I

INTRODUCTION

Lymphatic filariasis, also known as elephantiasis is a parasitic disease caused by nematodes inhabiting the lymphatic. It is a dramatically disabling disfiguring disease.

Wuchereria bancrofti , *Brugia, malayi* and *Brugia timori* cause lymphatic filariasis and are also responsible for the mobidity. *W. bancrofti* is the main cause of Lymphatic Filariasis (LF) in Nepal (Thakur 2000).

The World Health Organization (WHO) has identified lymphatic filariasis as the second leading cause of permanent and long-term disability in the world after leprosy. WHO has named filariasis as one of the six potentially eradicable infectious diseases, and initiated a program in 1997 to eliminate lymphatic filariasis globally as a public health problem.

It is estimated that the LF is endemic in some 80 countries including 120 million people (WHO 2000) in which more than 15 million people suffered from elephantiasis/lymphoedema, 27 million from hydrocoel, 83 million people from lymphatic functional disability and 30 million from renal pathology.

In 2002, national programs were active in 38 out of the 80 countries where LF is endemic, reaching almost 90 million people. The expansion required to meet the targets of reaching 350 million people by 2005 and all 1.1 billion at risk globally by 2020 is now the major challenge of what has become the global program to eliminate lymphatic filariasis, coordinated by the WHO and supported by a global alliance of partners (Ottesen 2002). For any country to be successful in eliminating lymphatic filariasis from its territory, the first epidemiologic approach to be adopted

is to assess the current magnified and geographic distribution of the disease.

Filariasis has been eradicated from several small islands and has been dramatically reduced in China. In one of the previously endemic provinces of China, the prevalence of microfilariae is less than 1% and active control has been replaced by surveillance alone. While in endemic areas like India where 90% of all cases were accounted for Lf, there has no decline in filariasis infection during the last 10 years and in several areas there has even been an increase control strategies including various combinations of vector control.

Vector control methods, which have been applied successfully, include killing of mosquitoes or “adulticiding” (there have been many instances where malaria vector control had a major impact of filariasis transmission); killing of larvae, or “larviciding” for example under certain condition, the use of polystyrene beads can be highly effective in *Culex* larval control and environmental management.

For more than 40 years, the chemotherapy of filariasis has been based on treatment with diethylecarbamazine (DEC), using a large number of different dosage schedules. Longitudinal studies indicate that repeated treatment with DEC may result in a significant reduction in the incidence of acute attacks and in the risk of developing chronic disease control with DEC can involve mass treatment of all eligible in community, or selective treatment of those who are diagnosed as micro filarial positive during night blood surveys. Selective treatment is expensive, but ensures better compliance. The main problem with mass treatment has been compliance with the 12 days treatment schedule. Recent encouraging results of single dose regimens with DEC are, therefore, of great practical interest. Excellent results have been achieved in some areas (especially in China)

with DEC medicated salt when it could be ensured that no other salt was used in the community during a period of six months or more.

In most of the world's endemic areas, there are still no any effective filariasis control measures. This is mainly because filariasis has not been regarded as a public health problem and most control strategies are too complicated and expensive to be sustained. In the past, parasite control and transmission control have eradicated filariasis in several endemic areas. However eradication will be very difficult to achieve in most places. It will be more appropriate to focus first on the development and implementation of simple, cost effective and sustainable strategies for morbidity control (Ramchandran 1993).

Control of lymphatic filariasis leading to its dimension is based on controlling transmission of the parasite and on preventing the consequences of disease.

If transmission of filariasis can be controlled, new infections will stop altogether. Interruption can be achieved by treating the affected population to eliminate the microfilaria and by reducing human vector contact, or both. The specific means for controlling transmission may vary from one area to another. This depends on the parasite, vector situation, the existing health care services and infrastructure, the availability of funds and local culture.

Even when microfilariae have been eliminated in an individual, the adult worms and external microbial pathogens can continue to induce lymphatic pathology and secondary infection. Infections can still be symptomatic as they are dying out, and damage lymphoedmatous limbs. Attention to the problem of clinical disease can alleviate suffering and limit disability in infected persons while control of transmission is being established. Experiences have shown that these efforts help considerably

in enlisting the full cooperation of the public in filariasis control campaigns (WHO 1997).

At present 1.1 billion people (20% of the world's population) is some 80 endemic countries located in tropical areas of the world are at risk of infection by *Wuchereria bancrofti* and *Brugia malayi* (Micheel *et al.*, 1996). The problem of Lymphatic filariasis is found to be graved in India, Indonesia and China. These three countries together account for more than two third of the total infected population. India alone accounts for around 50 percent of the total cases occurring worldwide. In India most of the cases are due to bancroftian filariasis (Ghai and Gupta, 1999).

Although bancroftian filariasis is rarely life threatening, it causes much suffering and disability. It represents a significant impediment to economic development as a result of lost working hour, and the costs of treating the sick and controlling the vectors of disease (Rozendaal 1999).

Outward manifestation of bancroftian filariasis such as lymphoedema occurs in a relatively small proportion of infected people in filariasis endemic areas, and usually several years after infection with the parasite. Thus, infection status is largely "hidden" because of the hidden nature of disease (Dreyer 1997). Its magnitude and public health impact are often not recognized by government officials, even in the areas of intense transmission. Nepal is also not an exception.

Nepal is bordered along with its eastern, southern and western sides by India's states. Sikkim, West Bengal, Uttar Pradesh, Uttaranchal, and Bihar of India are mostly affected areas with bancroftian filariasis (Park 2000).Since the border of Nepal with India is open, the movement of people from both the sides across the border is very common. Besides that the climatic condition of the terai belt of Nepal is very similar to that of the border states of India. Based on these facts, one can easily

visualize the bancroftian filariasis endemicity in Terai belt of Nepal. A proof for this is the record of high OPD cases of bancroftian filariasis in the terai hospitals. The hill and mountain districts are also not free from the disease.

Filariasis has been known to be the endemic in different areas of Nepal since a long time. Due to the lack of information, it becomes difficult to give an accurate estimation of its prevalence. At present, out of total population of Nepal (23.2 million approximately), 60% (13.9 million) are estimated to be at the risk of infection.

Out of three species of lymphatic filarial parasites, only one species *W. bancrofti* has been reported in Nepal (Thakur 2000)

The previous works on filariasis were performed by Jung (1973), Pradhan *et al.*, (1997), Bushal *et al.*, (2000), Bista *et al.*, (2000) and Manandhar (2001).

More recently, Ghimire *et al.*, (2003) studied the prevalence of lymphatic filariasis in an endemic district, Dhanusha of Nepal.

Hence the prevalence of lymphatic filariasis is seen at different places of Nepal, mainly in Terai region where the mosquito easily complete its life cycle. It may be due to geographical and climatic variation. In view of this, it is highly pertinent to enquiry the status and situation of filariasis. So to deal more efficiently with the problem, to establish the epidemiology of the disease in different regions of Nepal and to find the prevalence of the infection on the basis of age, sex, ethnic groups and attitude of the people regarding this view, the present study has been under taken, in the Rauthat district which is also a most filariasis effected district of Nepal.

II

OBJECTIVES

General Objective

To determine the situation of microfilariaemia in (Sirsiya) ward no. 13, Gaur municipality of Rauthahat district and to provide the data which may be helpful in the prevention, control and treatment of the disease

Specific Objectives

- To determine age-wise and sex-wise prevalence filarial parasites
- To study the knowledge, attitude and practices of people towards the disease
- To determine the filarial situation in relation to socio-economic status of the people
- To determine the asymptomatic and symptomatic filariasis cases in the community people
- To determine the acute and chronic filarial infection

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III

LITERATURE REVIEW

Global Situation of Filariasis

More than 15 million people suffered from elephantiasis, 27 million from hydrocoel and 83 million from renal pathology. It is estimated that LF is endemic in some 80 countries including 120 million people (WHO 2000). The parasitic disease LF is a major global and socioeconomic burden in the tropics and subtropics. Approximately one third of people with this infection live in India, Africa, and South East Asian countries, More than 1.1 billion people i.e. 20 % of the worlds population live in the areas where they are at the risk of infection from lymphatic filarial parasites out of which 90% of the infection is caused by *W. bancrofti* and 10% by *Brugia malayi* (WHO 1997). In South East Asian region, about 600 million people live in the endemic areas constituting about 60% of the global burden.

Some Recent Findings

* Poin *et al*., (2005) studied the individual factors associated with the presence of microfilariaemia. The results of the data analysis confirm that the acquisition of microfiloriaemia is gender-dependent (male generally being more likely to be microfilaraemia than females) and indicates that in males, a high level of exposure to infective larvae determines the shift from a microfilariaemic to microfilariaemia status.

* Jamail *et al*., (2005) studied about field validation of sensitivity and specificity of rapid test for detection of *Brugia malayi* infection. In Sarawak (Malaysia), sensitivity of *Brugia* and rapid dipstick as compared with microscopy of thick blood smears was

87% (20/23; 95/el: 66.4-97.2) where as microscopy showed that the number of infected children was seven times less than infected adults.

* Jang Jan *et al.,* (2004) conducted study retro peritoneos renal pedicle lymphatic disconnection for chyluria. Results, operative time ranged from 69 to 120 minutes (means 95 min.) intraoperative blood loss was 50-180ml (means 85 ml) chyluria disappeared in all patients immediately after operation. Mild hematuria occured in 4 cases within 12 hours and disappeared of 24 hours.

* Anosike *et al.,* (2004) studied human filariasis in Dass local government area of Bauchistate Nigaria significantly among communities, sex, age and various occupational categories ($P<0.05$). Blood filarial parasite showed a low CMFL. (Community Microfilarial Load) of 4.8. Close association was noticed between blood microfilaraemia and means MF density in various age group ($r=0.78$, $R<0.05$).

* Keylem *et al.,* (2004) determined the long term impact of ivermectin on the prevalence of *W. bancrofti* and *Monsonella* on a filarial infected person where the drug was given under community directed treatment strategies. Each subject was checked by a microscopical examination of a smear of night blood by measurement of the level of circulating antigen from adult *W. bancrotii* and by clinical examination of hydrocoel and lymphoedema.

* Towson (2003) studied on *Wolbachia* as a potential tool for suppression filarial transmission. Resultant one uses of *Wolbachia* induced CI (Cytoplasmic Incompatibility) as a form of sterile insect technique, to suppress mosquito population another

envisages the application of CI for population replacement, with the intension of preventing the transmission of human pathogens.

* Chadee *et al.,* (2003) studied on filarial infection in georgetown, South America. They conducted one year survey of febrile patient attending filariasis (Night) clinic. Total of 769 thick blood smears were collected of which 103 were positive for *W. bancrofti*, and the age group and sex of infected person were also described.

* Barkot *et al.,* (2003) studied on the progress and challenges for the elimination of filariasis from Pacific Island communities. The Pacific Programme for Elimination of Lymphatic Filariasis (Pac. E.L.F). The first regional campaign as attempt to eliminate filariasis of public health problem is using five annual mass drug administration (MDA) of Diethylcarbamazine (DEC) plus albendazole to stop transmission.

* Nuchprayoon *et al.,* (2003) studied on comparative assessment of an Og_4c_3 ELISA and an ICI filariasis test of Myanmar migrants in Thailand. These Og_4c_3 positive cases that were ICT negative CiCT-ve Og_4c_3+ve) has statically significant ($P<0.05$) unpaired t-test lower Og_4c_3 antigen levels (409.5 units) range 117-2,389 than these that were ICT positive (Og_4c_3+ve) (52,520 units range 130-2, 80,622) these antigens detection system are promising tools for the surveillance of bancroftian filariasis.

* Chandrasena *et al.,* (2002) estimated the sensitivity specificity and cost effectiveness of an immunochromatographic card test (ICT AMRAD) for the diagnosis of lymphatic filriasis against two standard parasitological techniques, thick blood film (TBF) and nucleopore membrane filtration (NMF). There were however, no false positives among the non endemic controls indicating the

possibility that the ICT may in fact be more effective than TBF on NMF.

* Witt *et al.*, (2001) reported that LF is first acquired in childhood, often with as many as one-third of children infected before age 5. Initial damage to lymphatic system by the parasites generally remained sub clinical for years or gives rise only to non-specific presentations of adenophagy, however specially after puberty the characteristic clinical features of adult disease syndrome (lymphoedema or hydrocoele) manifest themselves.

* Weerasoriya *et al.*, (2001) reported 4.4% prevalence of microfilariaemia in three suburban area of Matara, in Srilanka, and observed that the prevalence was significantly lower in female than in male and in males aged 20 yrs than in older males over all 9.5% of the subjects had clinical manifestation (6.5% had filarial fever, 3.0% had elephantiasis and 6.2% had hydrocoel. The prevalence of elephantiasis was generally among females (4.2%) than in the males (1.4%).

* Sunish *et al.*, (2001) examined percentage prevalence of microfilaraemia (PPMF) and antigenaemia (PPCFA) in 1999 in 3505 subjects from 3 villages in India. All microfilariaemics were positive for antigenaemia, and PPCFA was decreased steadily from 92% in the age group 2-5 years to 40% in age group 21-30 yrs.

* Omar *et al.*, (2000) reported 10.6% of the overall prevalence of filarial antigenaemia among Indian experiences in Saudi Arabia and concluded that in South Arabia and other Gulf States, where a continuous flow of South and South Eastern workers coming from areas endemic for bancroftian filariasis, the ICT card test may be

useful in monitoring the potential risk of introducing bancroftian filariasis.

* Massaga *et al*., (2000) reported the prevalence of *W. bancrofti* in 31% of 1025 inhabitants (32.1% of female and 31.5% of males. In hale area in Northeast Tanzania, clinically 6-9% of examined individual had elephantiasis and 28.5% males aged 15 years and above had hydrocoele. Both clinical manifestations and microfilaria prevalence increased with age.

* Swoboda Kopec *et al.,* (2000) studied on bacterial infection of skin and tissue in filariasis. Adenolymphangitis is a common occurrence in filarial lymphoedoma. Damage due to the lymphatics and lymphnode by *W. bancrofti* is followed by obliteration of lymph vessel and lymphatic obstruction of lymphatic prevents the bacteria's penetrating skin to be evacuated with lymph stream to regional lymphnodes.

* Pani *et al.,* (2000) evaluated ICT filariasis card rest for its sensitivity and specificity in detecting microfilaria carriers among 189 individual each in filariasis endemic and non endemic areas in south India and compared to both conventional night blood finger thick blood smears examination and venous blood membrane filtration. Though, the specificity of the test was 100% against both techniques.

Filariasis in Nepal

* Jones *et al.,* (1970) reported about three cases of bancroftian filariasis in Kathmandu valley among them one died due to heavy infection of microfilaria.

* Jung (1973) studied all together 9 sites which showed 4.99% to 8.15% *bancrofti* in all age groups and both the sexes in the urban population 6.6% to 10.3% in the semi urban population and 1.2% to 17.8% in rural population similarly 7.1% to 9.16% microfilariae rate was found in urban population 10.03 to 11.3% is the semi-urban population and 0.8% to 17.69% in the rural population.

* Pradhan *et al;* (1997) reported 24.6% endemicity rate with the overall 12.75% microfilaria infection (15.09%) in male and 8.97% in female and 11.95% crude disease rate (8.49%) in male and 16.59% in female of *Wuchereria bancrofti* in Gokarna VDC of KTM and identified 12 species of mosquitoes.

* Bhusal *et al.,* (1998) conducted a survey in Tokha, Chardeshwari VDC of Kathmandu valley. This survey showed the overall 5.8% prevalence of microfilaraemia with highest rate (11.8%) among the age group of 40-49 and 13.0% crude disease rate with highest rate (36.4%) in the age group 70 and above.

* Ghimire *et al*., (2003) studied about prevalence of lymphatic filariasis in an endemic district of Nepal. Study carried out in Mahendranagar and Nagrain VDCs of Dhanusha district in the Terai. At two sites 468 from Mahendranagar and 612 from Nagrain VDCs. 25/468 (5.3%) of Mahendranagar and 14/617 (2.3%) from Nagrain VDC were found +ve for *W. bancrofti* the prevalence was found to be higher in females although the participation of both sexes are almost equal.

* Bista *et al*., (2000) reported the cases of filariasis in out patient clinics of different health institutions and reported through the HMIS during the fiscal year 1995/96 to 1998/99.

* Manandhar (2001) conducted an epidemiological study of MF, in three different geographical regions of Nepal. The study reported 19.9% crude disease rates with highest rates of crude disease infection (38%) in to above age group.

* Tuladhar and Sherchand J. B. (2001) conducted an epidemiological survey in three different geographical regions, viz. Terai (Sipwa, VDC of Rupandehi district), inner Terai (Dovan VDC of Palpa district) and Hill (Katunje, Golmadhi, Itachhen and Byasi of Bhaktapur district) of Nepal. A total of 53 blood samples (10-35%) were found ICT filariasis positive in the study.

* Sherchand J.B. (2002) conducted an epidemiological survey to determine the prevalence of disease due to lymphatic filariasis in Magaragadi VDC Bardia district of Nepal. The prevalence of lymphatic filariasis from 500 samples population showed 141 infective cases with larvae of *Wuchereria bancrofti* which were found to be transmitted by the bite of the mosquito of genus *Culex quinquefaseiutus*.

* Sherchand *et al*., (2003) studied the prevalence of infection by *W. bancrofti* in 37 districts of Nepal from July to December (2001). The study populations were selected above 15 years age of respondents and the immunochromatographic test. ICT prevalence rates above 20% found in 11 districts, 6-19% were found in 15 districts and 0.1-5% were in 7 districts.

The following table gives an outlook of lymphatic filariasis situation in National and Region wise based on annual reports DOHS, MOH, and HMG Nepal from 1995/96 to 2004/2005.

Table A: National and Region Wise Number of Filarial Cases in Nepal of the Fiscal Year 1995/96 to 2004/2005

Year	National	Eastern Region	Central Region	Western Region	Mid Western Region	Far Western Region
1995/96	3100	493	849	789	662	317
1996/97	2636	257	981	736	303	481
1997/98	2371	328	605	976	317	155
1998/99	1744	165	671	913	281	14
1999/00	1797	209	718	632	195	43
2000/01	1632	262	546	692	123	9
2001/2002	1183	142	179	733	79	56
2002/2003	809	63	302	334	64	46
2003/2004	550	47	246	221	20	16
2004/2005	549	25	274	180	50	20

Table B: Distribution of Filariasis Cases According to the Geography of Nepal of the Fiscal year 2004/2005.

Year	Total cases	Mountain	Hill	Terai
2004-2005	549	4	192	353

IV

MATERIALS AND METHODS

Study Area

Nepal is administratively divided into five development regions, 14 zones, and 75 districts. There are 20 districts in the Terai region, 38 districts in hill region and remaining 17 districts are in the mountainous regions.

Rauthat is a terai district situated in Narayani zone of Central Development Region. It is 245 km. far from Kathmandu. It covers 1126 sq. km. including 5, 45,132 populations. In Rauthat district, Hindu population are 4,30,422, Budha, Islam, Kirat, Jain, Shikh, Christian and Bahae are 7815, 12,06,111, 149, 1,209, 120 and 531 respectively. In this district, 88162 households are reported. Rauthat district consists of 97 VDC and only one municipality. Sirsiya, (ward no. 13) of Gaur municipality was site selected for study. Sirsiya village is 3 km. far from Gaur market. Gaur municipality has been divided into 13 wards, has 3,956 households and total population of 25,383 with 13,368 males and 12,015 females. It covers 21.53 sq. km. and population density of 1178.96 per sq. km. Ward No. 13 of Gaur municipality (Sirsiya village) has 424 household including 2,713 population with 1,444 males and 1,269 females. Sirsiya village consists of Brahman, Rajput, Islam, Kaistha, Bhumihar, Bania and Sudi. This study area is surrounded by agricultural fields and forest.

Sample Size

A total of 527 human blood samples from the community people of ward no. 13 of Gaur municipality (Sirsiya village) were included in the survey.

Materials: - Microscopic slides, sterile lancets, cotton wool, gloves, mask, measuring cylinder, dropper, slide box, tooth pick.

Equipment: - Compound microscope.

Reagents: - Methanol, Giemsa stain, 5% Distilled water

Study Design:

Epidemiological cross-sectional survey design was applied as the research tool in this study.

Methods

1. Awareness program
2. Questionnaire survey
3. Blood sample collection and examination

Awareness Program

For awareness program the people of the study area were gathered at one place and were informed about different aspect of filariasis, its blood sample collection time, methods, purposes etc.

Questionnaire Survey

The set of questionnaire contained name, age, sex, occupation, education, marital status, relationship of the respondents with the head of household, surrounding environment and their effects against the disease and causes, respondents correct residence status, knowledge about disease, respondents view about the disease, respondents current health status, clinical symptoms of filariasis in relatives. The questionnaire was prepared, pre tested and piloted before administrating in the community.

These questions were filled by interviewing the respondents, during the evening time and were then informed when to take the blood sample with them.

Human Blood Sampling

By ear prick method

Sampling Technique

During the survey the blood samples were collected at night from 10 am-2.30 am when the people were in relaxed condition in their beds.

To ensure the better condition, the following precautions were taken.

1. During the study, questionnaire were distributed to those respondents who could fill themselves and for those who could not, were filled by interviewing to record their family back ground, economic status, knowledge about the disease and their clinical history of parents.
2. The sample slide, lancet was properly cleaned and dried but no antiseptic was used.
3. Each sampling slides were labeled with code number IA/1HH, 2A/2HH etc. which were coded similar to the questionnaires.
4. About 60 µl of the blood samples were collected from ear lobe to prepare 3 blood smears on one slide only. Each film contained about 20µl. After the blood sample was taken out from the person, thick blood films were prepared immediately and air dried for some times. The slides were then kept in the slide box for microscopic examination.

Blood drops on the slide for thick smear. Thick smears of blood.

Later the blood films on the slides were stained by Giemsa stain. The staining process was done by following method.

a) Dehaemoglobination of thick blood smear:- The thick blood smear were dehaemoglobinized and dried at room temperature.

b) Fixing of blood smear:- The smears were fixed with methanol. The slide was just dipped for about 5 sec. and fixed blood smears were dried at room temperature.

c) Staining of blood smear: - The dehaemoglobinized blood smears were stained in Giemsa stain at 1:10 dilution for 30 minutes and dried.

d) Observation: - The stained blood smears were examined under 5x, 10x, 40x and 100x objective lenses of the compound microscope. The microfilariae were identified as *Wuchereria bancrofti* on the basis of following observation:

Sheath stained, discrete nuclei, empty space between the nuclei and body wall, cephalic space along as it is broad, absence of nuclei at tip of tail, backwardly bent tail tip underneath the body.

Data Processing and Analysis

- Data editing: Data was edited as soon as possible to detect errors, omissions and to make sure that the data were accurately uniformed and well arranged.

- Coding:- Information were coded so that they were easily classified and tabulated.
- Classification and tabulation:- All the data were classified according to the need of the objective and tabulation was done for summarizing the data and displaying statistically.
- Data analysis and interpretation: Data were analyzed by means of table, bar diagram, multiple bar diagram and pie chart.

V

RESULTS

The study was carried out among the filarial suspected and unsuspected people by using cross-sectional sampling method at the (Sirsiya) ward no. 13 of Gaur municipality of Rauthat district from 18 September 2005 to 18 July 2006. The total population of the study area (Sirsiya) is 2713 in which, 527 human population samples were subjected for the filarial examination. These samples belonged to 92 households out of 424 total household.

The study was divided into two parts i.e. questionnaire survey and microscopic examination of blood samples. Both these studies were done in the same human samples. The economical and demographical characteristics of study population were also conducted to know the back ground of respondents.

General Prevalence of Microfilariaemia

Out of 527 people, 29 positive cases of microfilaria were found. Hence the prevalence percentage was 5.5 % (Table 1).

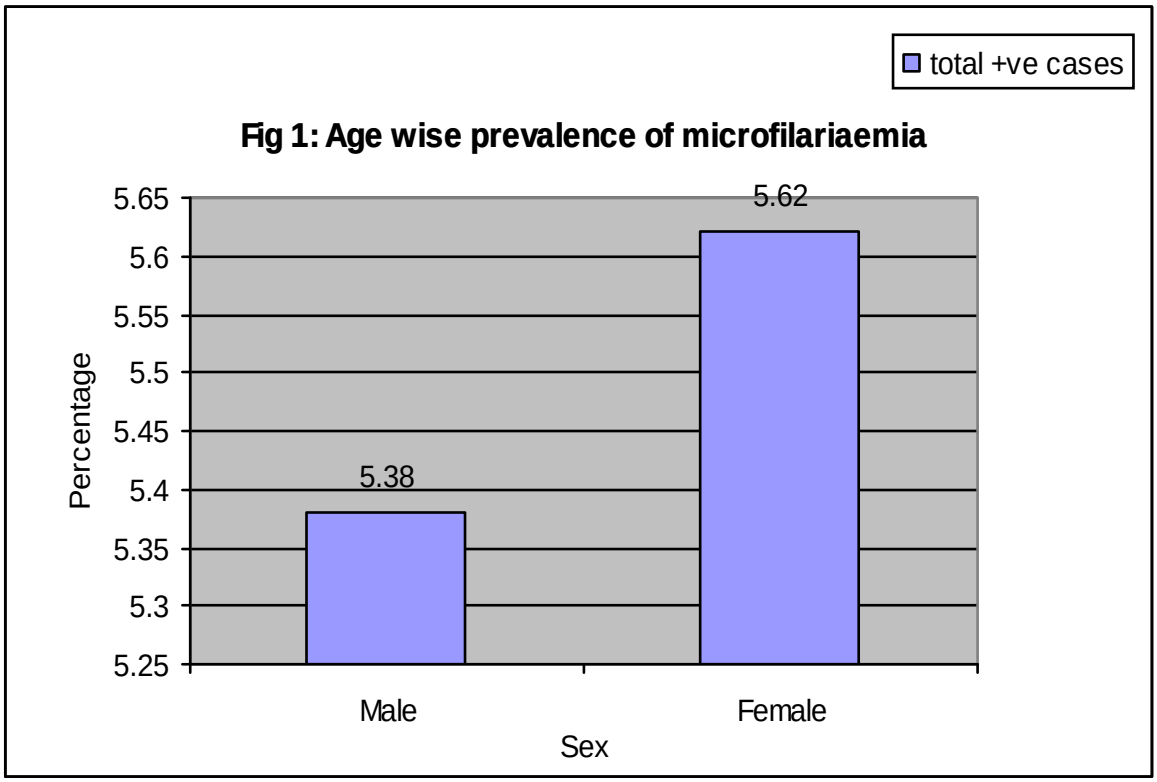
Sex-wise Prevalence of Microfilaria

Among 527 total samples, 29 were positive in which 14 were males and 15 were females (Table 1).

Statistically, the difference between the males and females was found to be insignificant. (χ^2= 0.0137, P>0.05, 3d.f.)

Table 1: General Prevalence and Sex-wise Prevalence of Microfilaria

Sex	Total sample examined	Mf positive	
		No.	%
Male	260	14	5.38
Female	267	15	5.62
Total	527	29	5.5



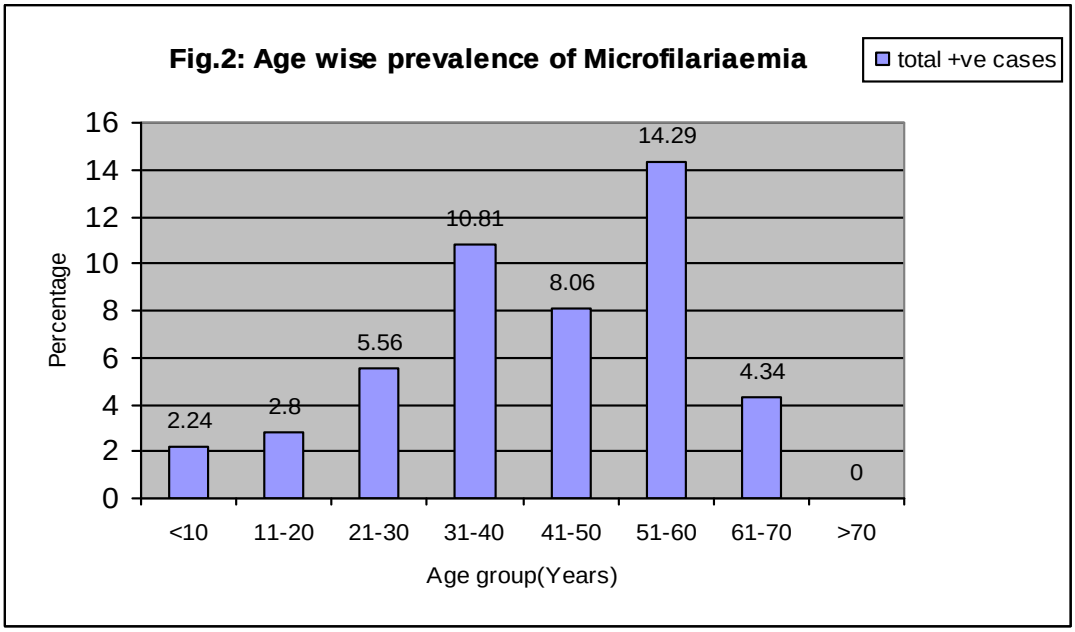
Age-wise Prevalence of Microfilaria

Among 527 total samples the highest number i.e. 134 of blood samples were examined of below 10 years age-group, out of which 3 samples were found to be positive. The highest rate of infection was found in 51-60 yrs. age group. Out of a total of 28 samples from this group, 4(14.29%) were found to be positive. But the lowest rate of infection was in above 70 years age group i.e. 0(00%). (Table-2)

Statistically, the difference between the age groups was found to be insignificant (χ^2= 12.11, P>0.05, 15d.f.)

Table 2: Age-wise Prevalence of Microfilaria

Age Group	Total Sample	Mf. Positive	
		No.	Percentage
<10	134	3	02.24
11-20	107	3	02.80
21-30	090	5	05.56
31-40	074	8	10.81
41-50	062	5	08.06
51-60	028	4	14.29
61-70	023	1	04.34
>70	009	0	00.00
Total	527	29	5.5



Education-wise Distribution of Microfilaria

Maximum no. of respondents was of secondary education level and above i.e. 167 whereas minimum numbers of respondents were literate (37) (able to read and write). Out of 167 secondary levels and above respondents, 107 were males. Out of 107 males, 6(5.61%) were positive for Mf. Out of 60 female respondents, 1(1.67%) was Mf positive. Similarly, out of 32 literate respondents, 3(13.4%) females were Mf positive, whereas no male was found positive in this group (Table 3).

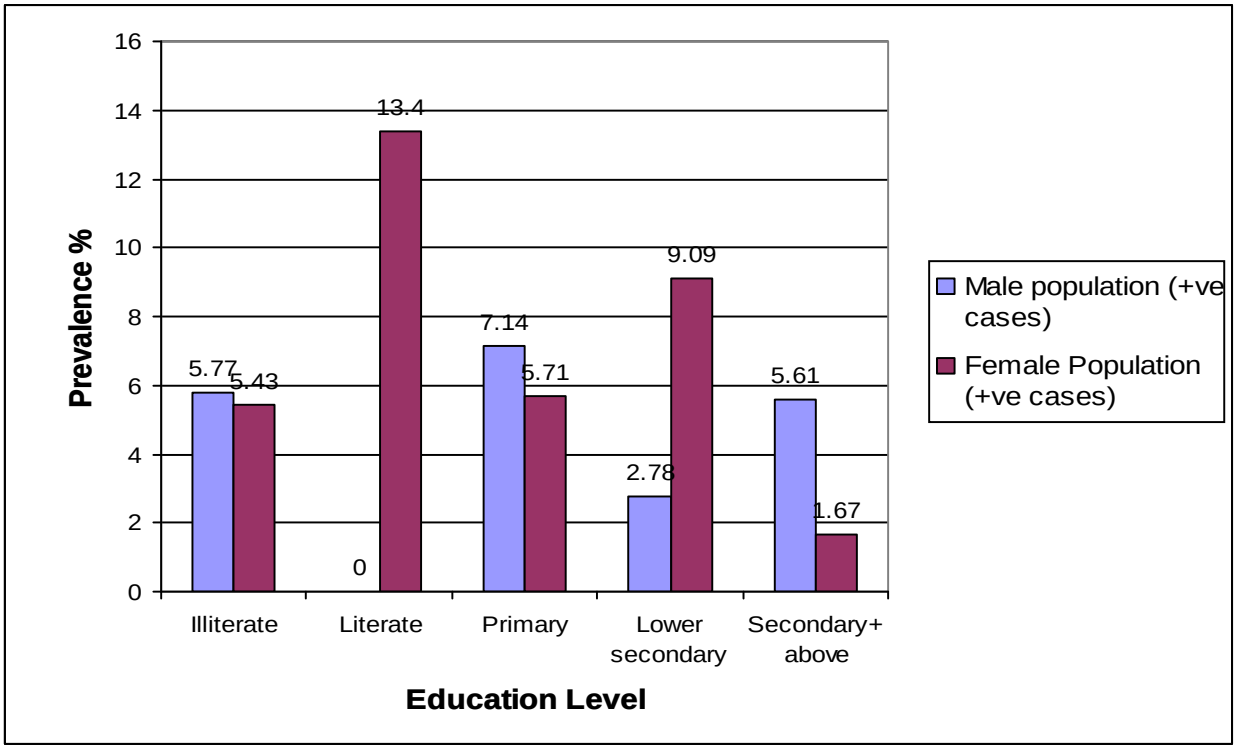
Statistically, the difference in the Mf prevalence among education wise was found not to be significant (χ^2= 4.608, P>0.05, 9d.f.).

Table 3: Education-wise Distribution of Microfilaria

S.N.	Education level	Total Population	Male population			Female Population			+ve cases	
			Total	+ve cases		Total	+ve cases		Total No.	%
				No	%		No	%		
1	Illiterate	144	052	03	5.77	092	05	5.43	08	5.55
2	Literate	32	009	00	0.00	023	03	13.4	03	9.38
3	Primary	126	056	04	7.14	070	04	5.71	08	6.35
4	Lower Secondary	58	036	01	2.78	022	02	9.09	03	5.17
5	Secondary+ above	167	107	06	5.61	060	01	1.67	07	4.19
6	Total	527	260	14	5.38	267	15	5.62	29	5.50

(Note: Illiterate = unable to read and write, literate able to read and write)

Fig. 3: Education-wise Distribution of Prevalence of Microfilaria



Occupation-wise Distribution of Microfilaria

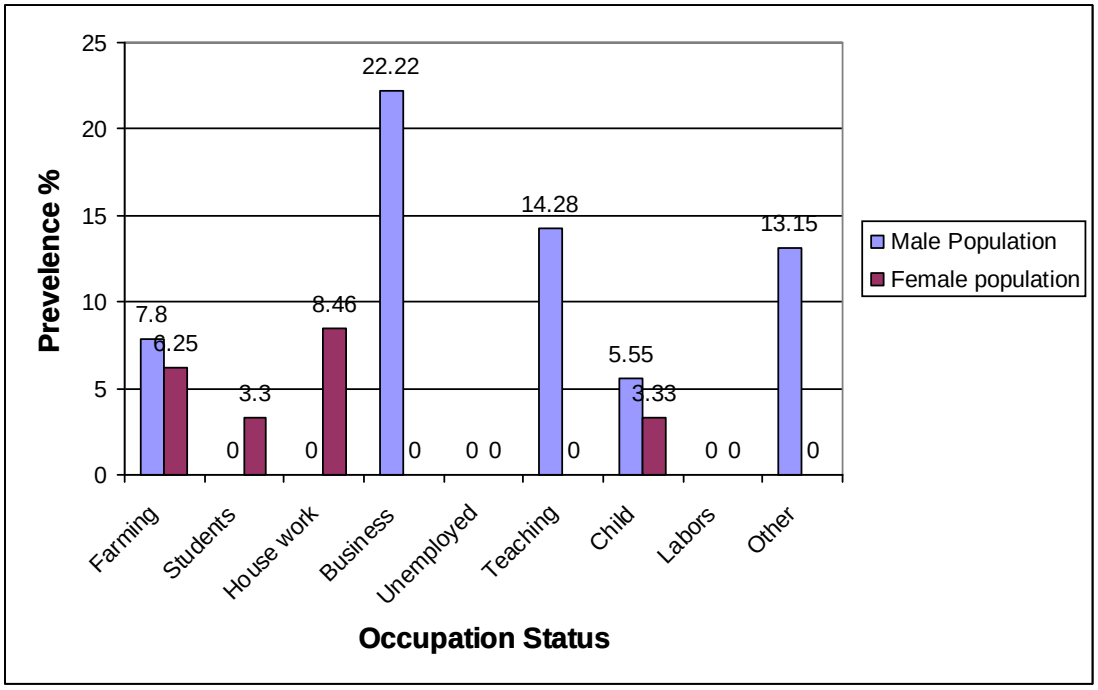
Out of 527 populations, 146 people were house workers. Among them the highest positive cases 11(7.58%) were found in females; while no male was found positive for Mf. The second highest microfilaria positive cases 5(9.03%) were recorded among students and others which included respondent working in post office, CMA, tailor master, Lab.tec., etc. The positive case was not found in unemployed and labors groups (Table-4). Statistically the difference among occupation-wise was found to be significant (χ^2= 29.03, P<0.05, 17d.f.)

Table 4: Occupation Wise Distribution of Microfilaria

S.N.	Occupation	Population	Male Population				Female population				
		Total No.	%	Total	+ve cases		Total	+ve cases		Total No.	%
					No.	%		No.	%		
1	Farming	067	12.71	51	04	7.8	016	01	06.25	05	07.46
2	Students	171	3244	105	00	00.00	066	02	03.03	02	01.17
3	House work	146	27.70	016	00	00.00	130	11	08.46	11	07.53
4	Business	015	02.84	009	02	22.22	006	00	00.00	02	013.33
5	Unemployed	007	01.32	003	00	00.00	004	00	00.00	00	00.00
6	Teaching	014	02.66	014	02	14.28	000	00	00.00	02	14.28
7	Child	048	09.10	018	01	05.55	030	01	03.33	02	04.17
8	Labors	006	01.13	006	00	00.00	000	00	00.00	00	00.00
9	Other	053	10.05	038	05	13.15	015	00	00.00	05	09.03
	Total	527	100.00	260	14	05.38	267	15	05.61	29	05.5

(Note: Other= respondents working in post office, CMA, tailor master, Lab tec. etc)

Fig. 4: Occupation-wise Distribution of Microfilaria.



Clinical Manifestation

The table 5 shows the distribution of clinically manifested cases in different age and sex groups. The highest clinically manifested cases of hydrocoel i.e. 8, were recorded in the age group 41-50 years, while the lowest i.e. 1 from below 10yrs. In males no elephantiasis case was recorded. In females maximum elephantiasis cases were recorded i.e. 2 were from the age-group 31-40 yrs. Two Breast swelling cases were also recorded in 31-40 yrs age group.

Table 5: Age -wise Distribution of Clinical Manifestation

Age group	Total Samples examined	Total positive cases	Male		Female				
			Hydrocoel		Elephantiasis		Breast swelling		Total
			No.	%	No.	%	No	%	
< 10	134	1	1	100	0	000	0	00	0
11-20	107	2	2	100	0	000	0	00	0
21-30	90	4	3	100	1	100	0	00	1
31-40	74	6	2	100	2	050	2	50	4
41-50	62	9	8	100	1	100	0	00	1
51-60	28	1	0	100	1	100	0	00	1
61-70	23	4	4	100	0	000	0	00	0
71-above	9	0	0	100	0	000	0	00	0
Total	527	27	20	100	5	71.42	2	28.58	7

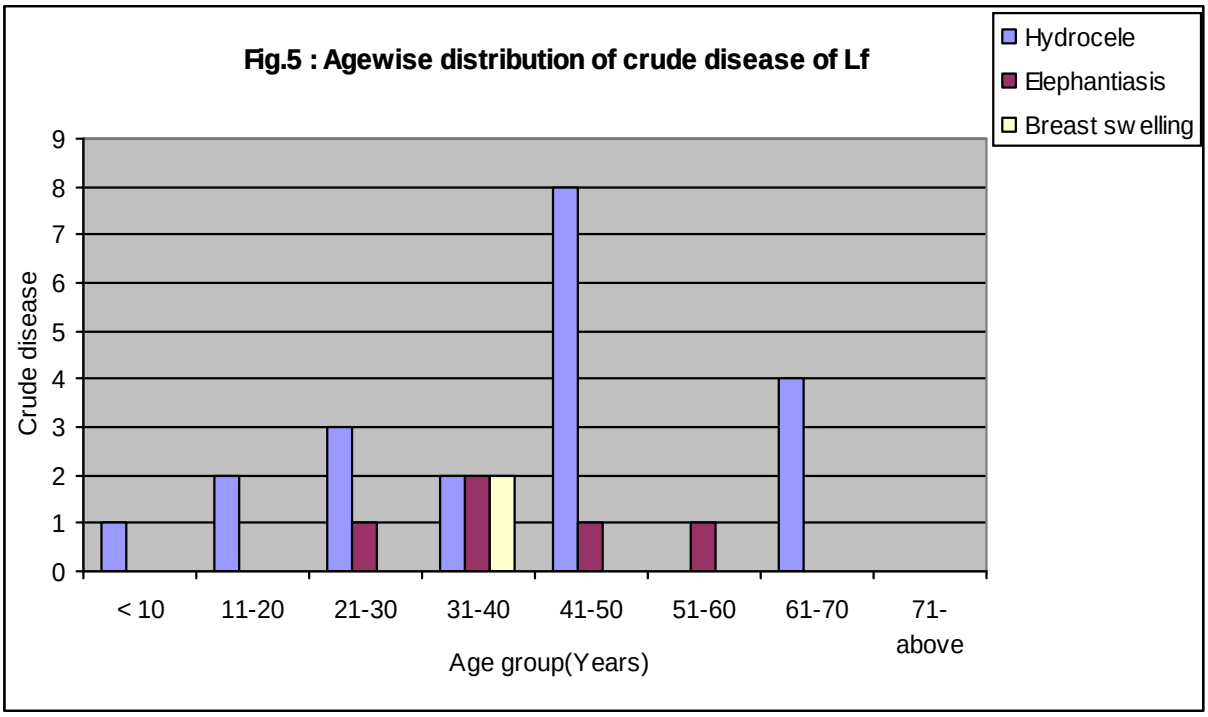


Fig.5 : Agewise distribution of crude disease of Lf
Hydrocele
Elephantiasis
Breast swelling
Crude disease
0
1
2
3
4
5
6
7
8
9
< 10
11-20
21-30
31-40
41-50
51-60
61-70
71-above
Age group(Years)

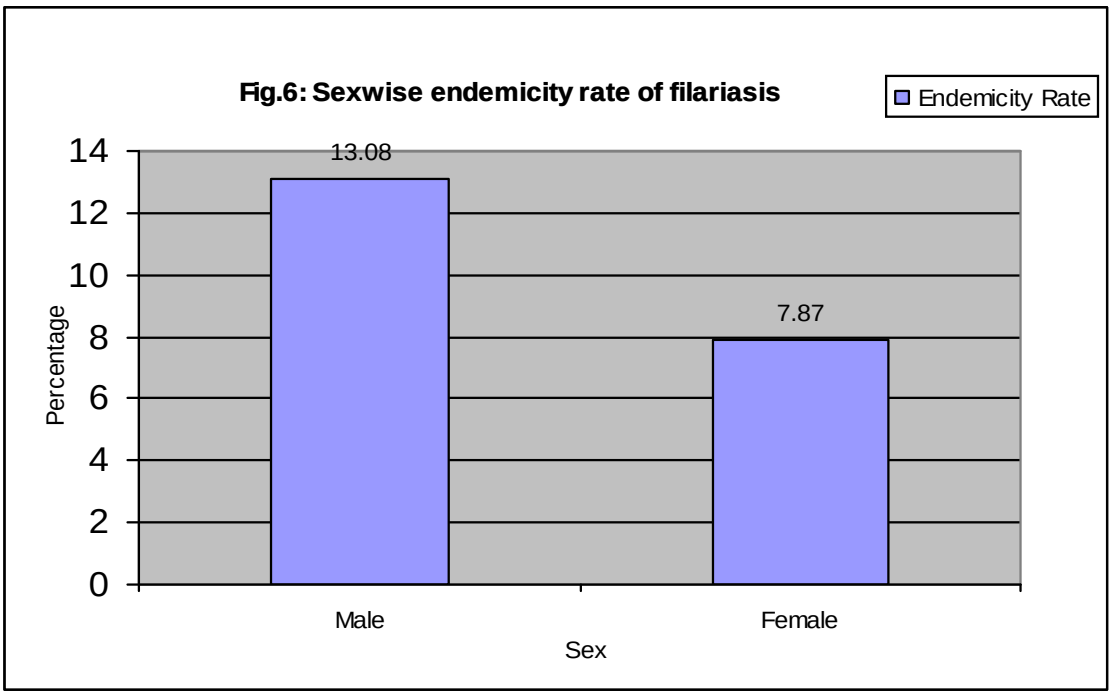
General and Sex-wise Endemicity Rate (ER) of lymphatic filariasis

Among 527 total samples, 28 (14 males and 14 females) were Mf positive without any sign and symptom of filariasis. Only one female was positive for Mf+CDR (Presence of microfilaria in blood as well as crude disease) was present in female but not in male. Among 527 total samples, 27 crude diseases were found. Out of this, 20 were males and 7 were females. The ER (endemicity rate) is high in the case of males (Table 6).

Statistically, the difference between males and females ER were found to be significant (χ^2= 4.190, P<0.05, 3d.f.)

Table 6: General ER and Sex-wise ER of Lymphatic Filariasis.

Sex	Mf	CDR	MF+CDR	ER (%)
Male	14	20	-	34(13.08%)
Female	14	06	1	21 (7.87)
Total	28	26	1	55 (10.44%)



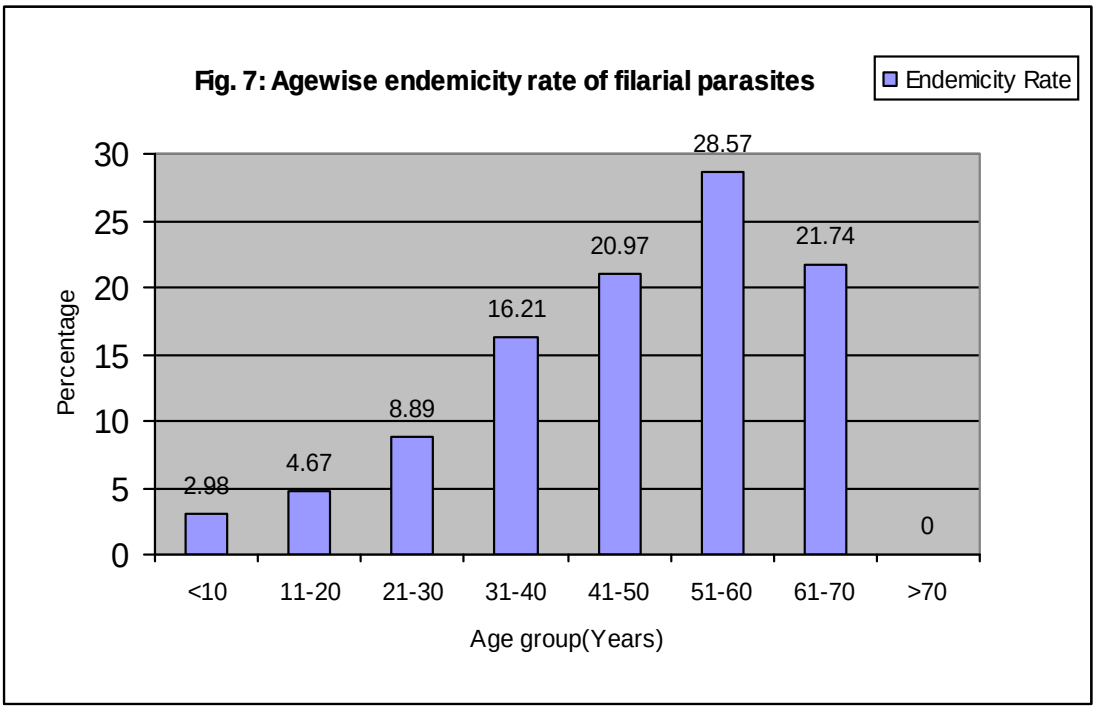
Age-wise Endemicity Rate of Lymphatic Filariasis

Out of 527 total samples, the highest microfilariaemia (microfilarial positive but without any sign and symptom of filariasis) was found in age group 31-40 years. Out of total sample 74 from this group, 7 were found to be positive for Mf, whereas the highest CDR(crude disease rate) was 8 which and was found in the age group of 41-50 years.(Table 7)

Statistically the difference in the endemicity rate among the age-groups were found to be significant (χ^2= 18.71, P<0.05, 15d.f.).

Table 7: Age-wise Endemicity Rate of Lymphatic Filariasis

Age Group	Total Sample	Mf. Positive	CDR	MF+CDR	ER	ER%
<10	134	03	01	00	04	02.98
11-20	107	03	02	00	05	04.67
21-30	090	05	03	00	08	08.89
31-40	074	07	04	01	12	16.21
41-50	062	05	08	00	13	20.97
51-60	028	04	04	00	08	28.57
61-70	023	01	04	00	05	21.74
>70	009	00	00	00	00	00.00
Total	527	28	26	01	55	10.44



Distribution of Microfilaria in Relation to the Use of Bed-nets

Out of 527 respondents, 465 were found always using bed-nets. This group showed 3.87% of microfilarial positivity which was also the least percent when compared to other groups. The maximum percentage of positive cases (21.74%) was found from the never user of bed-nets, whereas 15-38% of mf prevalence was found in occasional user of bed-nets (Table 8).

Table 8: Distribution of Microfilarial in Relation to the Bed-nets

S.N.	Use of Bed nets	Population	%	Positive case	%
1	Never	023	04.36	05	21.74
2	Always	465	88.24	18	03.87
3	Occasionally	039	07.40	06	15.38
	Total	527	100	29	5.5

Fig. 8: Use of Bed-nets by Studied Population

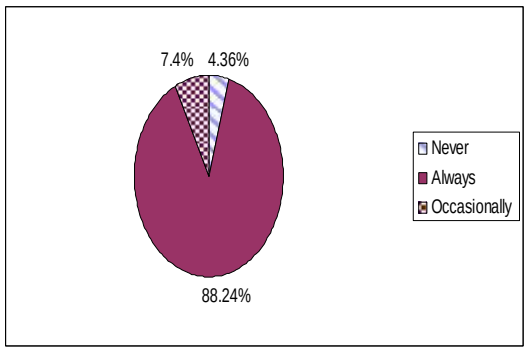
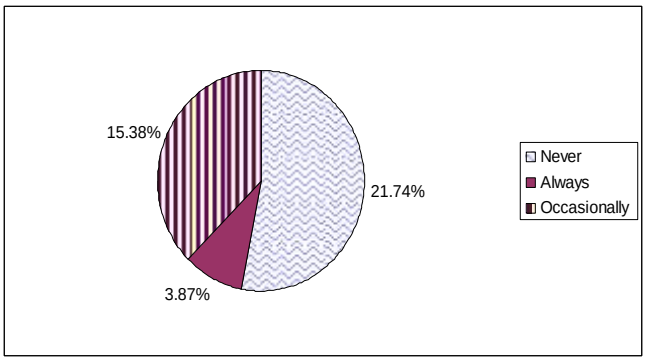


Fig. 9: Positive Cases Found in Relation to the Use of Bed-nets



VI

DISCUSSION AND CONCLUSION

Lymphatic filariasis is world wide in distribution mainly in Asia, Africa, Central and South America, the Eastern Mediterranean, Island of Oceania and the Pacific covering about 80 countries but seriously endemic areas are Asia and Africa. According to fifth report of the WHO expert committee on filariasis, issued in 2000, almost 751 million people were living in endemic areas and were at risk of the 72.8 millions were infected with *W. bancrofti* and 5.8 million with *B. malayi* and *B. timori*. Filariasis has been known to be endemic in Nepal since a long time (EDCD 2000). Mf has been reported from different areas of Nepal. The present study revealed the endemicity rate of 10.44% with overall microfilariaemia of 5.5% and crude disease of 5.12%. Jung (1973) reported 4.99% to 6.15% crude disease rate in all age groups and both the sexes in the urban population, 6.6 to 10.3% in the semi urban population and 1.2% to 17.8% in the rural population. Similarly, the study showed 7.1% to 9.16% microfilariaemia in the urban population 10.03% to 11.3% in semi urban population and 0.8% to 17.69% in the rural population survey carried out in Central Nepal. Pradhan *et al.*, (1997) in Gokarna VDC of Kathmandu valley reported 24.6% endemicity rate with the overall 11.95% microfilariaemia and 12.64% crude disease. Bushal *et al.,* (2000) reported 5.8% prevalence of microfilariaemia and 13% crude disease rate of *W. bancrofti* in Tokha-Chandeshwori VDC. Manandhar (2001) reported 19.9% crude disease in Sipwa, Dhovan and Bhaktapur. The results found out by Jung (1973), Pradhan *et al.,* (1997) and Manandhar (2000) are relatively greater than that of the present study in comparison to endemicity rate, microfilariaemia and crude disease. While the microfilariaemia (5.8%) reported by Bushal *et al.,* (2000) from Tokha

Chandeshwori VDC is approximately similar to present microfilariacmia rate. Sherchand *et al.*, (2000) surveyed 37 districts of Nepal and reported 13% prevalence of microfilaria which is also greater than the present prevalence rate in Sirsiya village of Rauthat district.

Participation of females, students, farmers and children were found to be relatively higher in the study. In most of the houses young males were out of village for working and earning purpose. Thus, only females, old farmers, children and students were found to stay at home. The mass orientation program held in front of health-post, where small market is also situated, resulted greater participation of farmers, students and females.

Among 29 positive cases, 14/260 (5.38%) were of males and 15/267 (5.62) were of females. Males and females were infected in the ratio of 1:1.1. Similar finding was also given by (2005). This may be because female respondents were more during blood sample collection in comparison to males. Not only this, in the present study the female population were found to be mostly involved in fieldwork and also in bringing wood and grass. During this period they suffered from mosquito bites. While males work in city and offices so they are prevented from mosquito bites.

All the age groups are susceptible to microfilaria, except age group above 70 years. The present study reveals high infection rate in the age group 51-60 years i.e. 14.29% while least in the age group <10 years i.e. 2.24%. The highest prevalence of Mf. in the age group 51-60 years may be because of high exposure towards outer environment, lack of awareness and carelessness towards using nets, about health and hygiene while the lowest prevalence in the age group below 10 is because of their indoor sleeping habit using mosquito nets. Age wise distribution of filariasis is

equivalent to the length of the exposure; this is also supported by WHO 2001. According to Witt (2001), although Lf is first acquired in childhood, clinical feature occur only after puberty and hence increase with age.

Lymphatic filariasis is a disease of poor environmental condition with low socio economic status, low literacy rate and high percentage of illiterate health education status (WHO 1997). The present study also showed that people who were more aware of filariasis had high socioeconomic status, while those who were less aware of filariasis had low socio economic status. This is supported by Jha (2003) Nepal. Hence, it was found that regarding filariasis economic status had direct impact on knowledge and awareness of people about filariasis.

The result of the study clearly shows that LF has adverse impact on the productive and wage-earning capacity of people suffering from filariasis. Sexual problems, which are generally not openly acknowledged, include marriages devoid of physical and sexual thoughts. This type of finding is supported by (WHO 1997).

During the field survey, it was found that environment condition and sanitation around the house play a major role to spread filariasis. In the surveyed area, it was observed that surrounding environment of most of the house holds were dirty. People also domesticated animals. They either use their own house as the cattle shed or construct it close to their residence; also each and every household has a large pit dug for accumulating the cattle dung for using as manure. During rainy seasons, these pits get filled up with water, which becomes an important site for mosquito breeding and hence increasing the chance of mosquito biting that increases the spread of vector borne disease. The presence of bushy area around the house also supports the growth of mosquito. Not only

this, the people worked in the morning and evening time which is suitable time for mosquito biting. These all are the major risk factors for acquiring the vector borne disease filariasis.

Cross-sectional sampling technique applied in this survey play an important role to determine the prevalence of the microfilaria in each and every people in the selected study site. This technique is very helpful to determine the microfilarial sign and also to determine the prevalence of disease in each member of the family. This study gives the exact result in the certain community of the targeted population and also helps to determine the density of microfilaria infection in the infected person with, which the infected person can be treated immediately.

By performing the survey on filariasis in the ward no. 13 of Gaur municipality (Sirsiyas) of Rauthat district, it can be concluded that illiteracy which is responsible for lack of awareness towards the vector borne disease, poor sanitary conditions around the house and carelessness towards health and hygiene etc. are the major contributing factors for the epidemicity of filariasis.

VII

RECOMMENDATIONS

The following recommendations are forwarded to minimize the filariasis after conducting the cross-sectional survey in Sirsiya (ward no. 13) of Gaur Muncipality of Rauthat district.

- Many people still are unknown about the lymphatic filariasis. Thus, it is necessary to aware them. For this awareness programme given though mass media, radio and television must be expanded for protecting vector born lymphatic filarial disease and to improve sanitation, health and hygiene.
- People should be made conscious to use mosquito net, mosquito coil, mosquito mat, bagon spray, fumigation and ointment for protection against mosquito bites.
- The mass drug administration, control programme must be regularized.
- Proper management of waste products, open drainage surrounding environments, marshy lands, bushy area which are the good breeding place for mosquito (disease vector).
- Not only the treatment of the human beings but also need to control the vectors side by side through out the elimination programme.
- Prevention should be taken from the bites of mosquito and regular health check up and treatment should be done immediately microfilarial parasites are in blood.

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ANNEX-I

Process of making dilute Giemsa solution

Giemsa Stain

Giemsa stain is an alcohol based Romanowsky's stain, it is highly flammable with flash point 12^{o}c, that requires dilution in PH 7.1-7.2 buffered water before use. It gives best staining of microfilarial parasites in thick and thin blood films, if the concentration of stain is low, the staining time is long. Care must be taken to prevent water from entering the stock stain.

Making a Giemsa 10% working solution

1. Firstly 100ml of an empty measuring cylinder is taken.
2. 90ml of distilled water and 10ml of Giemsa stock solution is poured in the same cylinder and mixed gently. Thus prepared Giemsa stain solution is now ready to be used.

Preparation of reagents for Giemsa stain

To make about 500ml of Giemsa stain:

Giemsa……..3.8grams

Glycerol (Glycerine)……..250ml

Methanol (Methyl alcohol)……..250ml

1. The Giemsa is weighted on a piece of clean paper (pre weighted) and transfered to a dry bowel of 500ml capacity that contains a few glass beads.
2. Using the same cylinder, the glycerol is also measured, and added to the stain, then mixed well.
3. The bottle of stain is placed in a water bath at 50-60^{o}C or up to 2hours at 37^{o}C that will help the stain to dissolve and also at intervals the stain should be mixed well.
4. Thus prepared stain is poured in a clean bottle, labeled and marked it flammable and toxic. It should be stored at room temperature in the dark, if kept well stoppered, the stain is stable for several months.

For use: filter a small amount of stain into a dry-dispensing container.

Caution:

1. Giemsa stain will be spoilt if water enters the stock solution during its preparation of storage.

2. Methanol is toxic and highly flammable; therefore it should be handled with great care and kept away from open flame.

Controlling stains and reagents:

Giemsa stain is used mainly for staining microfilaria, malarial parasites, trypanosomes and leishmanial parasites.

1. Only reliable and if possible ready made and standardized stain should be used.
2. The stock stain should be stored in a dark bottle and precautions should be taken to avoid moisture from entering the stain.
3. For routine use, a small amount of the stock stain should be transferred to a dry dispensing bottle (that can be closed tightly after use).
4. The quality of all new batches of Giemsa should be checked by using it to stain microfilarial parasite for the control purpose.
5. Thick and thin blood film should be prepared from fresh blood, dried and folded individually in paper, sealed in a plastic bag and stored in a freezer at 20^{o}C.

Characteristics of Giemsa stain:

Resulting colour of different organelles of the parasite after staining with Giemsa stain are as follows:

Chromatin of parasite……Dark red

Cutopolasm of parasite……..Blue

Schuffener's dots……...Red

Maurer's dots (Clefts)…….Red maure

Red cells……....Grey to pale maure

Reticulocytes…….Grey blue

Nuclei of neutrophils…….Maure purple

Granules of eosinophils…….Red

Cytoplasm of mononuclear cells……....Blue grey

Precaution and warnings:

Optional results will be obtained by strict adherence to this protocol. Reagents must be added carefully to maintain precision and accuracy. Once pricked or used lancet should never be reused. Biological contamination of dispensing equipment, containers or reagents can lead to false results. Precaution against microbiological and serological hazards in specimen handling, disposal and throughout all procedures should be taken with great care. Date expired components should never be used and the blood samples collected should be stored only in dry boxes.

ANNEX-II

Questionares for Filariasis Sentinel Survey in Salyatar VDC of Dhading District of Nepal

Date:
S.N……

1) Name of the respondent : ……..
Address : District:…….
Ward No./Tole/ Block No.……..

2) Age/sex…….

3) Education:
1. Literate☐ 2.Illiterate☐
If literate,
1. Primary. ☐ 2. Lower Sec. ☐ 3.Secondary ☐
4.S.L.C.☐ 5. Intermediate ☐ 6.Bachelor ☐
7.Master☐ 8.Others☐

4) Occupation:
1.Farming ☐ 2.Labour☐ 3.Business☐ 4.Student☐
5.Housewife ☐ 6.Teaching☐ 7.Unemployed ☐ 8.Others☐

5) Marital status:
1.Single/Married 2.Widow/Widower/Divorce

6) Relationship with the head of the family/ family size…….

7) Respondent's current residence status:
1.Birth place ☐ 2.Migrate☐ 3.Temporary☐
(How long have you been staying here?)…….years/months

8) Surrounding environmental condition:
1. Clean ☐ 2.Dirty☐ 3.Bushy ☐ 4.Open Drainage☐

9) Use of the any means for the protection against mosquito bite:
1. Yes ☐ 2. No☐
If yes, which one of the following:
1. Mosquito net ☐
2. Anti mosquito cream☐
3. Smoke☐
4. Spraying insecticides☐
5. By burning mosquito coils☐

10) Do you have knowledge about the disease filariasis(elephantiasis)?
1.Yes☐ 2.No☐
If yes, how is it transmitted?
1.By mosquito biting☐ 2. Contact with disease person☐
3.Mother to foetus☐

11) Respondent current health status:
1.Healthy☐ 2.Unhealthy☐
If unhealthy since when……..yrs ……months

12) Do you have any symptoms?
1.Yes☐ 2.No☐
If yes, which of the following
1.Fever ☐ 2.Effect on genital organ or breast ☐ 3.Headache☐
4.Swollen Lymphnode☐ 5.Hydrocele☐ 6.Swollen hand or limb☐
7. Skin thick, red and swollen blood vessels☐ 8.Chyluria☐
9.Abscess Formation☐ 10.Nausea☐ 11.Epigastric Pain☐
12.Weakness ☐ 13. Lazyness☐
If yes, have you used any medicine?
1.Yes☐ 2.No☐
If yes, which of the following?
1.Ayurvedic☐ 2.Allopathic ☐
3.Herbal☐

13)According to your knowledge is the disease is more in parent's time or now?
1.Parent's Time☐ 2.Now ☐ 3.Don't know☐

14) Have you seen any person suffering from this disease?
1.Yes☐ 2.No☐
If yes, how many…….

15) Is there any person suffering from this disease in your family or relatives?
1.Yes ☐ 2.No☐
If yes,
Who is he/she?.....(relation)

Thank you very much for your valuable time

Result of the test: Positive…… Negative…….

If positive number of microfilaria per 20ml……