

PREVALENCE OF FILARIASIS IN SOLAPUR DISTRICT, MAHARASHTRA, STATE, INDIA.

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ABSTRACT

More than 90% of the cases are caused by *Wuchereria bancrofti*. Filariasis is one of the major parasitic infections of mankind, which is widely spread throughout the tropics and subtropics. Filariasis is a parasitic and infectious tropical disease, that is caused by thread-like filarial nematode worms. Two species namely *Wuchereria bancrofti* and *Brugia malayi* are prevalent in India and the former contributes 99.4 % problem in the country. Lymphatic filariasis is a major vector borne disease widely distributed throughout the tropical and subtropical regions of the world. It is caused by three-lymph dwelling parasites *Wuchereria bancrofti*, *Brugiamalayi*, *B. timori* affecting more than 120 million people over 80 countries. The present study includes the survey of filariasis in Solapur District, Maharashtra State, India.

KEY WORDS: Emergence, Parasites,

INTRODUCTION

Phylum Arthropoda are A widely distributed of animal groups. Particularly, those within the classes Insecta and Arachnida live in close association with humans. The most important form of arthropods is the blood-sucking habits of ectoparasites such as mosquitoes, bedbugs and fleas. Mosquitoes, act as vectors of various parasites, which are pathogenic to human. More significantly blood-sucking insects transmit the organisms, hence are pathogenic parasite called as "vectors" causing several debilitating diseases such as filariasis and sometimes fatal diseases such as malaria, dengue, Japanese encephalitis, plague, yellow fever, typhus etc. World Health Organization (WHO) has identified filariasis as second leading cause of permanent and long-term disability next only to mood affecting disorder.

Filariasis is one of the major parasitic infections of mankind, which is widely spread throughout the tropics and subtropics. Filariasis is a parasitic and infectious tropical disease that is caused by thread-like filarial nematode worms. Two species namely *Wuchereria bancrofti* and *Brugia malayi* are prevalent in India and the former contributes 99.4 % problem in the country. In mainland India, the microfilaria (Mf) exhibit nocturnal periodicity, necessitating night blood surveys between 12.00 am and 2.00a.m. Midnight to detect Mf carriers. The World Health Organization (WHO) estimates that 8.2 million people are infected with *Wuchereria bancrofti* but other estimates are as high as 250 million. Another report of WHO/India has given alarming figures estimate as 374 million living in endemic areas and 45 million infected individuals. The present study includes epidemiologic survey of Filariasis in Solapur District, Maharashtra. Human filarial nematode worms have a complicated life cycle, which primarily consists of five stages. After the male and female worm mate, the female gives birth to live microfilaria by the thousands. The microfilarias are taken up by the vector insect (intermediate host) during a blood meal. In the intermediate host, the microfilaria molts and develop into 3rd stage (infective) larvae. Upon taking another blood meal the vector insect injects the infectious larvae into the dermis layer of our skin. After approximately one year the larvae molt through 2 more stages, maturing into to the adult worm. In India, filariasis has been recognized as disease of National importance because of continuous spread of disease and protracted suffering and disability caused in the affected population. India contributes to 40% cases of bancroftian filariasis in the global scenario. Though the disease is not fatal, it is usually acquired starting from early childhood and can be debilitating leading to disability causing unfold skin, pain, misery and impairment of health.

Filariae are transmitted by mosquitoes. In the mosquito, the parasite undergoes different stages while developing, of which only the third stage is infective. When a mosquito carrying the infective parasite bites a human, the parasites are deposited on the person's skin, from where they enter the body. These then migrate to the lymphatic vessels and develop into adult worms over a period of 6–12 months, causing damage and enlargement of the lymphatic vessels.⁵⁹

In endemic regions of lymphatic filariasis, humans exhibit a broad range of responses towards infection. These responses are classically divided in to following groups.

- 1) Asymptomatic amicrofilaraemia: Individuals with no clinical disease symptoms and no microfilaraemia.
- 2) Asymptomatic microfilaraemia: Individuals with microfilaraemia but few or no disease symptoms.
- 3) Acute clinical filariasis: Individuals attacked by 'filarial fever' associated with lymphadenitis and lymphangitis.

- 4) Chronic clinical filariasis: Usually take 10-15 years to develop from the onset of the first acute attack and leading to chronic pathology like hydrocele, lymphoedema, elephantiasis and chyluria, caused by the blockage of lymphatics.
- 5) Accultifilariasis: The clinical condition in which the classical clinical manifestations are not present and microfilariae also not found in the blood but may be found in the tissues. Tropical eosinophilia is the classical example of occult filariasis.

Filarial nematodes are noted for their longevity in the mammalian host, implying a high degree of sustained resistance to host immunity. Immunomodulation induced by filarial parasite includes primordial participation of the lymphocytes, multiple types of antigen presenting cells (APC) which includes macrophages and its cytokines and chemokines. Maizels *et al.*, (2004). Filarial nematodes are noted for their longevity in the mammalian host, implying a high degree of sustained resistance to host immunity. Immunomodulation induced by filarial parasite includes primordial participation of the lymphocytes, multiple types of antigen presenting cells (APC) which includes macrophages and its cytokines and chemokines (Vickery *et al.*, 1983).

There is also evidence that antifilarial immunity shows the essential participation of T cell and more specific CD4+ cells. All of these regulate innate immunity towards pathology of disease, lymphatic filariasis (Bhadwat and Borade, 2000). The microbial killing within phagocytes involves reactive oxygen species like superoxide, hydroxyl radicals etc (Hoerauf, 2006). RNIs has the ability to trigger lipid peroxidation in membranes, liposome and lipoproteins by abstracting hydrogen atom from polyunsaturated fatty acids. Resulting products include lipid hydroperoxyl radicals, conjugated dienes and aldehydes. Malondialdehyde is the commonly used marker of lipid peroxidation. The process of lipid peroxidation causes membrane permeability and fluidity changes with significant biological consequences (Esterbauer *et al.*, 1991; Esterbauerh 1993.) In view of above concepts, the present study was planned to investigate lipid oxidation in lymphatic filariasis patients.

Lymphatic filariasis is a painful and profoundly disfiguring among all diseases and a major public health problem in developing countries caused by *Wuchereria bancrofti* (Hoerauf, 2006; Kumaraswami, 2000; Shenoy *et al.*, 2007; Ottesen, 2006; Witt and Ottesen, 2001). Human lymphatic filariasis results from infection by the nematode parasites *W. bancrofti*, *B. malayi* and *B. timori* transmitted, principally by *Culex*, *Manasonia* species and *Anopheles* through an infective bite. The disease is prevalent in the rural and slum areas of many tropical countries, predominantly affecting the poorer sectors of the community. Recent estimates showed that more than 120 million people are affected with the disease about 90% having bancroftian filariasis and 10% having brugian filariasis.⁽¹⁸⁾ In India alone 412 million people are exposed to the risk of lymphatic filarial infection (National Institute Of Communicable Diseases, 1996). While around 31 million people harbour, microfilariae, 20 million suffer from chronic disease manifestations.⁽¹⁸⁾ Though the disease is not fatal, it is usually acquired starting from early childhood and can be debilitating leading to disability causing unfold pain, misery and impairment of health. Recent studies of socio-economic impact of the disease showed that the acute and chronic forms of the disease inflict social, psychological and economic burden on affected individuals and their families (Ottesen, 1980).

A) Bancroftian Filariasis

Bancroftian Filariasis is caused by the nocturnally periodic filarial nematode *W. Bancrofti* and is responsible for the majority (90%) of lymphatic filariasis worldwide. The bancroftian filarial parasite was named as *Wuchereria bancrofti*, accrediting Wucherer and Bancroft who discovered the microfilarial and the adult worm forms respectively.⁽²⁰⁾ The disease is highly prevalent in countries such as India, Bangladesh, Burma, China, Indonesia, Malaysia, Papua New Guinea, The Philippines, Sri Lanka, Thailand, Vietnam, Parts at East Central Africa and West Africa and Egypt, Mandagascar and neighboring islands, the Northern parts of South America, Brazil parts of Central America. India contributes about 74% endemic population and 81% of the disease burden in the South Asia region (World Health organization, 1987). As per recent estimates, about 428 million people with 31 million microfilarial carriers and 20 million clinical cases are spread in 13 states and 5 union territories. *W. bancrofti* is the most predominant infection comprising 99.4% of the problem in the country. In India, all states except those of Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Mizoram, Nagaland, Manipur, Tripura and Sikkim are endemic for bancroftian filariasis. While *B. malayi* is confirmed to the western coast of Kerala and few pockets in other states (NMEP.National Filarial Control Programme, 1987).

B) Brugian Filariasis

This is also nocturnally periodic filarial infection. The disease is endemic in South East Asian countries such as Southern China, India, Indonesia, Malaysia, Philippines, Republic of Korea, Thailand and Vietnam. In India the

infection is mainly restricted to rural areas and mainly prevalent in Kerala but scattered foci of low prevalence are reported in Tamilnadu, Andhra Pradesh, Orissa, Madhya Pradesh, Assam and West Bengal (National Institute Of Communicable Diseases, 1996).

Filarial Parasite – *Wuchereria bancrofti* and *Brugiamalayi*

In 1994 World Health Organization (WHO, 1994), has identified filariasis as second leading cause of permanent and long-term disability next only to mood affecting disorder. Filarial nematodes are noted for their longevity in the mammalian host, implying a high degree of sustained resistance to host immunity. Maizels *et al.*, (2004) studied the immunomodulation induced by filarial parasite includes primordial participation of the lymphocytes, multiple types of antigen presenting cells (APC) which includes macrophages and its cytokines and chemokines (Vickery. 1983). There is also evidence that antifilarial immunity shows the essential participation of T cell and more specific CD4+ cells. All of these regulate innate immunity towards pathology of disease, lymphatic filariasis (Bhadwat and Borade, 2000).

The National Filaria Control Programme launched in the state since 1957, based on the findings of one man commission report. The Global and National Programs to eliminate Filariasis has been implemented to reduce human microfilaremia to levels low enough to break the transmission of the disease. This study is undertaken in an attempt to shed light on the existence of Filariasis in a previously non-endemic area.

MATERIALS AND METHODS

The present study was undertaken during a period of Fifteen months from November 2009 to January 2011, survey was conducted and all available subjects were investigated. The survey was done in Solapur District, Maharashtra State, India (figure 1).

Filariasis is usually diagnosed by identifying microfilaria on a Giemsa stained thick blood film. Blood must be drawn at night under the guidance of Government medical officer. The microfilaria circulate at night (nocturnal periodicity), when their mosquito vector is most likely to bite. Also, decreased peripheral temperature may attract more microfilaria. Various concentration methods are also applied- i. Membrane filter ii. Knott's concentration method iii. Sedimentation technique. Preliminary surveys conduct by the local health workers revealing the probable existence of the Filariasis. The health education component of the program is strengthening to make the public aware of Filariasis.

Study area: The study is conduct in different localities of Solapur District. These villages are also known to be endemic for lymphatic Filariasis.

Sample collection: A door-to-door survey is conduct in the selected localities of Solapur District to include individuals (adults and children >5 yr) in the study. Informed consent was obtain from Government Medical officers and study individuals (parents in case of minor). Study the host history and diethyl carbamazine citrate (DEC) consumption.

Collection of Blood sample for Microfilaria (MF) detection: Study subjects were examined under the supervision and guidance of Government Medical officer: Mf is detect by making two thick blood smears of 20 µl each on a clean glass slide from 20:00 to 00:00 h. Sample Preparation: fixation, storage, staining and mounting of Mf. The smears were air dried, dehaemoglobinised and stained with Wright's stain to detect Mf.

Examination: Microscopic examination of and recording of the results by using statistical methods.

Statistical analyses: Detection of prevalence, abundance and frequency is measure by Standard statistical analysis methods. Parasitological methods for the detection of the parasites by Direct examination for detection of microfilariae, in thick blood smears is the common method employed for diagnosis of the infection, this is carried out by collecting blood smears from individuals during 21.00-23.00 hrs by finger prick method and examining them for the presence of mf after Giemsa's staining However, this method has drawbacks such as: requirement of night blood due to nocturnal periodicity of microfilariae causes great inconvenience. Surveys were conducted in Solapur District, the local language, Marathi and Kannada by asking preliminary questionnaire. The surveys were conducted with the help of medical officers from Solapur district and Filaria control unit in Solapur District. The data was analyzed by Slandered statistical methods.

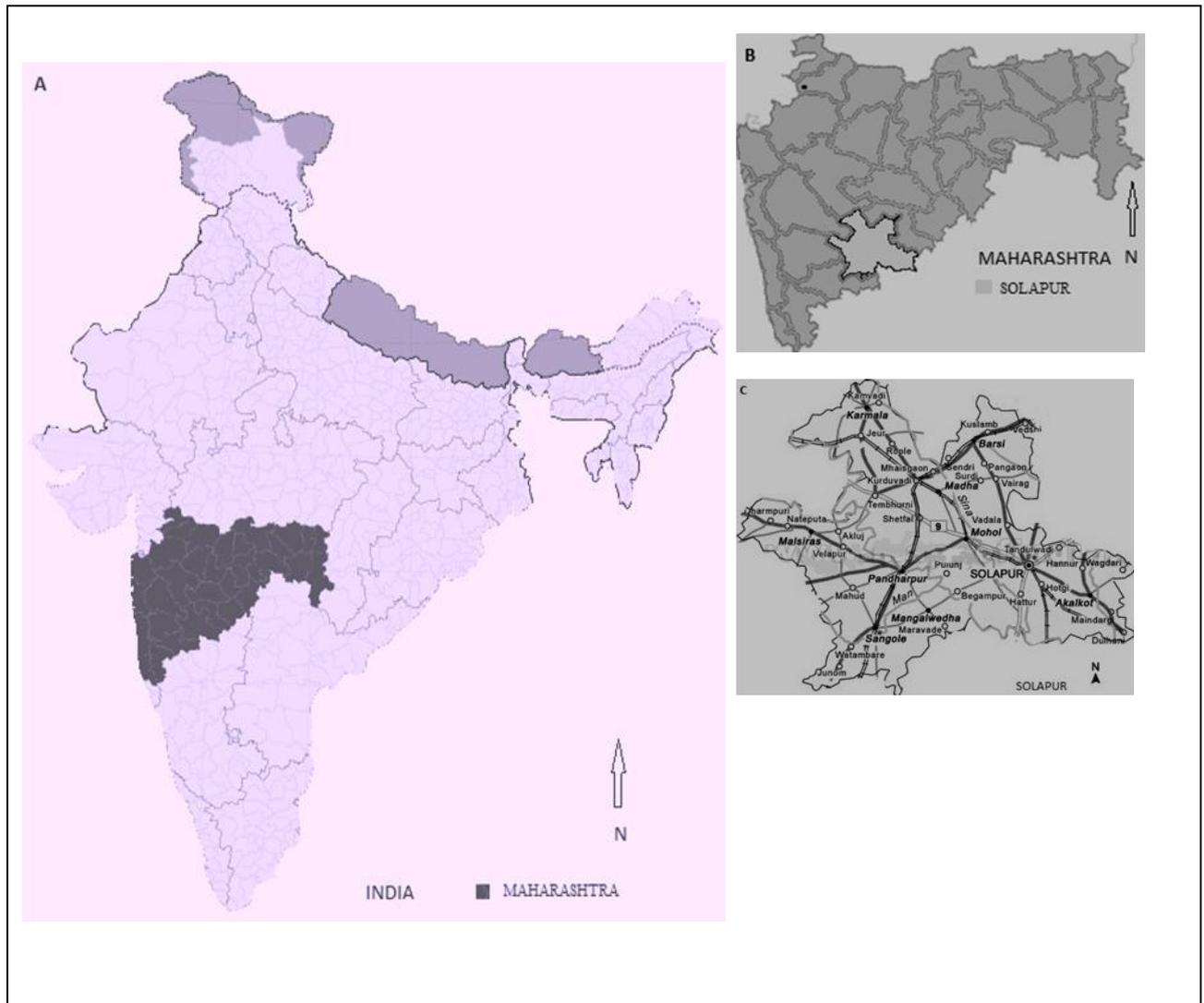


Figure-1. A- Map of India

B-Map of Maharashtra

C- Map of Solapur District, the geographical area of Filariasis infection in the framework of this study.

RESULTS AND DISCUSSION

The survey of Elephantiasis studied in Solapur District; Maharashtra State, India was showed in Table 1 for males. In Table 2 showed the Elephantiasis patient's information according to their sex- female from Solapur District, Maharashtra State, India. Elephantiasis is more prevalent in males than the females. The blood smear of the collected infected blood showed the filarial worms in figure 2 and 3. The filarial infection infected to right leg, left leg, and both legs in male and female patients were shown in figure 4. The Prevalence percentage of the infection is 89% in Male (422) as and 11% (50) in female (figure 2 and 3). Lymphatic filariasis is a painful and profoundly disfiguring disease caused by *Wuchereria Bancroft* (Ottesen, 1980). It is the second most important cause of permanent disability.⁽²⁾ *Wuchereria bancrofti* achieve this longevity despite a vigorous host immune responses and their apparent inability to undergo antigenic variation implying a sustained resistance to or subversion of host immunity.

Figure 2. Prevalence percentage of Elephantiasis in male and the female.

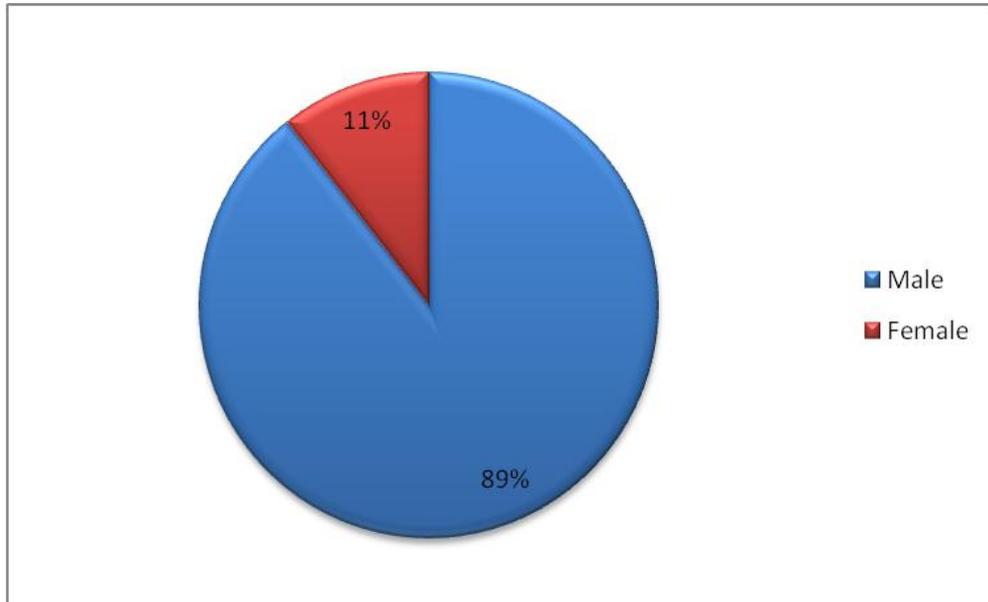
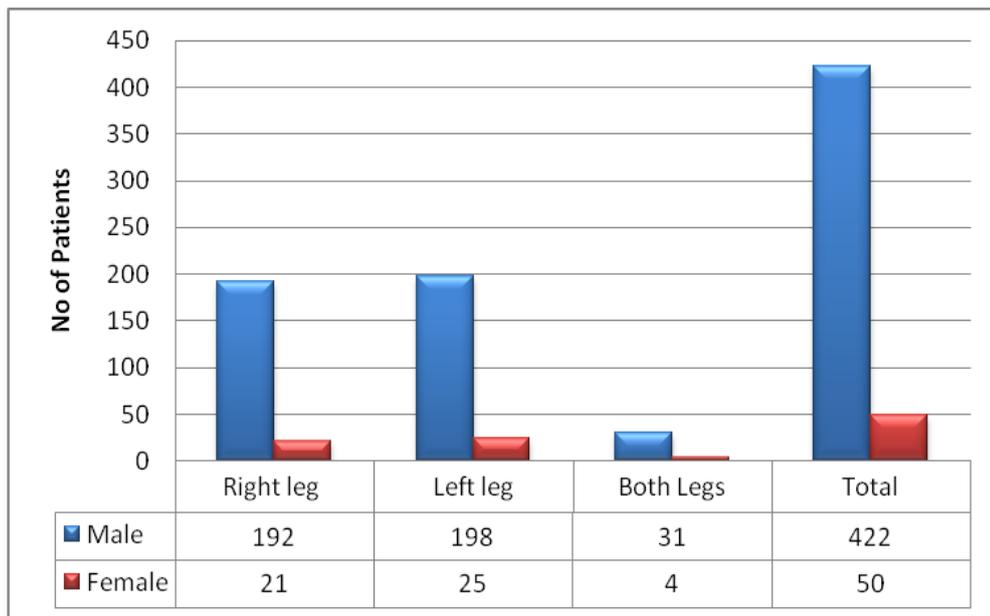


Figure 3. Prevalence percentage of Elephantiasis infection with Legs of male and female.



CONCLUSION

The work helps to reduce and eliminate transmission of LF by Mass Drug Administration. To reduce and prevent morbidity in affected persons, and to strengthen the existing health care services.

To prevent lymphatic filariasis is to avoid mosquito bites. The mosquitoes that carry the microscopic worms usually bite between the hours of dusk and dawn. If you live in an area with lymphatic filariasis then sleep under a mosquito net at night, use mosquito repellent on exposed skin between dusk and dawn and wear long sleeves and trousers.

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