Prevalence of *Wuchereria bancrofti* Infections in Tokha-Chandeshwori Village Development Committee, Kathmandu, Nepal

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Abstract

Bancroftian filariasis is endemic in many areas of Nepal. This study describes the infection and intensity of *Wuchereria bancrofti* in the Kathmandu valley. The real burden of *Wuchereria bancrofti* in most endemic areas remains unknown even through it is a major public health problem in many communities, particularly semi-urban areas of Nepal. This study describes the infection and intensity of *Wuchereria bancrofti* in Tokha-Chandeshwori VDC, the Kathmandu valley. The nocturnal periodicity of the parasite requires parasitological examinations to be done at night. The aim of this study was to develop and validate rapid epidemiological assessment tools for the community diagnosis of *Wuchereria bancrofti* that maybe used in the future to determine the distribution of the disease and identify high-risk communities in Nepal. A survey of 978 nocturnal blood film in this VDC indicated an overall prevalence of 5.8% for microfilaraemia. And crude disease rate of *Wuchereria bancrofti* was recorded to be 13.0% in the study area. The highest microfilaraemia infection rate was recorded as 11.8% among age group of 40-49. And the highest crude disease rate was recorded 36.4% in the age group of 70 and above.

Keywords: Filariasis; Wuchereria bancrofti; prevalence; Infection Tokha- Chandeshwori; Nepal.

Introduction

Wuchereria bancrofti in its various forms continues to be public health problem of considerable magnitude in many parts of Nepal. Occurrence of lymphatic filariasis in Nepal is reported from outpatient attendance in health institutions (Hospitals and Health Posts) located in urban and semi-urban areas. But, no national study on the prevalence and distribution of lymphatic filariasis and the epidemiology of the disease including that of vector has been conducted in a systematic manner yet. As there are many unresolved problems concerning the transmission of infection as well as treatment and control of the disease, filariasis control has not been given a priority by the Nepalese Government. In most parts of Nepal, real data on the distribution of the disease are not widely available, primarily because
the standard procedures for assessing communities at risk of the disease are cumbersome, time-consuming, expensive and very intrusive (WHO, 1992). In most endemic areas the parasite exhibits nocturnal periodicity and thus parasitological examination need to be done at night. This becomes logistically cumbersome to organize and communities often refuse to co-operate. As a result very few studies have been done on filariasis in Nepal. One brief epidemiological study was conducted covering different eco-topographical areas in the year 1973 in the Central Region of Nepal. The study reported the prevalence of lymphatic filariasis and has also detected Cx. *quinquefasciatus* asa vector in all the surveyed areas (Jung, R.K. 1973). The other one, the epidemiological study, was conducted to determine the prevalence of lymphatic filariasis in Gokarna VDC of the Kathmandu valley. The overall microfilaria infection and crude disease rate of *Wuchereria bancrofti* were recorded to be 12.75 and 11.95 percent respectively in the study area (Pradhan, *et. al*., 1998).

This paper reports the findings of the study conducted at Tokha-Chandeshwori Village Development Committee (VDC) in the Kathmandu valley. The study describes the relationship between transmission intensity and infection and disease due to *wuchereria bancorofti* in endemic areas. Several factors may regulate the outcome of infection in bancrofian filaraisis. People's knowledge about transmission and prevention of filariasis is also very poor. Elephantiasis and lymphoedema are the most commonly recognized consequences of bancrofian filaraisis infection. Genital damage especially hydrocele (fluid filled balloon-like enlargement of the sacs around the testes) and elephantiasis of the penis and scrotum in men, and the breasts in women, occurs much more frequently but is generally kept hidden. More common but only recently recognized is the hidden damage to the kidneys and the lymphatic system of infected individuals.

Objective

a) To determine *Wuchereria bancrofti* microfilaraemia distribution, prevalence and intensity in the study areas.

b) To assess the overall manifestations of the infection in the community.

Material and Methods

Study area

Tokha-Chandeshwori Village Develop-ment Committee, a semi-rural setup, in Kathmandu district, is situated in the northeast corner of the Kathmandu valley, approximately 10 Kilometers from downtown Kathmandu City. The northeast & west of the areas are forested and hilly. The study areas: 9 wards, (communities) have a population of about 3,381 and the Newar ethnic group inhabit predominately. More than 79.3% of inhabitants are engaged in farming. The houses are constructed in a cluster having open drains with polluted water, which are highly suitable for the breeding of *Cx. quinquefasciatus*, the vector of filaria.

The study was conducted between July 1998 to November 1998 to determine the prevalence of crude disease rate, the microfilariae infection rate. In all, a total of 978 blood samples were collected from the inhabitants (all ages) attending the designated camp-site, one each in the selected wards (communities) covering about 28.9 % of the population of the area. With the co-operation of village health workers, social workers and the chairman of each ward of the Tokha-Chandeshwari VDC, nine (9) campsites (each wards) were arranged for the survey. All individuals were clinically examined and had a blood samples taken for detection of microfilariae. Both clinical and laboratory examinations were done concurrently at night (between 21.00 PM. to 01.00 AM.) because of the nocturnal periodicity of the parasite. Clinical examination of all individuals was carried out by the physician (Upreti, R.P.), and included examination of lymphoedema/elephantiasis of the limbs, hydrocele (in males) and breast lymphoedema/elephantiasis (in females). Also the name, age, sex including the signs and symptoms, history (Adenolymphangitis, and recurrent infection or the newly recognized sub-clinical abnormalities of lymphatic and renal function) of each individual was recorded. A finger-prick, thick and thin blood film, were prepared using 20 l'l of blood and stained with Giemsa's stain at pH 8.2. The entire film was examined and all microfilariae counted and recorded. As a quality control measure, 20% of all slides were randomly selected and re-examined 'blindly'. The few films for which the readings were different had very low-density for microfilaraemia. All members (infected persons) of the Tokha-Chandeshwori Village Development Committee of each ward were treated using the current World Health Organization (WHO) recommended treatment regimen of DEC. The recommended dose is 6-mg/kg by body weights daily, in three-divided dose after food, for 12 days and thereafter followed in the Teaching hospital, Maharajgunj, Kathmandu, Nepal. For this study ethical clearance was obtained from Nepal Health Research Council (NHRC), Kathmandu and permission for blood sampling was received from all individuals, and in the case of children, from their guardians.

Statistical analysis was carried out using Epi-Info. The community prevalence of clinical filariasis and of microfilaraemia were standardized by age and sex using the total population of the communities from the census data as the standard population (Kirkwood, 1998). The Pearson correlation coefficient was used to assess the closeness of association between the prevalence of disease and the prevalence and intensity of infection.

Data collection techniques

We conducted a pilot study to test rapid assessment procedures for the community diagnosis of bancroftian filariasis in some semi-rural communities in the Kathmandu valley. The assessment criteria included direct key informant interviews, focus group discussions, routine reporting form health facilities, self-administered questionnaire, and a purposive examination of adult males for hydrocele. All the data collection methods were easy, convenient, non-invasive to use and acceptable to the community. The study provided reliable estimates of the burden of bancroftian filariasis in the community when compared with the data standard epidemiological surveys. The direct key informant interviews and focus group discussions gave a broad perspective of the burden of diseases in the community in general, and bancroftian filariasis in particular. The use of self-administered questionnaire provided data comparable with data on elephantiasis in the community from a case search.

Result

A total of 978 individuals were summed for microfilaraemia (table I & II). The study describes the relationship between transmission intensity and infection and disease due to *Wucherieria bancrofti* in
an endemic area (Tokha–Chandeshwori VDC) of Kathmandu, Nepal. The prevalence of microfilaraemia in the

study population was 5.8%. The study population was clinically assessed for elephantiasis (limbs, breast, genitalia) and hydrocele. Of the total 9.6%, 3.4 were found respectively (elephantiasis and hydrocele) with total clinical signs and symptoms of the disease. Of the total blood samples examined, 57-blood samples of 38 males (66.7%) and 19 females (33.3%) were found to be positive for microfilariae. Among the infected persons, the ratio of male to female was about 2:1. The overall human microfilariae infection rate was recorded to be 5.8% (male7.4% and female 4.1%) at the time of study. The number of microfilariae present in each positive blood sample was counted to determine the density (geometric mean).

Table I: Age and sex standardized prevalence of disease and infection rate of study area, 1998.

Ward	***Male* l'**				***Female* l'**		
No.	*No. of person examined*	*Microfilaraemia*	*Elephantiasis*	*Hydrocele*	*No. of person examined*	*Microfilaraemia*	*Elephantiasis*
1	**136**(51.7)	10(7.4)	13(9.6)	11(8.1)	**127**(48.3)	6(4.7)	16(12.6)
2	**101**(60.1)	7(6.9)	9(8.9)	2(2.0)	**67**(39.9)	3(4.5)	13(19.4)
3	**76**(46.3)	5(6.6)	2(2.6)	2(2.6)	**88**(53.7)	2(2.3)	7(8.0)
4	**27**(55.1)	5(28.5)	3(11.1)	5(18.5)	**22**(44.9)	1(4.5)	3(13.6)
5	**28**(57.1)	1(3.6)	0(00.0)	2(7.1)	**21**(42.9)	1(4.8)	0(00.0)
6	**28**(51.9)	2(7.1)	3(10.7)	0(00.0)	**26**(48.1)	0(0.0)	2(7.7)
7	**72**(53.3)	5(6.9)	5(6.9)	7(9.7)	**63**(46.7)	4(6.3)	3(4.8)
8	**30**(54.5)	2(6.7)	4(13.3)	1(3.3)	**25**(45.5)	1(4.0)	4(16.0)
9	**15**(36.6)	1(6.7)	3(20.0)	3(20.0)	**26**(63.4)	1(3.8)	4(15.4)
Total	**513(52.5)**	**38(7.4)**	**42(8.2)**	**33(6.4)**	**465(47.5)**	**19(4.1)**	**52(11.2)**

Table Ia.

Ward	*Community*	***Total: Male and Female* l'**				
No.		*No. of persons examined*	*Microfilaraemia*	*Elephantiasis*	*Hydrocele*	*Total chronic disease* β
1	Yalag Tole	**263**(26.9)	16(6.1)	29(11.0)	11(4.2)	40(15.2)
2	Thalag Tole	**168**(17.2)	10(6.0)	22(13.1)	2(1.2)	24(14.3)
3	Tothilag Tole	**164**(16.8)	7(4.3)	9(5.5)	2(1.2)	11(6.7)

4	Tothilag Tole	**49**(5.0)	6(12.2)	6(12.2)	5(10.2)	11(22.4)
5	Tothilag Tole	**49**(5.0)	2(4.1)	0(0.0)	2(4.1)	2(4.1)
6	Tothilag Tole	**54**(5.5)	2(3.7)	5(9.3)	0(0.0)	5(9.3)
7	Ekulag Tole	**135**(13.8)	9(6.7)	8(5.9)	7(5.2)	15(11.1)
8	Ekulag Tole	**55**(5.6)	3(5.5)	8(14.5)	1(1.8)	9(16.4)
9	Tothilag Tole	**41**(4.2)	2(4.9)	7(17.1)	3(7.3)	10(24.4)
Total		**978(100.0)**	**57(5.8)**	**94(9.6)**	**33(3.4)**	**127(13.0)**

l' Percentage in parentheses.

β Hydrocele plus all elephantiasis (limbs, breast, genitalia).

Table II: Age and sexwise distribution of samples in microfilariae and clinical surveys in study population, 1998.

Age	***Male* l'**				***Female* l'**		
group	*No. of person examined*	*Microfilaraemia*	*Elephantiasis*	*Hydrocele*	*No. of person examined*	*Microfilaraemia*	*Elephantiasis*
00-09	**67**(13.1)	1(1.5)	1(1.5)	0(0.0).	**55**(11.8)	0(0.0)	2(3.6)
10-19	**198**(38.6)	15(7.6)	11(5.6)	11(5.6)	**156**(33.5)	3(1.9)	9(5.8)
20-29	**122**(23.8)	11(9.0)	6(4.9)	12(9.8)	**92**(19.8)	2(2.2)	9(9.8)
30-39	**47**(9.2)	2(4.3)	5(10.6)	2(4.3)	**58**(12.5)	5(8.6)	13(22.4)
40-49	**22**(4.3)	4(18.2)	6(27.3)	1(4.5)	**29**(6.2)	2(6.9)	4(13.8)
50-59	**27**(5.3)	3(11.1)	6(22.2)	4(14.8)	**36**(7.7)	3(8.3)	5(13.9)
60-69	**19**(3.7)	1(5.3)	4(21.1)	2(10.5)	**28**(6.0)	3(10.7)	6(21.4)
70-79	**11**(2.1)	1(9.1)	3(27.3)	1(9.1)	**11**(2.4)	1(9.1)	4(36.4)
Total	**513(52.5)**	**38(7.4)**	**42(8.2)**	**33(6.4)**	**465(47.5)**	**19(4.1)**	**52(11.2)**

Table IIa.

Age	*Total : Male and Female* l'				
group	*No. of person examined*	*Microfilaraemia*	*Elephantiasis*	*Hydrocele*	*Total chronic disease* β
00-09	**122**(12.5)	1(0.8)	3(2.5)	0(0.0)	3(2.5)
10-19	**354**(36.2)	18(5.1)	20(5.6)	11(3.1)	31(8.8)
20-29	**214**(21.9)	13(6.1)	15(7.0)	12(5.6)	27(12.6)
30-39	**105**(10.7)	7(6.7)	18(17.1)	2(1.9)	20(19.0)
40-49	**51**(5.2)	6(11.8)	10(19.6)	1(2.0)	11(21.6)
50-59	**63**(6.4)	6(9.5)	11(17.5)	4(6.3)	15(23.8)
60-69	**47**(4.8)	4(8.5)	10(21.3)	2(4.3)	12(25.5)
70-79	**22**(2.2)	2(9.1)	7(31.8)	1(4.5)	8(36.4)
Total	**978(100.0)**	**57(5.8)**	**94(9.6)**	**33(3.4)**	**127(13.0)**

l' Percentage in parentheses.

β Hydrocele plus all elephantiasis (limbs, breast, genitalia).

Clinical cases

Survey of clinical filarial cases in the Kathmandu valley hospitals was done. The reported cases from outpatient department of different hospitals (TU Teaching Hospital, Bir Hospital, Patan Hospital and Tropical Disease Hospital, Teku) were collected (table III). Additional information was collected from different village development committees (VDCs) and municipality offices.

Table III: Clinical survey of filarial cases in the Kathmandu Valley Hospitals 1994-1998 (Five years).

S.	*Year*	***Teaching Hospital***		***Bir Hospital***		***Patan Hospital***		***Teku Hospital***	
No		*Hydrocele*	*Lymphoedema/ Elephantiasis*	*Hydrocele*	*Lymphoedema/ Elephantiasis*	*Hydrocele*	*Lymphoedema/ Elephantiasis*	*Hydrocele*	*Lymphoedema/ Elephantiasis*
1	1994	11	15	15	-	35	-	-	5
2	1995	05	13	10	-	42	-	-	8
3	1996	01	25	18	-	49	-	-	01

4	1997	09	22	20	-	40	-	-	6
5	1998	01	24	18	-	15	-	-	3
Total		**27**	**99**	**81**	**-**	**181**	**-**	**-**	**23**

Discussion

A total of 978 subjects were clinically examined and looked for the microfilariae in blood film. Of the total, 57 subjects were positive for the parasite. The average microfilariae density per individual blood sample was recorded to be 13.5. The highest number of microfilariae was observed to be 43 per 20 l'l blood and the lowest was 1 per 20 l'l blood. The highest microfilariae infection rate was 11.8% & 12.2% recorded in the age-group of 40-49 & ward No. 4 respectively and the lowest rate was 0.8% & 3.7% in the age-group of 0-9 & ward No. 6 respectively. The youngest person found infected with microfilariae was a 2-years old boy and the microfilariae count was 3 per 20 l'L blood, and the oldest person was 75 years old and the microfilariae count was 16 per 20 l'l blood. The details of microfilariae infection rate in different age group and ward-wise are presented in table I & II.

Prior to the collection of blood samples, each individual was subjected through clinical examination for the filarial manifestations. Out of 978 persons examined, 127 persons (male -75 and female -52) were detected having signs and symptoms of lymphatic filariasis. The signs and symptoms were lymphoedema / elephantiasis of the limbs, hydrocele (in males) and breast lymphoedema / elephantiasis (in females). The overall crude disease rate was recorded to be 13.0 % (male -59.1% and female- 40.9%) in the population of the study area. The highest crude disease rate was recorded to be 36.4% & 24.4% in the age-group of 70-79 & ward No. 9 respectively and the lowest rate was recorded to be 2.5% & 4.1 % in the age-group of 0-9 & ward No. 5 respectively. The overall endemicity rate in the population of study area was found to be 18.8%, which is very high. The crude disease rates in different age-group & ward-wise is spelled out in table I & II.

Conclusion

One significant finding which is worth to be highlighted is that 57 persons were found to be positive but only 32 persons have overt disease manifestation, except 25 persons none of them had any signs and symptoms of filarial manifestation. Clinical examination has shown 127 persons with disease manifestation out of the same 978 persons.

In conclusion, the results of this cross-sectional epidemiological study suggest that environmental factors related to exposure play a crucial role in deciding the infection status of the microfilariae. However, detailed environmental risk factor assessment in relation to the infection/disease (filariasis) is in process. Present finding suggests further immuno-epidemiological studies to be carried out.

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