevalence of LF for the entire country through WHO recommended standard techniques. This study planned to give the exact picture of LF prevalence in Dhanusha District where mass drug administration (MDA) has been planned in the second year (2004) of the first phase of the LF elimination program by the Government of Nepal.

## Materials and methods

Volunteer participants in the 6-75 year-old group, from randomly selected houses of Mahendranagar VDC, in three clusters (Mahendranagar Main Market, Hariharpur Tole

and Kuchai Tole), and those of Nagrain VDC, in four clusters (Ward Nos 1, 2, 3 and 6), were enrolled and collections of blood samples for thick and thin smears were carried out from 22.00-02.00 hr following standard methodology [6, 13-18]. During sample collection, a questionnaire was also filled out by each participant, to ascertain the chief complaints of the participants and their correlation with lymphatic filariasis. All collected samples were processed and microscopically looked for the presence or absence of microfilaria. Finally, the statistical analysis of the available data was performed to see the significance of the difference between two sentinel sites.

## Result

A total of 1,086 samples were collected from two sentinel sites, of which 468 (43.1%) were from Mahendranagar VDC and 618 (56.9%) from Nagrain VDC, respectively. In Mahendranagar, 237 (50.6%) samples were from female, and 231 (49.4%) were from male, volunteer participants. Similarly, in Nagrain VDC, 357 (57.8%) were from female, and 261 (42.2%) were from male, volunteer participants. It has been observed that the male and female volunteers participated almost equally in both VDCs. It was found that participation of the volunteers of age group 15-50 were highest in this study.

In Mahendranagar, the prevalence of lymphatic filariasis was found to be nearly the same for both sexes. However, in both sexes, the age group 16-45 was found to be the most prevalent age group.

Similarly, in Nagrain, the prevalence of lymphatic filariasis was found to be higher in females (2.8) than males (1.5). However, the age group 16-45 was found to be the most prevalent age group.

In Mahendranagar, the highest prevalence of microfilariae was found in scheduled caste, a group of people with traditional practices of living and treatment practices (8.5%), followed by Muslim (7.8%). The next affected groups were Brahmin, Chhetri and Newar.

Similarly, in Nagrain, the highest prevalence of microfilariae was found in Chhetri (2.9%) and Vaishya (2.9%). The next affected groups were

**Table 1** Age and sex distribution of microscopic LF-positive cases.

Age group	Mahendranagar				Nagrain			
	Male		Female		Male		Female	
	Sample	%	Sample	%	Sample	%	Sample	%
	examined	positive	examined	positive	examined	positive	examined	positive
< 15	84	3.6	79	3.8	77	1.3	78	3.9
16-25	62	11.3	42	4.8	71	0	85	4.7
26-35	32	0	59	6.8	48	6.3	107	0.9
36-45	36	5.6	33	3.0	32	0	51	3.9
46-55	18	5.6	9	0	22	0	22	0
56-65	3	33.3	6	16.7	7	0	12	0
>65	2	0	3	0	4	0	2	0
Total	237	5.9	231	4.8	261	1.5	357	2.8

**Table 2** Distribution of LF in different ethnic groups.

Ethnic group	Mahendranagar		Nagrain	
	Samples tested	Positive (%)	Samples tested	Positive (%)
Brahmin	68	3 (4.4)	221	4 (1.8)
Chhetri	65	3 (4.6)	205	6 (2.9)
Vaishya	159	5 (3.1)	103	3 (2.9)
Newar	17	1 (5.9)	0	-
Muslim	77	6 (7.8)	40	0 (0.0)
Scheduled caste	82	7 (8.5)	49	1 (2.0)
Total	468	25 (5.3)	618	14 (2.3)

**Table 3** Geographical distribution of positive cases according to the location of their stay.

Ward No/Tole	Mahendranagar		Ward No/Tole	Nagrain	
	Samples collected	Positive (%)		Sample collected	Positive (%)
Main Market (MM)	183	9 (4.9)	1	65	2 (3.1)
Hariharpur (HP)	159	9 (5.7)	2	100	3 (3.0)
Kuchai Tole	126	7 (5.6)	3	253	3 (1.2)
			6	200	6 (3.0)
Total	468	25	Total	618	14

Brahmin and scheduled caste.

In Mahendranagar, 183, 159 and 126 samples were collected and analyzed from the Main Market, Hariharpur and Kuchai Tole, respectively. The prevalence of microfilariae was found to be almost similar in Hariharpur (5.7%) and Kuchai

Tole (5.6%). The prevalence of microfilaria in Main Market was found to be 4.9%.

In Nagrain, of the 65, 100, 253 and 200 samples collected and studied from Ward nos 1, 2, 3, and 6, respectively, the prevalence of microfilariae was found to be 3.1, 3.0, 1.2 and

3.0%, respectively.

## Discussion

This prevalence study of lymphatic filariasis is based on two sentinel sites in Dhanusha District (Mahendranagar and Nagraim VDCs), situated in the east of central Nepal. Most houses in the area have mud walls and thatched roofs. Due to high illiteracy and poverty levels, people do not use bed nets. In this study, the individuals of age group 6-75 were considered. The study was conducted during the period June-July 2002, after meeting with local people and village chiefs before starting the work. In Mahendranagar, three communities: Main Market, Hariharpur and Kuchai Tole were studied, collecting 183, 159, and 126 samples, respectively, from the volunteer participants. In Nagraim VDC, a total of 65, 100, 253 and 200 samples were collected from four different communities covering Ward Nos 1, 2, 3 and 6, respectively.

Of the 618 samples of Nagraim VDC, 14 (2.3%) were found positive, while among the 468 samples collected from Mahendranagar VDC, 25 (5.3%) were found positive for *W. bancrofti*, respectively. Other filarial parasites, for example, *B. malayi*, *Loa loa*, etc were not found in this study.

The study shows microfilariae were found in all age groups. However, the prevalence in the age group 16-45 years was higher than the others. This is because, at the age between 16-45 years people are considered to be the most physically fit and able to do laborious work, hence spending most of their time doing outdoor work, which leads to a higher risk of being bitten by mosquitoes. Besides, at this age, hormone function is at its peak level. It is already known that a special kind of smell leads to mosquito attack. Maximum attraction is caused by high level of hormone function in the host [7].

The study showed that there was no significant difference in lymphatic filariasis between males and females.

In the ethnic group wise distribution in Mahendranagar, the highest prevalence of filariasis was found in ethnic scheduled caste (8.5%) followed by the Muslim (7.8%). Similarly, in Nagraim the highest prevalence of microfilariae was found in

Chhetri (2.9%) and Vaishya (2.9%), followed by Brahmin and ethnic scheduled caste peoples.

In Nepal, very few surveys of lymphatic filariasis have been undertaken in the past. Jung [7], in a cross-sectional survey, found the prevalence ranging from 0-17.8% in nine different sites of central Nepal. Pradhan *et al* [8], in a study in Gokarna, Kathmandu, found an endemicity rate of 24.6%. Bista *et al* [9], in a situation analysis study in 1995-1996, recorded lymphatic filariasis rates of 13.2-23.4% in different regions of Nepal. Recently, Scherchand [11], epidemiologically mapping lymphatic filariasis in 37 districts, found 11 districts with above 20%, 15 districts with 6-19% and seven districts with 1-5% antigenemia. The disease is more prevalent in Terai areas than the hills.

The prevalences of 5.3% and 2.3% in Mahendranagar and Nagraim VDCs were similar to the findings of Jung [7], but they were considerably lower than the findings of Pradhan *et al* [8]. This may be because of the differences in geographical location between the two study sites.

The prevalence of around 6% at one of the sentinel sites in Dhanusha District is similar, but somewhat lower than the findings of Scherchand [11]. It may be because the result of this study is based on the microscopic demonstration of parasites in patient blood, whereas Scherchand used ICT MF for detection of antigen secreted by the parasite, which may be cross-reactive with other similar antigens, since the specificity of the ICT kit, as stated by the kit manufacturer, is around 85-95%.

## Conclusions

Lymphatic filariasis is an ancient problem and still exists in many parts of Nepal, especially in the Terai region, mainly because of high humidity, water stagnancy due to fishponds and lack of proper hygienic practices. Another possible reason for increasing prevalence and incidence is the open free border with India's plain region, where a large number of people cross freely every day. There may also be cross-border transmission of disease by the host itself. The present study, conducted between June-July 2002, showed the prevalence of lymphatic filariasis in Mahendranagar was 5.3%, and in Nagraim it was

2.3%. The global program for the elimination of lymphatic filariasis, including the mass drug administration program in Nepal, should be based on the best-represented epidemiological data. To date, epidemiological mapping of the whole country for the prevalence of LF has not yet done. Therefore, performing nationwide mapping for LF before, or in the first phase of, implementing the global elimination program for lymphatic filariasis may be vital in LFE.

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