Case Report

Evaluation of Endemic Status of Lymphatic Filariasis in Areas Adjoining to the Endemic District of Bangladesh

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Abstract

In Bangladesh, it was assumed that the endemicity of Lymphatic Filariasis (LF) in areas adjoining to the endemic districts may be related to the endemicity of this districts due to presence of sufficient vectors and extend of microfilaria for it's chronicity. LF is caused by nematodes (round worms) and mainly transmitted to man by the infected- Culex mosquito. Among the 3 types of thread-like filarial worms; Wuchereria bancrofti is responsible for 90% of the cases. Filariasis is endemic in 34 districts and clinical cases are reported from 51 districts, with high endemicity in the northern part of Bangladesh. This cross-sectional survey study was conducted among 6,100 participants at areas adjoining to the endemic districts of LF to evaluate the endemic status during the period of 1st July 2014 to 30th June 2016. Total 10 sub-districts (upa-zilas) were selected from 5 districts of 4 divisions adjoining to the filaria endemic districts, and then 02 sub-districts (Sub-D) from each district. From each Sub-D, 02 unions (several unions constitute a sub-districts) and 10 'spot check site (SCS)' from these unions were selected

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randomly. Villages and nearby areas of the 'SCS' were publicized previous day of data collection by personnel from Upa-zila Health Complexes (UHC) and audio announce. Average 60 samples were collected from each 'SCS' and interviewed participants in the same day. Data were collected by using On Site Filariasis Rapid test cassette for identifying the filarial cases and socioeconomic and demographic data had also been collected by interviewing using questionnaire. The mean age of the participants was 30.03±14.85; female - male ratio of were 1: 0.97 and almost equal numbers (20%-30%) respondents were in each age group (5-15, 16-25, 26-40 and >40 years). Most of the participants were Muslims and two third were married, where 56% were completed primary education or could not read and write and 44% secondary level or above. Nearly three fourth of participants were involved in household/ agricultural works or laborers; others were students, had service and small business and 01% had no work. Two third of participants had no income or could not state and other had monthly income ranges from 1000 to 10,000 taka. Prevalence rate of LF test positive cases was 0.2%; male-female ratio was 1:3, IgG was detected in 83% and rest IgM. Two third of cases were in age group 16-25 years and one fourth in >40 years; only 8.3% were in 5-15 years and no cases were found in age group 26-40 years. All positive cases were Muslim and two third were married, where majority were illiterate or primary and rest of them completed secondary or above. Two third of cases did household or agricultural works and rest were students. Two third had no income or could not state, one fourth had >2000 to 5000 taka and only 8.3% had income 5001->10000 taka. The highest prevalence rate (2.50/1000 Pop) were found in Naogaon & Gaibandha districts and sub-districts were Niamotpur & Sadullapur (5.0/1000 Pop) and no cases were detected at Singra (Natore), Porsha (Naogaon), Palashbari (Gaibandha). Two third of cases suffered from itching; majority had fever and cough and one third stated breathlessness. Clinical signs edema was seen in feet 41.7% of cases. Few cases 08.3% had reached to health care facilities and 91.7% cases had never sought diagnostic facilities. Adjoining areas of endemic districts of LF are prone to spread this disease. Routine survey of LF cases would be continued in areas adjoining to the endemic district.

Keywords: *Lymphatic filariasis (LF), endemic status, areas adjoining to the endemic districts, spot check site, endemicity of LF, OnSite Filariasis Rapid test.*

INTRODUCTION

In Bangladesh the National Lymphatic Filariasis Elimination Programme was started in 2001 with an ultimate goal to eliminate Filariasis from Bangladesh by 2015. In 2001, mass drug administration (MDA) was started in one districts and scaled up in 19 districts. Till 2010, 13 out of 19 districts had completed five or more rounds of MDA and Microfilariae (MF) prevalence rates were found to be zero in 5 districts. MF survey (2008-10) reveals the prevalence is < 1%. Recently, the critical issue is to evaluate status of endemicity of area adjoining to the endemic districts in Bangladesh.[1]

The ICT filarial antigen test (Binax) is a rapid immunochromatographic technique (ICT) using specific monoclonal and polyclonal antibodies and one of choice for community surveys and rapid assessment of filarial endemicity[2].

In May 1997, the 50th World Health Assembly recognized the importance of controlling lymphatic filariasis and passed a resolution calling for "the elimination of lymphatic filariasis as a public health problem" and the International Task Force for Disease Eradication labeled filariasis as one of the six diseases that have the potential to be eliminated by 2020.[2] LF has been identified by the World Health Organisation (WHO) as the second leading cause of permanent and long-term disability world-wide.[3]

Diethylcarbamazine has been used to treat filariasis since 1947 and global filariasis elimination is annual, mass, community-wide drug administration of this drug. [3] Ivermectin is equally effective against brugian filariasis.[12] A combination of diethylcarbamazine and ivermectin are very effective in rapid and long-term clearance of microfilariae.[3]

All the mosquitoes- culex, anopheles, mansonia and aedes--spread the disease.[5] The symptoms of the disease appear after three to seven years of the mosquito bite and the leg, arm, genital organ and breasts become enlarged abnormally.[6]

Government of Bangladesh (GoB) reports, filariasis detected in 32 districts in 2006. But blood test (ICT) by experts had detected the disease in 39 districts in 2006, mostly in border areas, about 5 million poor people had been suffering from LF, locally called 'Godh' and nearly 50 milion people were vulnerable.[5]

Recently filariasis is endemic in 34 districts (based on ICT survey) and clinical cases were reported from 51 districts, with high endemicity in the northern part of the country. It is estimated that 70 million people are at risk of infection in endemic areas and about 20 millions are suffering, most of them are children, while 10 million people are with various forms of clinical deformity and another 10 million people are microfilaremics.[7] At least one in every ten persons in thirteen northern districts carries filarial parasite.[9]

There are three types of thread-like filarial worms: *Wuchereria bancrofti*, which is responsible for 90% of the cases, *Brugia malayi* most of the remainder and *B. timori*, may also causes the diseases.[8, 10] Man is the definite host of Bancroftian and Brugian filariasis and it is transmitted to man by the bites of infected mosquitoes - *Culex* mosquito. Adult filarial worm lives in lymphatic vessels for 6-8 years and microfilariae that circulate in the peripheral blood and are able to infect mosquitoes. This infection causes lymphangitis, lymphadenitis, elephantiasis of genitals, legs and arms.[4,10]

Countries where LF is found are mostly in the tropical and sub-tropical regions of the world.[7] LF is endemic in 83 countries including six south Asian countries with over 1.3 billion people at risk of contracting it. [6,8,11] Globally, over 120 million people are currently infected, with about 40 million disfigured and incapacitated by the disease.[5,10] Approximately 65% of those infected live in the WHO South-East Asia Region, 30% in the African Region, and the remainder in other tropical areas.[10]

METHODOLOGY

Study design: Cross-sectional survey study.

Study places: Five districts from four divisions adjoining to the filaria endemic districts and then two Sub-Ds from each district.

Study period: 1st July 2014 to 30th June 2016 (02 years).

Sample Size: Six thousand and one hundred (6,100)

Sampling Technique: Five (05) adjoining districts were selected purposively out of 29 districts border with the 34 endemic districts. From 05 districts, 02 Sub-Ds had been selected randomly from each district and these Sub-Ds were selected from those Sub-Ds border with the endemic districts, lastly 02 unions were selected randomly among the unions from each selected sub-districts. Among the villages of 02 selected unions 10 'SPSs' were selected randomly. The location of 'SCSs' were fixed at entrance point of the selected village. Villages and nearby area of the selected 'SCSs'

were publicized previous day by UHC Health Personnel and audio announce. Male female ratio was controlled at almost 1:1 and 20% of children (5 to 15 years) had been included in this survey study. From each 'SCS' average 60 samples have been examined and interviewed in the same day.

Data collection procedure: Data had been collected by using OnSite Filariasis Rapid test cassette (Serum/plasma). One (01) ml of venous blood was collected by syringe from the left cubital vein and then ICT was done by OnSite Rapid Test for identifying the filarial cases (IgG and IgM antibody for lymphatic filarial parasites). Socioeconomic and demographic data had also been collected by interviewing patients.

Data management and analysis: Data were cleaned first; then data were processed and data entry was done for analysis (single entry of data had been performed). Data had been analyzed by computer using SPSS (Version 19.0).

Ethical implications: The study had been conducted maintaining all possible ethical considerations. Informed written/verbal consent of the respondents had obtained before data collection. Confidentiality of data was ensured strictly and name of participants and cases preserved in computer by anonyminazation and were used only for the purpose of this study. Ethical clearance has been obtained from the Ethical Committee of NIPSOM (National Institute of Preventive and Social Medicine).

RESULTS AND OBSERVATIONS

A. Distribution of participants in survey (n= 6,100):

Out of 6100 respondents, 3006(49.3%) were male and 3094(50.7%) were female and 93% was Muslim and rest 7% was other religion. Among the respondents 66% was married, 33% was unmarried and 1% divorced, separated, widow etc.

The education level of the respondents 35% primary, 44% secondary-higher secondary or above level and 21% could not read and write. By occupation 68% was household and agricultural works, 12% student, 14% service and business, 5% labor and factory worker, 1% had no work. Monthly income of the respondents, 67% had no income or un-responded or could state and 33% had monthly income 1,000 to >10,000 taka.

The mean age of the study subjects was 30.03±14.85 years.

Figure-1 shows the distribution by age group. Out of 6100 respondents 1267(20.8%) were in 5-15 years, 1474 (24.2%), 1603(26.3%) and 1756(28.8%) were in 16-25, 26-40 and >40 years repectively.
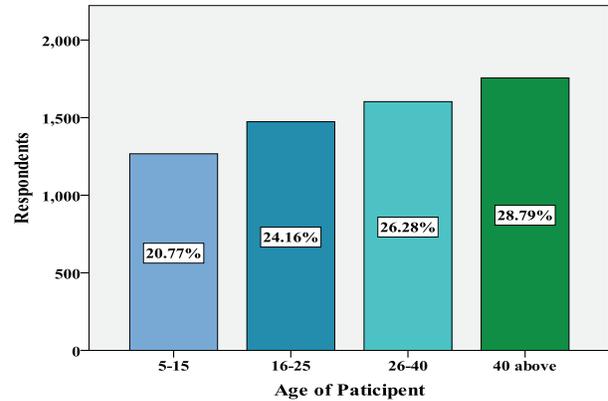

Figure-1: *Age of respondents in survey (n= 6,100)*

B. Distribution of respondents by 'Rapid Test result of blood examination (n= 12).

Out of 12 cases, IgG was detected in 10(83%), IgM in 02(17%). Distribution by sex, 03(25.0%) were male and 09(75.0%) were female.

Table 1 shows the distribution of cases by age groups, 01(8.3%) were in 5-15, 08(66.7%) and 03(25.0%) were in 16-25 and >40 years respectively. No cases were in age group 26-40 years.

Table 1: Age distribution of test positive cases (n= 12)

Age (Years)	Frequency	Percent
5-15	01	8.3
16-25	08	66.7
26-40	00	00
>40	03	25.0
Total	12	100.0

Table 2-5: The distribution of cases- by marital status (Table- 2), 08(66.7%) were married, 03(25.0%) were unmarried and 03(8.3%) were separated. By level of education (Table-3), Illiterate, Primary or Equivalent 07(58.3%), secondary 04(33.3%) and higher secondary were 01(8.3%). By occupation (Table-4), students 04(33.3%), agricultural works 01(8.3%) and household works was 07(58.3%). By monthly income (Table-5),

08(66.7%) had no income or could not state, 01(8.3%) had income less than 2000 taka, 02(16.7%) had income 2001 – 5000 taka and 01(8.3%) had income 5001 – >10000 taka.

Table 2-5: Distribution of test positive cases by marital status, education, occupation, monthly income

Table 2

Marital Status	Frequency	Percent
Married	08	66.7
Unmarried	03	25.0
Separated	01	8.3
Total	12	100.0

Table 3

Education	Frequency	Percent
Illiterate , Primary or Equivalent	07	58.3
Secondary or Equivalent	04	33.3
Higher Secondary or equivalent	01	8.3
Total	12	100.0

Table 4

Occupation	Frequency	Percent
Student	04	33.3
Agricultural work	01	8.3
Household work	07	58.3
Total	12	100.0

Table 5

Monthly Income	Frequency	Percent
No Income	08	66.7
<= 2000	01	8.3
2001-5000	02	16.7
5001-10000	01	8.3
Total	12	100.0

Table- 6 shows the prevalence rate of test positive individuals of districts and Sub-Ds adjoining to the endemic districts. The prevalence rate of Tangail district 1.54/1000 Pop, Natore & Madaripur districts 1.67/1000 Pop and Naogaon & Gaibandha districts were 2.50/1000 Pop. In Sub-Ds, the prevalence rate 5.0/1000 Pop at Niamotpur & Sadullapur and 3.3/1000 Pop at Gurudaspur. 1.67/1000 Pop at Gopalpur, Kalkini and Madaripur Sadar. 1.43/1000 Pop at Madhupur and there were no test positive case at Singra, Porsha, Palashbari.

Table 6: Prevalence of test positive cases of districts and Sub-Ds adjoining to the endemic districts (n= 12)

Division	Adjoining District	PR (Per 1000 Pop.)	Adjoining Sub-Ds	Test Positive	Study Pop.	PR (per 1000 Pop)
Dhaka	Tangail	02 (1.54)	Gopalpur	01	600	1.67
			Madhupur	01	700	1.43
Rajshahi	Natore	02 (1.67)	Gurudaspur	02	600	3.33
			Singra	00	600	0.00
Rajshahi	Naogaon	03 (2.50)	Porsha	00	600	0.00
			Niamotpur	03	600	5.00
Rangpur	Gaibandha	03 (2.50)	Palashbari	00	600	0.00
			Sadullapur	03	600	5.00
Barisal	Madaripur	02 (1.67)	Kalkini	01	600	1.67
			Madaripur Sadar	01	600	1.67
4 Divisions	5 Districts	12		12	6100	

(PR- Prevalence Rate; Pop- Population)

C. Clinical manifestation among test positive cases (n= 12):

Table-7.1 shows the clinical symptoms of cases, out of 12, 08 (66.7%) were suffering from itching of body, 07 (58.3%) from occasional fever, 07 (58.3%) from cough and 04 (33.3%) were suffering from breathlessness. Table-7.2 shows the present clinical signs edema, out of 12 cases, 05(41.7%) had edema in feet and 07 (58.3%) had no sign of edema.

Table-8 shows the health seeking behavior of cases, out of 12 cases, only 01(08.3%) had reached to government hospital, diagnostic facilities and investigation processes while 11(91.7%) had never seek health facilities.

Table 7.1: Acute clinical symptoms in positive cases (n=12)

Symptoms	Frequency	Percent
Itching of body	08	66.7
Occasional fever	07	58.3
Cough	07	58.3
Breathlessness	04	33.3

Table 7.2: Edema commonly seen in positive cases (n=12)

Edema commonly seen in	Frequency	Percent
Feet	05	41.7
No signs	07	58.3

Table 8: Health seeking behavior, name of investigations done and place of diagnosis of positive cases (n=12)

Health seeking behavior	Place of diagnosis	Name of investigations done	Frequency	Percent
Government hospital	Government hospital	CBC and ESR	01	08.3
No where	First Time by this survey	No Investigations	11	91.7

DISCUSSION

The cross-sectional survey study was conducted among 6,100 populations from 10 Sub-Ds (Two from each district) of 5 districts adjoining to the filarial endemic areas in Bangladesh.

In this survey females were higher than male and most of them were Muslim; where two third of respondents were married. The mean age of the participants was 30.03±14.85 years and almost uniform distribution of respondents ranges from 20% to 30% were found in different four age group of 5-15, 16-25, 26-40 and >40 years.

The educational status of respondents was low in compare with other similar community of Bangladesh, more than half of them completed primary education or could not read and write others were secondary or above. Household and agricultural workers were more than two third of the respondents, only 12% were students, 14% were in service and business, rest were labors/ factory workers or had no work. As this study was conducted mostly in the rural area and most of most of the respondents were female, student and unemployed, for this, more than two third had no income or un-responded or could not state. Other one third had monthly income ranges from one thousand to more than ten thousand takas.

The prevalence rate was 2/1000 Pop were found among the surveyed population. Terms of reference (TOR) of National Lymphatic Filariasis Elimination Programme (NLFEP) stated from MF survey (2008-10) reveals the prevalence is < 1%[1]. This rate is almost similar to this survey rate in areas adjoining to the endemic districts. But we recognize from review article of Hossain MM from there the highest rates of infection and disease are in the northern part of the country where up to 16.8% of the population is MF-positive and 10.1% have chronic disease.[19]

Among the cases, IgG was detected in ten cases (83%) and IgM in rest two (17%), consequently antibody titer is needed for confirmation of active and persistent case of Lymphatic Filariasis. These study findings may be crucial to slow and steady transmission of LF from endemic area to its' nearby and adjoining areas.[2]

The study observes the equal distribution of cases ranges between 2 to 3 in each study district and same size of study population adjoining to the corresponding endemic areas[1].

The highest prevalence rate was observed in Naogaon & Gaibandha districts and at Niamotpur and Sadullapur Sub-Ds and no case was found at Singra, Porsha, Palashbari Sub-Ds.

The entire cases were Muslim in religion, among them three fourth of them are female and two third were married. Here more than half of cases were illiterate or primary or equivalent and rest of them were secondary or higher secondary level of education. Two third of cases were involved in agricultural and household work, rest of them were students. The small number test positive cases may not representative in districts.

Most of the test cases live in proverty. Among the cases two third had no income or could not state and rest had monthly income < 2000 to 5000 taka or more. This finding similar to the report of The Global Alliance to Eliminate Lymphatic Filariasis, The Socio-Economic Impact of LF and the Program to Eliminate It, "Lymphatic Filariasis and Poverty". From this we know "LF is a disease of poverty. In 2003, World Bank classified (80%) of LF endemic countries as low or lower-middle income countries[16].

Majority of the cases were young adult & children. Out of total cases three fourth were in age group 16-25 & 5-15 years and rest one forth were above 40 years. There no case detected in age group 26-40 year. Statement of Financial Express' Friday June 24, 2005 "about 20 million people of the endemic area suffering from the disease, most of them are children." This study finding is similar to the statement that most of the cases were in age group 5-25 years[6].

The observation of result shows poor awareness on LF among study community, as of health seeking behavior, information on place of diagnosis and knowledge on investigations were found a few cases and most of them had no awareness. The low level of education may influence these events.

The relative sensitivity and specificity of OnSite Filariasis IgM Rapid Test is 95.8% and 100% respectively, where in case of IgG relative sensitivity and specificity is 92.3% and 100% respectively[14]. So there is chance of false negative case detection.

CONCLUSION:

It was assumed that the prevalence of LF in the sub-districts adjoining to the endemic districts seem to be similar to the endemic districts. Ultimate study result shows the reasonable prevalence of Lymphatic Filariasis in

study areas. But sub-districts of highest prevalence rate may have some other associated factors for transmission of microfilarias. This study revealed that young adult & children are being mostly infected and losing their productive life. Here missing of filarial infection in middle age group (26-40 year) and 3 times more infectivity in female than male is an issue of further study. Findings of poor health seeking behavior indicate the scarce of awareness on LF in study community and drawback of programme planning. Majority of cases had no income or could not state stipulate the proverty situation of the study population.

RECOMMENDATIONS

This survey study contains remarkable academic, program implementation and policy implication. Following recommendations can be made in the area adjoining to the endemic districts to interrupt incidence: (1) Surveillance for identifying the mode of transmission and size of spread to interrupt incidence of LF, (2) ICT (Spot test for W. bancrofti Antigen) test should be done among young adult & children for screened out of their exact prevalence. (3) Preventive measure (assure use of mosquito net/LLIN for every individual, routine indoor residual spry, early case detection, existing case searching and treatment) should be taken to interrupt transmission of infection and to combat the further spread and transmission of LF.

CONFLICT OF INTEREST

This survey study was conducted with technical support of Communicable Disease Control (CDC), Directorate General of Health Services (DGHS), Mohakhali, Dhaka-1212.

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