

Prevalence of Lymphatic Filariasis in North and South Zones of Bangladesh

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ABSTRACT

The present study was carried out mainly in the two extremely poor prone zones like north and south zones of the country consisting of 20 districts, among those, three districts like Gaibandha, Sylhet, Mymensingh are non-endemic areas of filariasis. Out of 20 studied districts, Bagerhat, Gopalganj, Sylhet, Narail, Mymensingh and Norshindhi have no patients of filariasis. 89.81% patients were found in endemic area (17 districts) and 10.18% patients were found in non-endemic area (3 districts). The highest frequency of patients was found in Lalmonirhat and Thakurgaon followed by Gaibandha. In the present study, 69.2% patients were found in the north zone and 30.8% patients in south zone. There were no patients in the age group (0-10), the highest number of patients was found in the age group (41-50) and gradually it is decreasing with the age. 90.5% of patients were suffering from leg swelling followed by hand swelling (7.6%). About 0.7% and 1.2% of patients were suffering from breast and scrotum swelling respectively.

Keywords: Filariasis; North and South Zone; Endemic; Age-Groups; Physical Disability

Introduction

The exact figures of filariasis in Bangladesh are not known, but it is endemic in 34 out of 64 districts of the country. There is high endemicity of Filariasis in Nilphamari, Thakurgaon, Dinajpur, Rangpur, Panchagar, Kurigram, Gaibandha, Chapai Nowabgonj, Rajshahi and Lalmonirhat. The World Health Organization (WHO) ranked Lymphatic filariasis (LF) as the 4th leading cause of permanent disability (WHO,1998). LF is the highest disease burden on any tropical disease except malaria which is one of the most disfiguring diseases and a major cause of clinical morbidity. Morbidity caused by chronic Lymphatic filariasis (LF) is mostly lifelong [1-4]. LF is a mosquito-borne parasitic disease which causes physical deformation and disability mostly in tropical regions and poorer country of the world. LF takes a large toll on individuals both through physical disability and social stigmatization [5-8]. It affects the people with genital disease and with lymphoedema. Young, unmarried women with LF are unable to abide by the standards set by society, due to limited marriage prospects [9,10]. Men with LF share similar sentiments [9,11,12]. The disease impairs patient's educational and employment opportunities, marriage prospects, and sexual life.

In Thailand and West Africa, there is a common perception that children born to LF-infected women will also inherit the genes for the disease [9]. Although lymphatic filariasis is not associated with high mortality rate, chronic filarial infection causes enormous suffering [13]. The socio-economic impact due to long term disability and deformity are extraordinarily great. The determination of prevalence of the filarial infection in the community is important and necessary for public health program. Since the prevalence and intensity of infection are linked to poverty, its elimination can contribute to achieving the United Nations Millennium Development Goals (MDG) as well as Sustainable Development Goals (SDG: POST MDG).

Lymphatic Filariasis : A Neglected Poor People Disease of Tropical World

Lymphatic filariasis considered globally as a neglected tropical disease of poor people and a devastating obstacle to socio-economic development because they debilitate, deform, blind, and kill [1,14]. Communities frequently shun and reject women and men disfigured by the disease. Affected people frequently are unable to work because of their disability, and this harms their families and their communi-

ties. (CDC 2010). Lymphatic filariasis affects the world's poorest people, more than a billion people who subsist on less than \$2 per day because the poor people are unaware, unhygienic as well as unable to buy mosquito curtain. This disease is being neglected year after year. Lymphatic filariasis is primarily a disease of the poor in tropical countries [15,16]. Nearly 60% of the lymphatic filariasis problem is in the Southeast Asia Region, 30% in the African Region, 5% in the Eastern Mediterranean Region, 4% in the Western Pacific Region and 1% in the American region. Except the Panjab, Haryana, Rajasthan, Jammu and Kashmir, Himachal Pradesh, Sikkim, Nagaland, Meghalaya, Mizoram, Manipuri, Tripura, Chandigarh and Delhi, the entire country of India is endemic for *W. bancrofti*. In 1955 the Govt. of India launched a national program against filariasis known as National Filariasis control Program [17].

Lymphatic Filariasis (LF) is caused by nematode parasite-*Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*- and is transmitted by mosquitoes [18]. The adults of *Wuchereria bancrofti*, *Brugia timori* and *Brugia malayi* live within the lumen of lymphatic vessels. Subcutaneous Filariasis is caused by *Loa loa* (the African eye worm), *Mansonella streptocerca*, *Onchocerca volvulus*, and *Dracunculus medinensis* (the guinea worm). These worms occupy the subcutaneous layer of the skin, the fat layer. Serous cavity Filariasis is caused by the worms *Mansonella perstans* and *Mansonella ozzardi*, which occupy the serous cavity of the abdomen. Filariasis is a severely debilitating and stigmatizing disease caused by the parasite *Wuchereria bancrofti*, classic causative agents of this disease in humans. Whereas acute episodes of the disease cause temporary disability, lymphatic filariasis leads to permanent disability [19,20]. The *Culex quinquefasciatus* species is the most common vector for bancroftian filariasis in Bangladesh. This domestic mosquito is known to thrive in impoverished urban areas and breed in stagnant, dirty water. Different works carried out by different scientist in Bangladesh also showed that this species is endophilic in nature i.e., it prefers to rest indoor [8,21-25].

As the severity of the disease becomes more apparent, social and economic stigma follow suit. Most females in India, East Africa, and Haiti, for example, are expected to nurture children [26]. However, young, unmarried women with LF are unable to abide by the standards set by society, due to limited marriage prospects [9]. There are also significant economic implications that enforce the image of these infected LF women's being poor marriage prospects. In fact, a study on infected Haitian women by Coreil and colleagues found that many women were unable to "harvest the garden produce because has to stand to do it" [27,28].

Materials and Methods

Study Areas

Out of 64 districts in Bangladesh, 12 districts of North zone and 8 districts of South zone of Bangladesh were treated as study sites. Out of 20 districts, 17 districts are endemic, and 3 districts are non-en-

demetic areas. The name of those endemic 17 districts is Panchagarh, Thakurgaon, Nilphamary, Lalmonirhat, Kurigram, Dinajpur, Rangpur, Chapainawabganj, Norshindhi, Dhaka, Narail, Gopalganj, Barisal, Pirojpur, Bagerhat, Jhalakathi and Barguna. The other 3 non-endemic districts are Gaibandha, Sylhet and Mymensingh (Figure 1). The present study was carried out during 2009 to 2013, from door to door through direct observations and recording in the questionnaire. In order to achieve this aim, research was conducted within each domain of interest, which in this case includes the community, provider and program/policy domains. These include village/community members, Upazilla health Officers. At the national level, the opinions of the managers and staff of specific disease control programs are also gathered in semi-structured interviews focusing on integration and their program. District maps were used to select the sampling sites. Within selected sites, patients and their selected family members and selected community people, health institute, NGO-staff have been interviewed.

Results and Observations

A total of 422 patients were interviewed. Out of that, 292 patients were in the north zone and 130 patients were in south zone. Besides, out of 422 patients, 379 patients were in endemic areas and the rest 43 patients were in non-endemic areas. To select the districts, the following characteristics are taken into consideration.

Endemic and Non-Endemic Zones

Out of 20 study districts, 17 districts are endemic, and 3 districts are non-endemic areas. Notable that according to program coverage in WHO LF database, 2007, Gaibandha district is a non-endemic area, but in the present observation, some patients of filariasis found in Gaibandha (Figure 1). No filarial patients were found in the other two studied non endemic districts like Mymensingh and Sylhet. So for comparative study between non-endemic and endemic districts, only Gaibandha district was selected as a representative of non-endemic districts and Lalmonirhat was selected as a representative of endemic districts because of the highest frequency of patients found in Lalmonirhat among 20 studied districts. According to the objectives of the present study, the prevalence and epidemiological aspects of lymphatic filariasis in different zones/districts of Bangladesh, the socio-economic characteristics and the infrastructural condition of the community for participation in prevention and elimination of this disease, to assess the attitude and level of knowledge of the community towards the causes, preventions and control measures of filarial disease, the magnitude of negligence to lymphatic filariasis, the factors which make the growth prevalence of lymphatic filariasis were observed.

The study was carried out among the people of the 12 districts of North zone and 8 districts of South zone of Bangladesh. Out of those 20 districts, 17 districts were endemic, and 3 districts were non-endemic [29,30] areas. According to JICA and WHO, Gaibandha was a non-en-

demographic district but in the present study, the patients were identified in Gaibandha. Besides, out of those 20 districts, patients were found in 14 districts and were absent in other 6 districts. District maps were used to select the sampling sites. A total of 422 patients were interviewed, 292 patients were in the north zone and 130 patients were in the south zone. On the other hand out of 422 patients, 379 patients were in endemic areas and the rest 43 patients in non-endemic areas. Bagerhat, Gopalganj, Sylhet, Narail, Mymensingh and Norshindhi have no filarial patients as per information provided by the concerned

civil surgeons' office. The highest frequency of patients was found in Lalmonirhat and Thakurgaon followed by Gaibandha.

Frequency of Patients Found in Endemic and Non-Endemic Zone (Endemic-Non-Endemic Declared by WHO)

Among the 20 studied districts 17 districts are endemic and 3 districts named Sylhet, Gaibandha, and Mymensingh are non-endemic districts, and 89.81% patients were found in endemic area and 10.18% patients were found in nonendemic area (Figure 1).

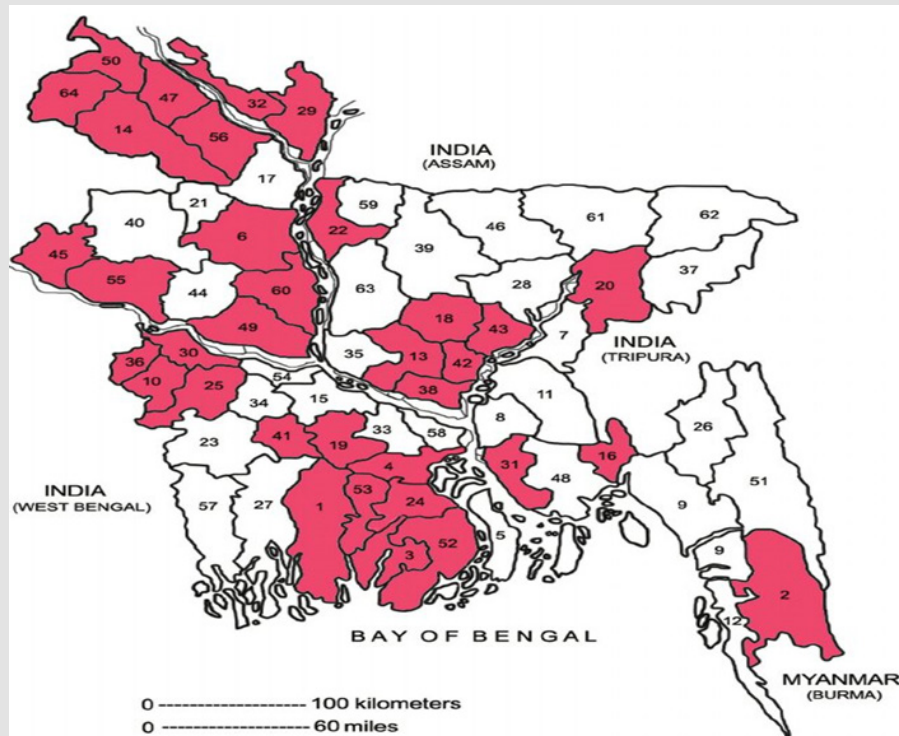


Figure 1: Districts (in red) with high endemicity of Human Lymphatic Filariasis (HLF), including those under a Massive Drug Administration (MDA) program, which also have over 80% filarial endemicity in Bangladesh. Districts, listed in alphabetically, follow: 1: Bagerhat, 2: Bandarban, 3: Barguna, 4: Barisal, 5: Bhola, 6: Bogra, 7: Brahmanbaria, 8: Chandpur, 9: Chittagong, 10: Chuadanga, 11: Comilla, 12: Cox's Bazar, 13: Dhaka, 14: Dinajpur, 15: Faridpur, 16: Feni, 17: Gaibandha, 18: Gazipur, 19: Gopalganj, 20: Habiganj, 21: Jaipurhat, 22: Jamalpur, 23: Jessore, 24: Jhalokati, 25: Jhenaidah, 26: Khagrachhari, 27: Khulna, 28: Kishoreganj, 29: Kurigram, 30: Kushtia, 31: Lakshmipur, 32: Lalmonirhat, 33: Madaripur, 34: Magura, 35: Manikganj, 36: Meherpur, 37: Maulavibazar, 38: Munshiganj, 39: Mymensingh, 40: Naogaon, 41: Narail, 42: Narayanganj, 43: Narsingdi, 44: Natore, 45: Nawabganj, 46: Netrokona, 47: Nilphamari, 48: Noakhali, 49: Pabna, 50: Panchagarh, 51: Parbattya Chattagram (Rangamati), 52: Patuakhali, 53: Pirojpur, 54: Rajbari, 55: Rajshahi, 56: Rangpur, 57: Satkhira, 58: Shariatpur, 59: Sherpur, 60: Sirajganj, 61: Sunamganj, 62: Sylhet, 63: Tangail, 64: Thakurgaon. Reproduced with slight modifications for legibility, with permission from the Filariasis Elimination Program, Center for Disease Control (CDC), Directorate General of Health Services (DGHS), Dhaka, Bangladesh [28].

Distribution of Patients in Different Zones

Considering Dhaka City Corporation as a centre of the country, the south side of Dhaka City Corporation treated as south zone and the north side of the Dhaka City Corporation treated as north zone. These zonewise distributions of patients are shown in the following table. Among 20 studied districts 12 districts are in north zone and 8 districts are in south zone in Bangladesh and the 69.2% patients

are found in north zone and 30.8% patients are found in south zone (Figure 2). The names of Districts in North Zone are: Panchagarh, Dinajpur, Thakurgaon, Rangpur, Kurigram, Lalmonirhat, Nilphamari, Chapainawabganj, Sylhet, Gaibandha and Mymensingh. In South Zone the districts are: Pirojpur, Barisal, Jhalokathi, Barguna, Dhaka, Bagerhat, Gopalganj, Norshindhi and Narail. The overall prevalence of filaria was quite higher (69.2%) in North Zone than South Zone (30.8%).

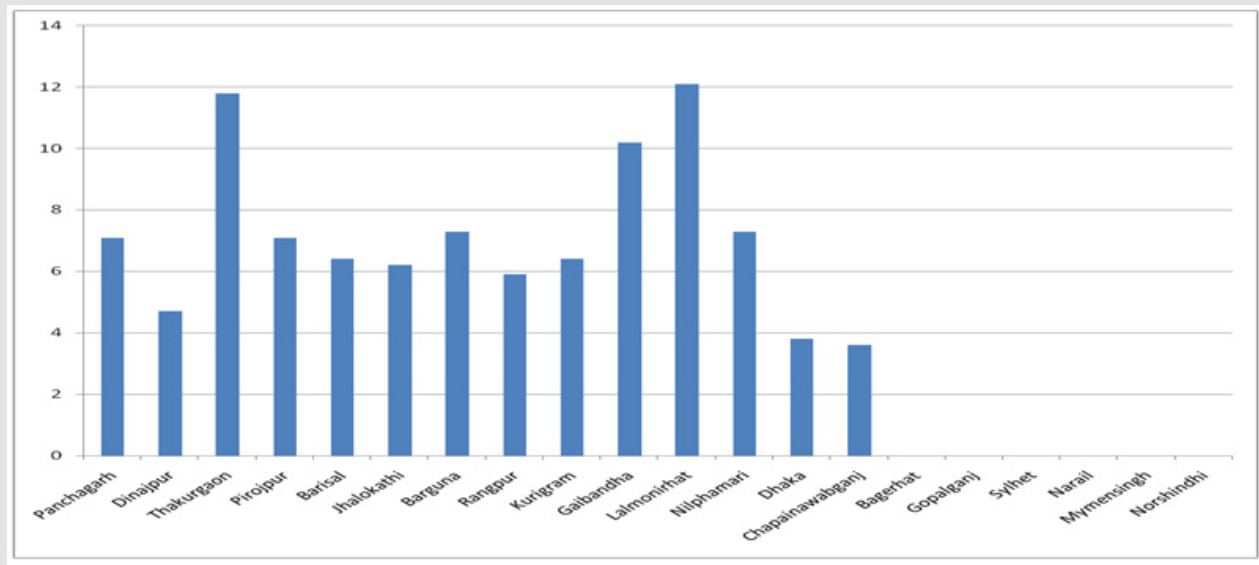


Figure 2: Prevalence of LF in different studied districts.

Distribution of Patients according to their Sex

Higher percentage of female patients is found in Kurigram (77.8%), Lalmonirhat (72.5%), Thakurgaon (72%), Dinajpur (70%), Chapainawabganj (66.7%), and Panchagarh (56.7%). Border as well as

insolvent area’s female is more affected than central area. Male-female patients’ distribution is as follows (Figures 3 & 4). Among the total patients, 53.6% are female and 46.4% are male, the female is comparatively less educated than male, so the number of female patients is little bit higher than male.

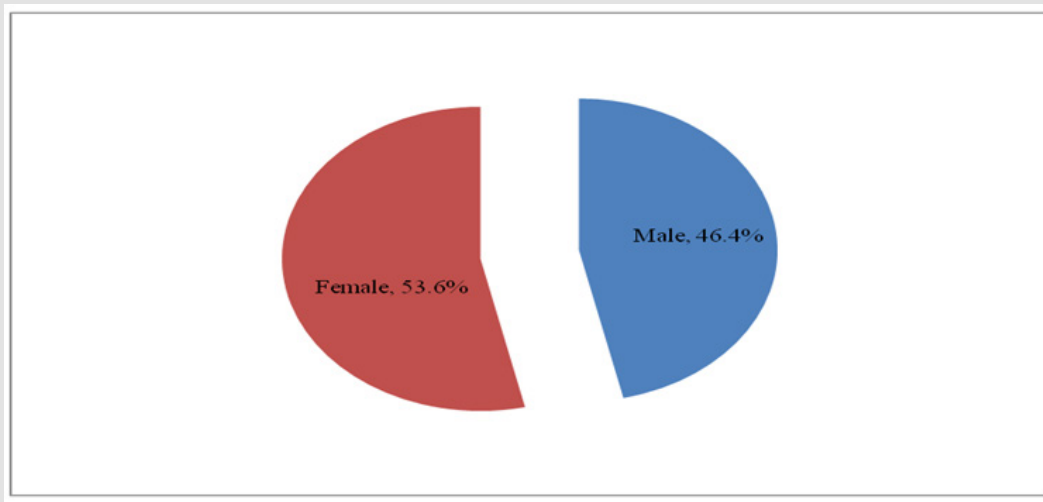


Figure 3: Distribution of patients according to sex (overall).

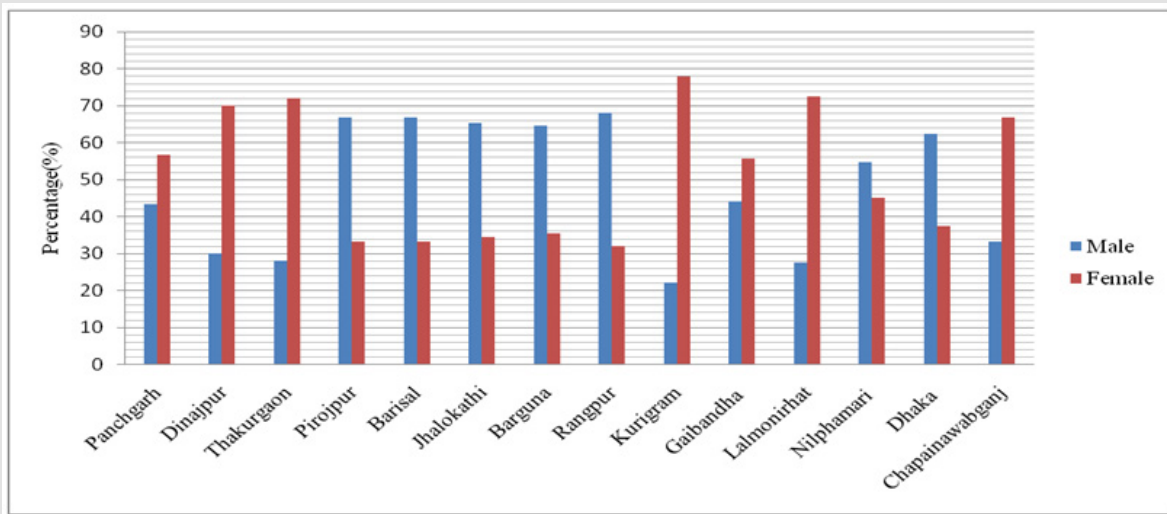


Figure 4: Distribution of respondent-patients according to sex (District wise).

Distribution of Patients according to Age Group

In the present investigation, the patients were divided into nine categories based on age group for determining the age wise magnitude of the prevalence of filariasis. The Patients' distribution according to different age group was follows. In the present study, filariasis was not found in tender aged (0-10 years) children in the study area. 31-60 years old patient were found in every district. Older aged (81-90 years) patients were not found except in Thakurgaon district

(Figures 4-6). It is more difficult to translate chronic disability and illness into a value that is readily understood by public health officials and health advocates in relation to their contribution to poverty. Rural to Urban Migration and increasing urbanization, both of which are occurring increasingly in low-income countries, facilitate the spread of LF. This is mostly due to inadequate waste disposal and sanitation facilities, which increases the number of breeding sites for the mosquito vectors [31].

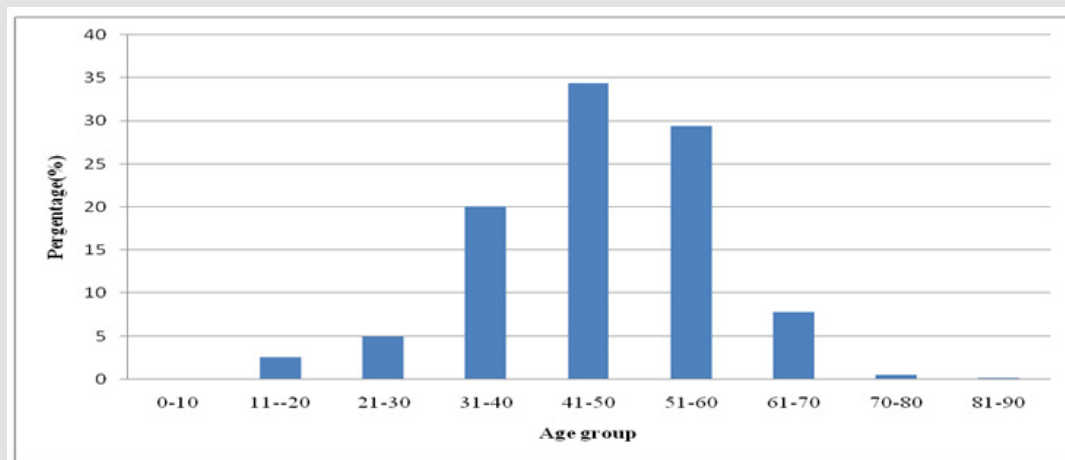


Figure 5: Distribution of patients according to age group (overall).

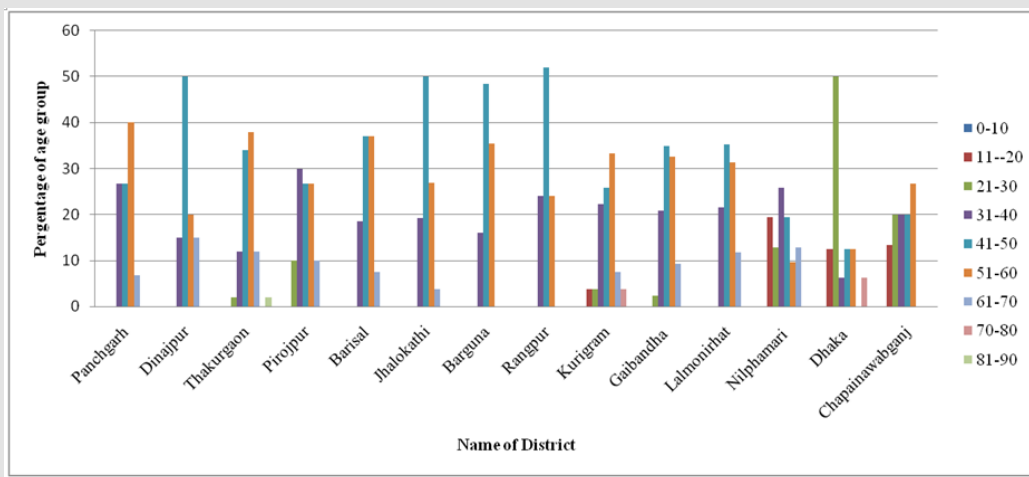


Figure 6: Distribution of patients according to age group (District wise).

According to JICA (Japan International Cooperation Agency), about 70 million people are identified as endemic to filariasis mainly in Northwest area (relatively poor area) of Bangladesh. The most patients of endemic districts are illiterate having knowledge gap than that of non-endemic district. The disease is also dependent on educational status/knowledge/awareness of the household's people. Very few patients of endemic district are used to go for treatment to the health complex. Filariasis affected the most populated district is Lalmonirhat where only 35.3% household expenditure is above Tk. 4000/- per month and 11householdhold expenditure is below Tk. 1000/- per month. The higher monthly expenditure of the patients' households of endemic district is higher than that of non-endemic district. About 70.9% respondents of the study areas have no knowledge about filariasis. The highest number of patients goes to healer

for treatment rather than doctor and health complex.

Swelling of Organs or Parts of Body Due to Filariasis

Swelling of organs or parts of body due to filariasis of the respondents was observed. Distributions of respondents according to swelling organ due to filariasis are shown in (Figure 7). Leg is the most swelling organ of the patients in every district. Some districts have some patients with hand swelling. Breast and scrotum swelling were found less because of shame, the patients may not be spelled out about their sensitive organs. In the present study, 90.5% patients were suffering from leg swelling followed by hand swelling (7.6%). 0.7% and 1.2% of patients are suffering from breast and scrotum swelling respectively. Perhaps the patients may not be spelled out about their sensitive organ because of shame (Figures 7 & 8).

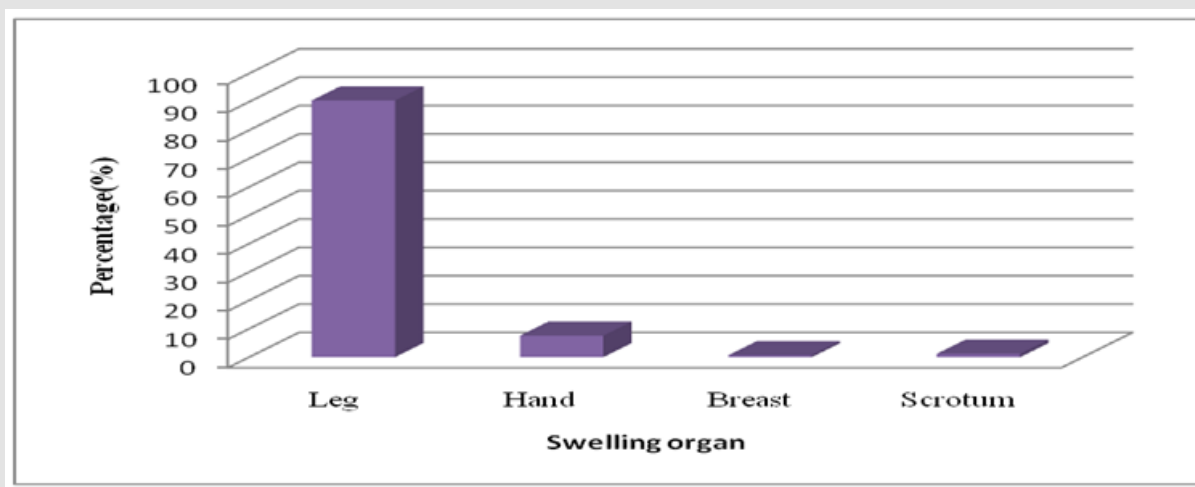


Figure 7: Overall status of the swelling of affected organs of the respondents.

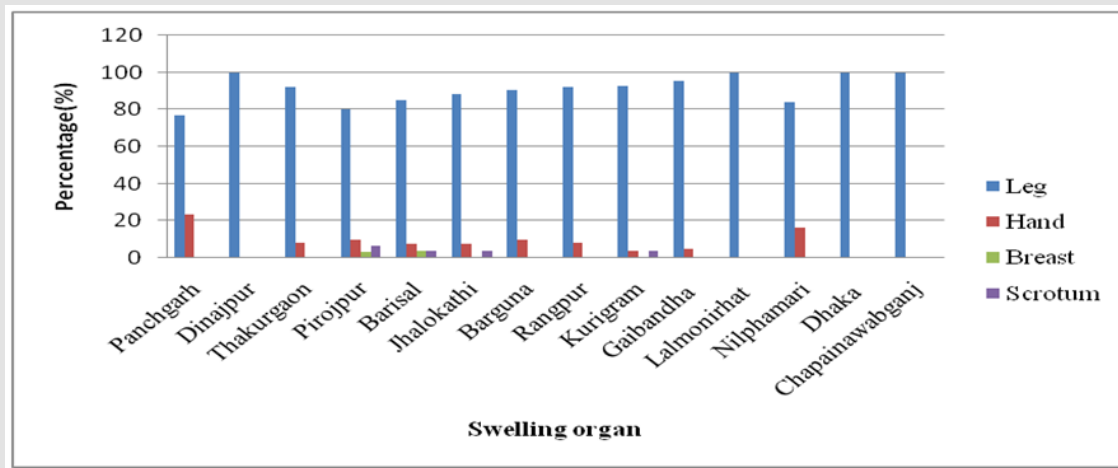


Figure 8: of respondents according to affected organs/parts due to filariasis.

Discussion

Most patients with LF tend to experience skin fold thickening and pigmentary changes to their skin. In these instances, the infected skin hardens and develops small bumps. Furthermore, due to the dryness of the skin, soaking the patients' skin in water does not relieve the painful cracks that soon develop [31]. Along with skin changes in the early stages of LF, infected persons also must battle other infections [13]. Swelling of body parts is a consequence of LF. Those who have swollen toes find it nearly impossible to wear shoes, which are vital for protection against the outside environment. The lack of shoes increases the chances of the patient suffering from a secondary infection. Specifically, the swelling of the toes is accompanied by the tightening of skin cells, which facilitates further growth of bacteria and fungi. In this way, infected persons become breeding grounds for further diseases. The trauma of LF patients does not end here. Those who continue to experience progressive swelling are declared to have elephantiasis and are in for a life of painful disability [3,32].

The inflammatory response begins with the death of or damage to adult worms, which leads to host reaction and acute filarial lymphangitis. A heavy worm burden and the presence of worms in the scrotal area precipitate the development of hydrocele, chyluria, chylocele, and lymph scrotum. Lymphatic dysfunction caused by dilatation of the lymphatic vessels makes the patient more prone to repeated secondary bacterial infection, which precipitates lymphedema and elephantiasis. Microfilariae play an important role in the pathogenesis of tropical pulmonary eosinophilia [15,33]. The pathology associated with lymphatic filariasis results from a complex interplay of the pathogenic potential of the parasite, the immune response of the host, and external ('complicating') bacterial and fungal infections. While genital damage (particularly hydroceles) and lymphoedema/elephantiasis are the most recognizable clinical entities associated

with lymphatic filarial infections, there are much earlier stages of lymphatic pathology and dysfunction whose recognition has only recently been made possible through ultrasonographic and lymphoscintigraphic techniques [34,35]. The influence of human factors such as population density, movement, economic status, occupation, literacy level and health seeking behaviour on the occurrence of lymphatic filariasis at micro level has been described elsewhere [27,36,37]. Similarly, the vector abundance may vary widely at micro level depending on the geo-physical and human associated factors, but the 'vectorial capacity' (vector survival and capacity for parasite development) and the transmission of infection are greatly determined by the geo-environmental factors at macro level.

So, it can be easily said that the male ones are more susceptible host for *W. bancrofti* than female. It was probably due to the larger working territory of the male than female. Because male go at different places for work and sometime, they sleep outside of the house under the open sky especially in summer when the weather prevails very hot and humid. The current status of the disease filariasis in the district Kurigram is 14.33%, in Chapai Nawabgonj is 4.11% and in Lalmonirhat it is 3.12%. There is no single factor responsible for this disease. Many factors responsible for this disease to be caused. Illiteracy and climatic factors as well as negligence of the government are the most notable ones to be caused lymphatic filariasis. Risk factors for lymphatic filariasis do not seem to be the direct causes of the disease but seem to be associated in some way. Having a risk factor for lymphatic filariasis increases the chances of getting a condition for higher prevalence. In our country the infrastructure is very poor, especially in the northern part (Thakurgaon, Rangpur, Dinajpur, Lalmonirhat, kurigram etc). The communication system between the urban and rural areas is not good- Electricity is not available in the village. So most of the villagers do not have television, radio, fan, etc. as a result they cannot get the information regarding filariasis. The

healthy sanitation is not well established in the rural areas and mosquitoes get the healthy environment for their breeding [2,38-55].

Conclusion

According to WHO, Filariasis spreads normally in those areas where the population densities are very high along with deficiencies in urban infrastructure. It was found in the study area that the population was overcrowded. It was also observed from the study that for control, prevention and elimination of filariasis from Bangladesh the activities such as MDA, Social mobilization, Community based Information, Education and Communication (IEC), Morbidity control, Training to health, para-medical health personnel including volunteers and NGOs for MDA and morbidity control must need to strengthen by the government.

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